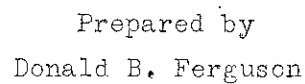


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CANNING FACTORY



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COSTS AND RETURNS IN GROWING AND HARVESTING CANNING FACTORY PEAS

Donald B. Ferguson*

Canned vegetables lend themselves well to shipment to our Allies and to the Armed Forces all over the world. The importance of canning crops as a source of food was recognized early in World War II and steps were made to increase production of those crops. So that growers and administrators of the food program might better know the cost of producing these crops, the Department of Agricultural Economics of the New York State College of Agriculture made a survey in the summer of 1942 of growers of the four major canning crops--snap beans, tomatoes, sweet corn and peas. The survey covered the costs and returns of the 1941 crops.

This report on peas for canning is one of four made on the survey and is based on a farm-to-farm survey of 59 growers in Livingston County and 51 growers in Orleans County, New York.

Canning Factory Peas in New York and the United States

Peas are one of the most important vegetable crops grown for canning in New York State. A larger acreage is normally devoted to peas for canning than to any other canning crop in the state. From 1936 to 1940 the New York acreage of peas grown for canning averaged about 35,400 acres (table 1). In 1941, a total of 41,200 acres of peas were grown for canning in New York. This was an increase of about 16 per cent over the five-year average, and a further increase in acreage of about 12 per cent was made in 1942. The United States acreage of peas for canning during the years 1936 to 1940 averaged 307,560 acres and in 1941 totaled 361,390 acres.

TABLE 1. ACREAGE, YIELD, PRODUCTION, AND FARM PRICE OF CANNING FACTORY PEAS
IN NEW YORK AND THE UNITED STATES, 1936-1940, 1941, and 1942

Year	Acres	Yield Pounds	Production Tons	Farm Price Dollars
- New York -				
1936-40 Av.	35,400	1,346	23,784	55.54
1941	41,200	1,410	29,050	51.80
1942	46,000	2,080	47,840	71.00
- United States -				
1936-40 Av.	307,560	1,633	252,710	50.49
1941	361,390	1,913	345,620	48.67
1942	438,070	1,949	426,980	63.93

* This study was started by C. A. Becker, now Lt. (j.g.) USNR, who made up the field blanks and directed the field work with the collaboration of the writer.

The average yield of peas in New York is less than in most other important pea-growing areas of the country. The 1936-1940 average yield in New York was about 1,350 pounds per acre as compared with the average yield in the United States of about 1,630 pounds per acre. In 1941 the average yield of peas in New York was slightly above the five-year average of 1,410 pounds per acre. The average yield in the United States in 1941 was well over the five-year average being about 1,900 pounds.

Prices of peas for canning in New York average higher than do those for the country as a whole. For the five years, 1936-1940, the average price for peas in New York was \$55.54 per ton as compared with \$50.49 per ton paid growers as an average over the United States. In 1941 prices in New York averaged \$51.80 as compared with an average of \$48.67 for the United States. Prices for peas were supported at a higher level for the crops of 1942 and 1943 by the United States Department of Agriculture to encourage a continued high rate of production at a time when costs had risen.

Rates for Power and Machinery

Flat rates were used in calculating the cost of power and machinery for growing peas on the farms surveyed (tables 2 and 3). Horse work was charged at the rate of \$0.19 per hour. This was the average cost per hour of horse work on New York cost account farms for 1940. The average costs of operating tractors of the various sizes on New York cost account farms for the years 1938 to 1940 were used. These costs averaged \$0.43 per hour for one-plow tractors, \$0.48 per hour for two-plow tractors, and \$0.64 per hour for three-plow tractors.

TABLE 2. RATES CHARGED FOR POWER

Item	Size	Rate Used
Horse work (per hour)		\$ 0.19
Tractor work (per hour)	1 plow	.43
	2 plow	.48
	3 plow	.64
Truck use (per mile)	1 ton or smaller	.045
	1½ ton or larger	.063
Automobile (per mile)		.04

The 1938-1940 average cost of operating trucks on New York cost account farms was charged for the use of trucks on these farms. This amounted to \$0.045 per mile for trucks one ton or smaller in size, and to \$0.063 per mile for 1½ ton or larger trucks. A rate of \$0.04 per mile was charged for automobile use.

Charges for the use of machinery were based upon information obtained by Professor J. P. Hertel in a survey of the costs of operating farm machinery on 438 farms in Chenango and Ontario Counties (table 3).

TABLE 3. COST OF OPERATING FARM MACHINERY*

Implement	Rate per Acre	Implement	Rate per Acre
Walking plow	\$ 0.33	Limo sower	\$ 0.23
Tractor plow, one bottom	.85	Roller	.04
Tractor plow, two bottom	.49	Horse-drawn cultipacker	.07
Horse-drawn disk	.13	Tractor-drawn cultipacker	.06
Tractor-drawn disk	.11	Cultivator, 1 horse	.08
Harrow, spring tooth	.05	Cultivator, 2 horse	.17
Harrow, spike tooth	.04	Cultivator, tractor	.36
Grain drill	.26	Mower, horse	.27
Manure spreader - \$0.10 per ton			

* Hertel, J. P., Cost of Operating Equipment on New York Farms, 1936, A. E. 209

Labor Rates

The average cost of labor used in growing and harvesting peas was 37 cents per hour in Livingston County and 39 cents per hour in Orleans County (table 4). Labor hired especially for peas was charged at the rate actually paid by each grower. The cost of the other labor or the regular farm labor and the value of labor of the operator and his family was calculated for each farm and charged at that rate. This calculation included the cash wages and also the cash value of room, board, and privileges.

Labor for both growing and harvesting peas, unlike the other canning crops, was provided almost entirely by the regular farm labor force. The harvesting of peas does not create a large seasonal peak demand for labor on most farms as does the harvesting of tomatoes and snap beans.

TABLE 4. HOURS AND COST OF LABOR FOR GROWING AND HARVESTING PEAS, LIVINGSTON AND ORLEANS COUNTIES, 1941

	Hours Labor per Acre	Average Rate per Hour
Livingston County		
Growing	7	\$ 0.39
Harvesting	8	.36
Total	15	\$ 0.37
Orleans County		
Growing	8	\$ 0.39
Harvesting	11	.38
Total	19	\$ 0.39

AVERAGE COSTS AND RETURNS

Description of Farms

The fifty-nine growers from whom records were obtained in Livingston County grew an average of 9.9 acres of peas per farm in 1941 (table 5). The range in acreage was from two to fifty acres per farm. Eight of the 59 records were obtained on peas grown on the Genesee River valley flats. These eight growers gave information on an average of $25\frac{1}{2}$ acres of peas per farm. The 51 upland growers had an average of 7.4 acres per farm. The 51 growers from whom records were obtained in Orleans County had an average of 7 acres of peas per farm in 1941. The range of acreages in Orleans County was from 1.5 acres to 25 acres per farm.

TABLE 5. FACTORS IN GROWING PEAS FOR THE CANNING FACTORY
LIVINGSTON AND ORLEANS COUNTIES, 1941

	59 Farms Livingston County	51 Farms Orleans County
Acres peas per farm	9.9	7.0
Average yield per acre, pounds	1220	1605
Fertilizer per acre, pounds	179	172
Manure per acre, tons	2.8	3.4
Seed per acre, bushels	4.5	4.4
Man hours per acre, growing	7	8
Man hours per acre, harvesting	8	11
Total man hours per acre	15	19
Total cost per acre	\$ 45.39	\$ 47.78
Returns per acre	33.16	43.32
Net returns per acre	\$-12.23	\$- 4.46
Average net cost per ton*	\$ 72.77	\$ 57.98
Average price per ton	52.70	52.42
Net returns per ton	\$-20.07	\$- 5.56
Returns per hour of labor	\$- 0.42	\$ 0.15

* Value of vines and silage deducted.

The average yield on the farms surveyed in Livingston County was 1,220 pounds of peas per acre. This was nearly 200 pounds less than the average yield reported for the state in 1941 and somewhat less than the 1936-1940 state average yield. There was no marked difference in yield between the peas grown on the flats and those grown on the upland areas on these farms in 1941. The Orleans County growers from whom information was obtained had an average yield of 1,605

pounds of peas per acre. This represented a yield nearly 200 pounds per acre above the state average for 1941. On the Livingston County farms 16 acres or about 3 per cent of the planted acreage of peas were unharvested because of crop failure. In Orleans County only 5.5 acres or about 1.5 per cent of the planted acreage was unharvested. The yield in Livingston County varied from a crop failure to 1.87 tons per acre. In Orleans County the yield varied from a crop failure to 1.22 tons per acre.

An average of 15 hours of man-labor were required to grow and harvest an acre of peas for canning on these Livingston County farms. The labor requirements in Orleans County averaged 19 hours per acre. Labor for growing the peas in each county represented slightly less than one-half of the total labor cost. An average of 11 hours were used in harvesting an acre of peas in Orleans County as compared with an average of 8 hours in Livingston County. The larger amount of Labor per acre in Orleans County might be accounted for partly by the fact that the acreages were smaller so that labor could be used less efficiently and also the yield was higher.

The total growing and harvesting costs per acre of peas in Livingston County averaged \$45.39 compared with an average of \$47.73 in Orleans County. The returns per acre averaged about \$33 in Livingston County and about \$43 in Orleans County. The higher returns in Orleans County were accounted for by the higher yield. The net returns per acre showed a loss of \$12.23 per acre in Livingston County and a loss of \$4.46 in Orleans County.

The average price per ton received for peas was about the same in both counties, averaging \$52.70 in Livingston County and \$52.42 in Orleans County. The average net cost per ton of growing and harvesting peas after deducting the value of vines and silage was \$72.77 in Livingston County and \$57.98 in Orleans County. This left a net loss of \$20.07 per ton of peas in Livingston County and \$5.56 per ton in Orleans County.

The returns to labor showed a loss of \$0.42 per hour in Livingston County, and a return of \$0.15 per hour in Orleans County. This means that in Livingston County the growers lost \$0.42 for each hour they spent on the enterprise in addition to their labor, and in Orleans County the growers were paid only 15 cents per hour for the amount of hours they spent on the enterprise.

Costs per Acre

Growing costs per acre averaged about \$39 in Livingston County and about \$41 in Orleans County (table 6). Harvesting costs averaged about \$6 per acre on the farms surveyed in Livingston County and nearly \$7 per acre in Orleans County.

Seed represented the most important single item of cost in growing and harvesting peas for canning. Of the total growing and harvesting cost, seed represented 40 per cent of the total in Livingston County and 37 per cent of the total in Orleans County. The decision of most growers as to whether or not to grow peas for canning probably is not determined as much by the cost of seed as its importance in the total cost would indicate, because the seed is furnished by the

canner. The seed is insured and if the returns from the peas are not sufficient to pay for the seed, the grower is not liable for its cost. This fact may influence growers to grow more peas for canning than they would if they had to bear all the risk of the seed cost.

TABLE 6. COSTS PER ACRE TO GROW AND HARVEST PEAS FOR THE CANNING FACTORY
LIVINGSTON AND ORLEANS COUNTIES, 1941

Expense	Livingston County		Orleans County	
	Cost per Acre	Per Cent	Cost per Acre	Per Cent
<u>Growing Costs:</u>				
Labor	\$ 2.69	5.9	\$ 3.20	6.7
Horse work	1.22	2.7	1.73	3.6
Tractor work	1.95	4.3	1.66	3.5
Equipment	1.33	2.9	1.33	2.8
Seed	18.30	40.3	17.70	37.0
Fertilizer	2.39	5.3	2.75	5.8
Manure	5.37	11.8	7.14	14.9
Land	5.38	11.9	5.09	10.7
Other, including interest	.69	1.5	.39	.8
Total growing cost	\$ 39.32	86.6	\$ 40.99	85.8
<u>Harvesting Costs:</u>				
Labor	\$ 3.01	6.6	\$ 4.14	8.7
Horse work	.53	1.2	.81	1.7
Tractor work	.34	.8	.07	.1
Trucking and other	2.19	4.8	1.77	3.7
Total harvesting cost	\$ 6.07	13.4	\$ 6.79	14.2
Total Growing and Harvesting Cost	\$ 45.39	100.0	\$ 47.78	100.0

Labor represented the second most important item of cost in growing and harvesting the peas in both counties, being about 12.5 per cent of the total in Livingston County and about 15.4 per cent in Orleans County. Labor requirements for growing peas for canning are the lowest of any of the four canning crops studied, and most of the work on peas can be done at a time that does not compete seriously with other crops, except harvesting which sometimes competes with alfalfa harvest.

The cost of manure represented about 12 per cent of the total in Livingston County and about 15 per cent of the total cost in Orleans County. This was followed by land costs which represented about 12 per cent in Livingston County and 11 per cent in Orleans County. The cost of commercial fertilizer applied represented slightly over 5 per cent of the cost in Livingston County and about 6 per cent in Orleans County.

The total cost of the commercial fertilizer applied before the peas were planted was charged them in this study. Since peas are on the ground a relatively short time, they probably do not obtain the full benefit of the commercial fertilizer. Thus if a second crop follows peas in the same year, there would be some justification in charging part of the commercial fertilizer cost to the second crop rather than all to peas. Very little difference in the total cost of growing peas would have resulted if this had been done in this study. Also where the peas were followed by a second crop or by a seeding there might be justification for charging part of the land costs to the second crop. However, in this study, peas were charged with the full land costs for one year. Further discussion of the use of land following the pea crop is found later in the report.

The Amount and Cost per Acre of Materials and Power

An average of 2.8 tons of manure was charged to peas in Livingston County as compared with 3.4 tons per acre in Orleans County (table 7). The manure was valued at \$1.90 per ton in Livingston County and \$2.08 in Orleans County. This value per ton included the value of the manure at the barn as estimated by the growers and also the cost of applying it. In determining the charge for manure, 40 per cent of that applied to the pea land in 1941, 30 per cent of that applied in 1940, 20 per cent of that applied in 1939, and 10 per cent of that applied in 1938 was used.

The Livingston County growers used an average of 179 pounds of commercial fertilizer per acre as compared with an average of 172 pounds per acre used by the Orleans growers. The fertilizer applied by the Livingston County growers averaged \$26.75 per ton, and that used by the Orleans growers averaged \$31.89 per ton.

TABLE 7. AMOUNTS PER ACRE AND COST OF MATERIALS AND POWER
IN GROWING AND HARVESTING PEAS FOR CANNING,
LIVINGSTON AND ORLEANS COUNTIES, 1941

	59 Farms Livingston County	51 Farms Orleans County
Amount per Acre		
Manure (tons)	2.8	3.4
Fertilizer (pounds)	179	172
Seed (bushels)	4.5	4.4
Horse work (hours)	9.2	13.4
Tractor work (hours)	4.5	3.6
Cost per Unit		
Manure (per ton)	\$ 1.90	\$ 2.08
Fertilizer (per ton)	26.75	31.89
Seed (per bushel)	4.06	4.01
Horse work (per hour)	.19	.19
Tractor work (per hour)	.51	.48

An average of 4.5 bushels of seed were used per acre in Livingston County and an average of 4.4 bushels in Orleans County. The seed cost in both Counties averaged slightly over \$4 per bushel. Cannors usually furnish growers 4 bushels for each acre contracted. Growers, however, commonly use this amount of seed on a smaller acreage than that contracted. This accounts for the average seed application of more than 4 bushels per acre.

An average of 9.2 horse hours and 4.5 tractor hours were used in growing and harvesting an acre of peas in Livingston County as compared with an average of 13.4 horse hours and 3.6 tractor hours used in Orleans County. The total cost of horse and tractor work was about the same in both counties, averaging somewhat over \$3 per acre.

Kinds of Fertilizer Used

Twenty-two of the 59 Livingston growers and fifteen of the 51 Orleans growers applied no commercial fertilizer before planting canning factory peas (table 8). Superphosphate was used by more of the growers than fertilizer of any other analysis. Ten of the Livingston County growers used a fertilizer with a 3-12-6 analysis but none of that analysis was used in Orleans County. Eight of the Orleans County growers used a 2-8-10 fertilizer which accounted for about 23 per cent of the total amount used in that county. Seven of the Orleans growers used nitrate and six used a 4-12-4 fertilizer.

TABLE 8. KINDS OF FERTILIZER USED FOR CANNING FACTORY PEAS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Fertilizer Analysis	Livingston County			Orleans County		
	Number of Farms	Pounds	Cost	Number of Farms	Pounds	Cost
Superphosphate	23	49,450	\$ 517	10	14,250	\$ 160
3 - 12 - 6	10	35,217	563	--		
2 - 8 - 10	--	--	--	8	14,250	237
4 - 12 - 4	--	--	--	6	13,814	226
Nitrate	--	--	--	7	9,400	133
Other	4	19,450	313	6	9,850	175
None	22	--	--	15	--	--
Total	59	104,117	\$1,393	51	61,564	\$ 981

Variation in Cost per Ton

The average cost to grow and harvest a ton of peas for canning in Livingston County was \$74.46 and in Orleans County \$59.54 (figure 1). There was a wide range in costs between individual farms and few growers produced their peas at

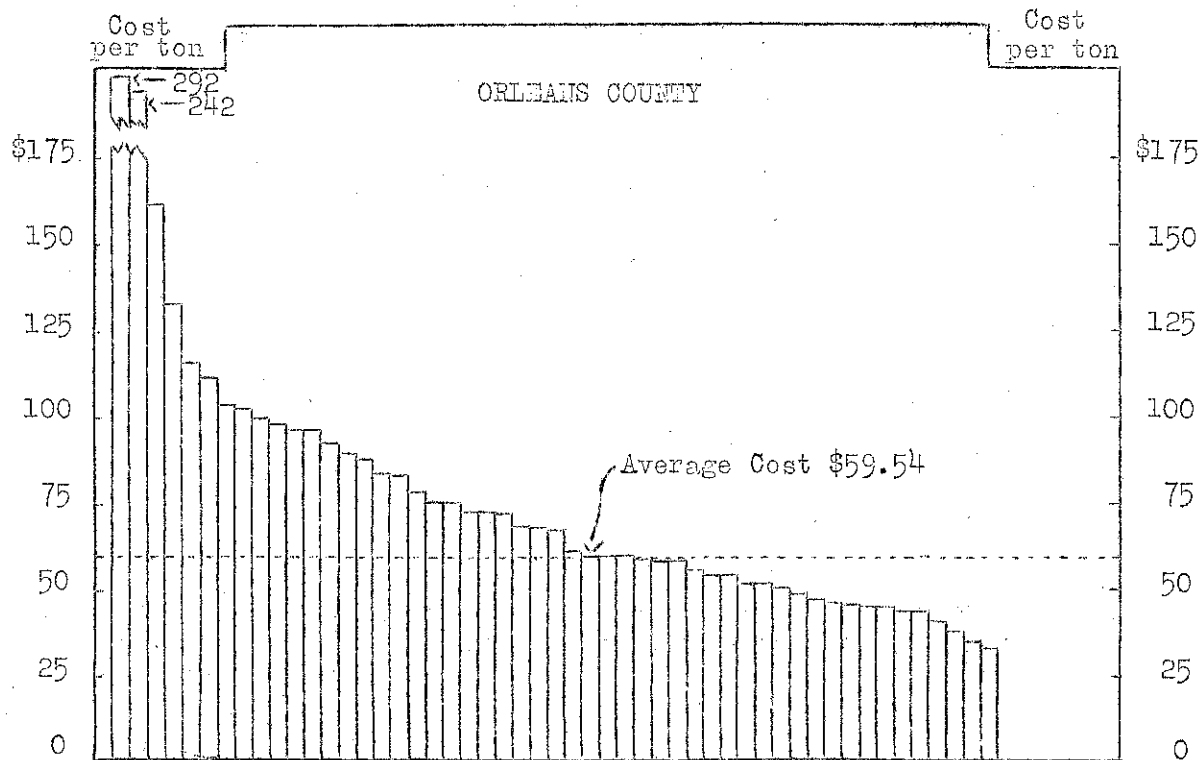
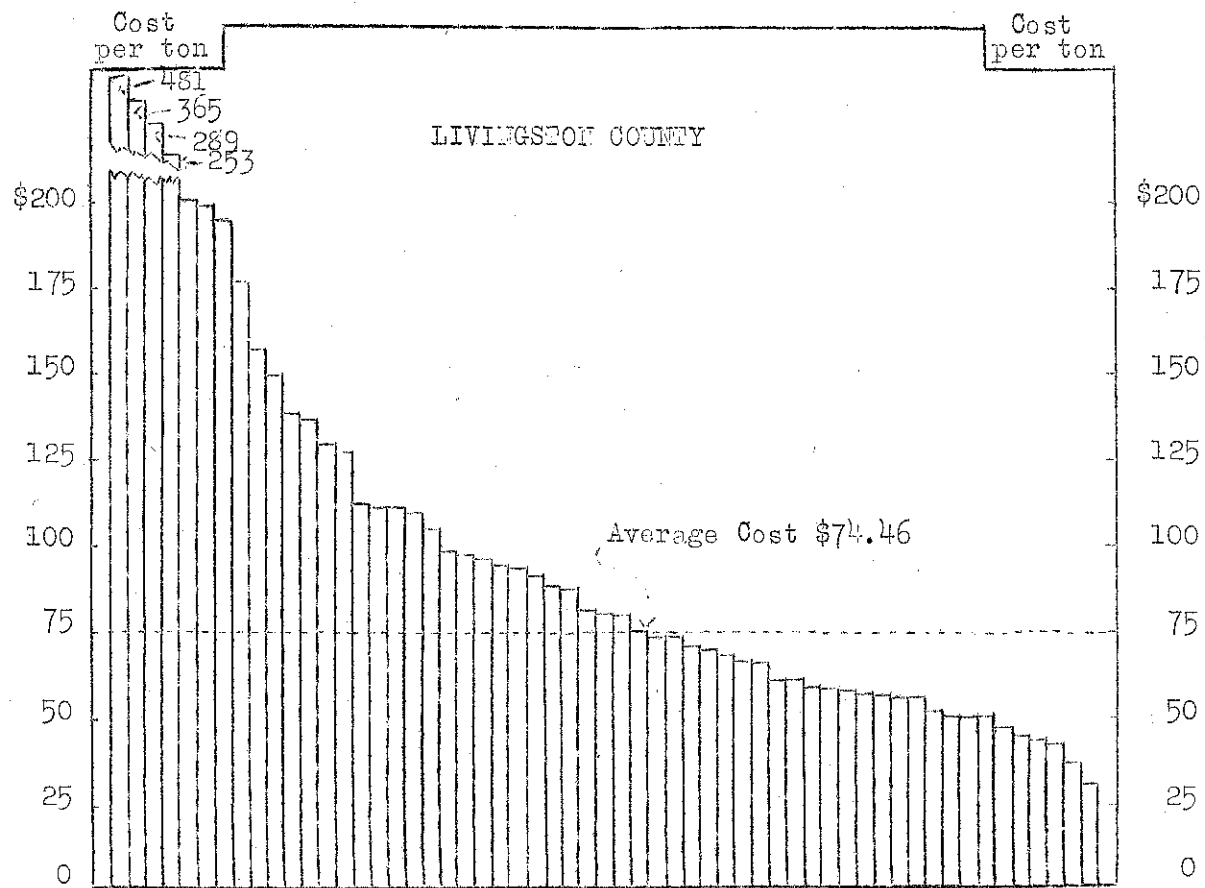


FIGURE I. COST TO GROW AND HARVEST A TON OF PEAS FOR THE CANNING FACTORY
59 LIVINGSTON AND 51 ORLEANS COUNTY FARMS, 1941

The height of each bar represents the cost on one farm.

near the average cost in either of the counties. The variation between farms was wider in Livingston County than in Orleans and ranged from about \$29 per ton to more than \$481 per ton on one farm where the yield was extremely low. In Orleans County the range was from about \$32 to more than \$292 per ton. In nearly all instances in both counties, the extremely high costs per ton were caused by low yields or near crop failures on some farms. Of the Livingston growers, 26 produced their peas at costs below the average and 33 had costs above the average. In Orleans County 24 of the growers had costs below the average for that county, and 27 had costs above the average. The cost to grow and harvest a ton of peas was closely associated with the yield per acre. The cost to grow and harvest an acre of peas varied much less between farms than did the yield per acre. Thus, the cost per ton tended to be lower where the yield was high than where it was low. In Livingston County, the four farms having the lowest yield per acre had the highest cost per ton. A similar relationship between the yield per acre and the cost per ton was found in Orleans County.

About 28 per cent of the peas grown in Livingston County were grown at a cost of less than \$50 per ton, compared with 46 per cent of those grown in Orleans County (table 9). About one-fifth of the peas in Livingston County and somewhat more than one-fourth of those in Orleans County were grown at a cost of from \$50 to \$60 per ton. In Livingston County 15 per cent of the peas were grown at a cost of \$100 or more per ton as compared with 5 per cent in Orleans County.

TABLE 9. PRODUCTION OF CANNING FACTORY PEAS AT DIFFERENT COSTS,
LIVINGSTON AND ORLEANS COUNTIES, 1941

Cost per Ton to Grow and Harvest	Livingston County			Orleans County		
	Number of Farms	Yield per Acre Tons	Per Cent of Production	Number of Farms	Yield per Acre Tons	Per Cent of Production
Less than \$50	9	1.03	28.4	13	1.03	46.1
\$50 to \$59	8	.91	20.6	11	.83	27.6
\$60 to \$79	12	.62	21.7	10	.65	9.6
\$80 to \$99	9	.48	13.9	9	.59	11.7
\$100 to \$199	5	.43	7.3	4	.60	3.3
\$120 or more	16	.25	8.1	4	.26	1.7
Total	59	.61	100.0	51	.80	100.0

Variation in Labor Returns

The returns per hour of labor spent on the enterprise is the amount per hour by which total returns exceeded all costs other than labor costs. The returns per hour of labor varied greatly between farms similarly as did the cost per ton. The average returns per hour of labor for peas on the Livingston County farms was a loss of 42 cents; but the returns to individual growers varied from a loss of \$4.44 per hour to a return of \$2.05 per hour (figure 2). In Orleans County the average returns per hour were \$3.15 and the range was from a loss of \$2.30 per hour to a return of \$1.61 per hour.

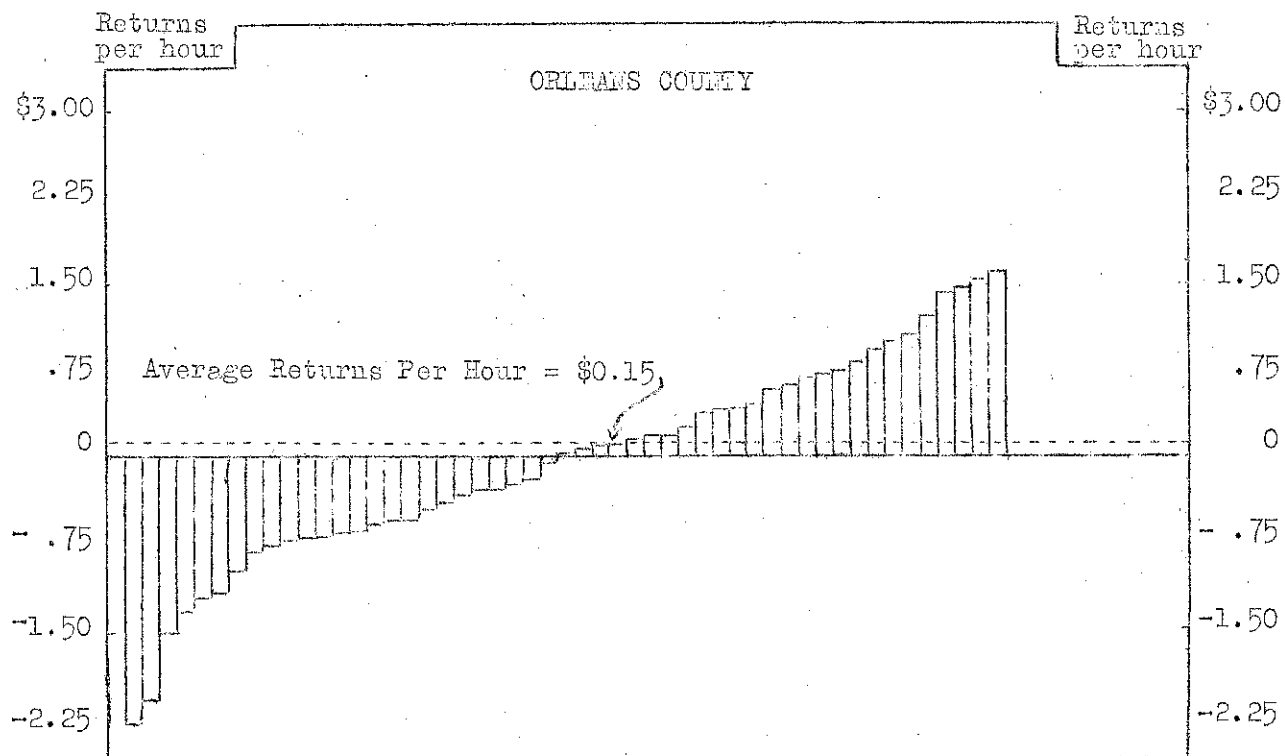
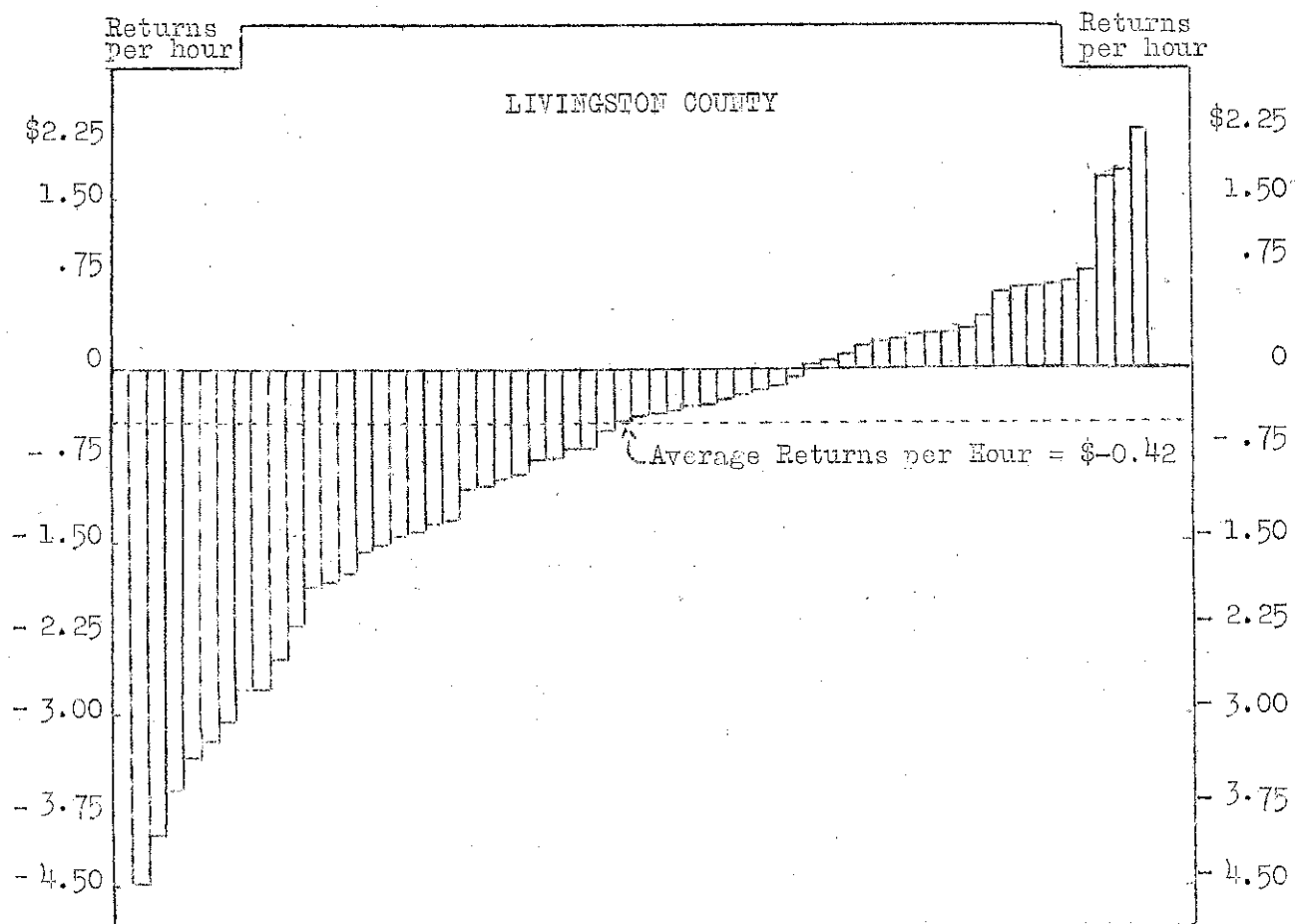


FIGURE 2. RETURNS PER HOUR OF LABOR OF PEAS FOR CANNING
59 LIVINGSTON AND 51 ORLEANS COUNTY FARMS, 1941

The length of each bar represents the returns on one farm.

A total of 39 of the Livingston County growers and twenty-five of the Orleans County growers failed to get any returns for the time spent on the enterprise after allowing for all the costs other than labor such as for use of land, fertilizer, seed, machinery and farm power costs. Ten of the Orleans County growers and five Livingston growers obtained some returns for the time spent on the enterprise but not enough to cover all the labor costs involved. In Orleans County, sixteen of the growers made a gain after allowing for all expenses and in Livingston County 15 growers made a gain. Seven of the Orleans growers and three of the Livingston growers had a return of more than a dollar per hour spent on the enterprise.

On a crop like canning peas where a relatively small amount of labor is required per acre and where the returns per acre vary widely depending mostly upon the yield, the returns per hour of labor tend to vary greatly. In each county, growers who had the lowest returns per hour of labor had the highest growing cost per ton. And likewise, those who had the highest returns per hour of labor had the lowest growing cost per ton. The yield of peas probably is the most important factor in determining the returns per hour of labor, because the growing cost per acre and the returns per ton of peas vary much less than does the yield per acre. The growers of the higher yields usually receive the highest returns per hour of labor spent on the enterprise.

Relation of Yield to Costs

The yield per acre is an important factor affecting the cost per ton of growing peas for canning. Although the total cost of growing and harvesting an acre of peas tends to increase with the higher yields, the increase is relatively small compared with the increase in the yield, so the cost of growing and the total cost per ton tend to decrease with the increase in yield.

Growing costs are made up largely of the costs which tend to vary only slightly, regardless of the yield. In Livingston County the growing cost per acre increased from an average of \$37 for those growers having a yield of less than .45 tons per acre to \$43 for those having yields of .75 tons or more per acre (table 10). The increase in growing costs per acre between the group having the low yields and the group having the high yields was the same in Orleans County. The 23 growers in Livingston County that had the low yields produced their peas at an average cost of \$132 per ton compared with an average cost of \$52 per ton for the eighteen growers with the highest yields per acre. In Orleans County the cost per ton for the group with the lowest yield averaged \$92 as compared with \$49 for the group with the highest yield.

Relation of Yield of Peas to Labor Requirements

The information obtained showed no relationship between the yield and the number of hours required to grow an acre of peas. Growers with the high yields used no more labor than did those who obtained low yields (table 11). The total man hours required to grow and harvest an acre tended to increase slightly as the

TABLE 10. RELATION OF YIELD OF PEAS PER ACRE TO COSTS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Range	Yield of Peas Per Acre, Tons	Number of Farms	Acres Per Farm	Cost Per Acre		Total Cost Per Ton
	Average			Growing	Total	
Livingston County						
Less than .45	.31	23	9.4	\$ 37	\$ 42	\$ 132
.45 to .74	.56	13	9.2	38	44	79
.75 or more	.97	18	11.1	43	50	52
Orleans County						
Less than .60	.46	16	6.7	\$ 37	\$ 42	\$ 92
.60 to .89	.78	17	5.6	42	48	62
.90 or more	1.05	18	8.6	43	51	49

yield increased. The heavier tonnage of peas required somewhat more labor to harvest than did the light tonnage.

A ton of peas was harvested with somewhat less labor where the yield was high than where it was low. It takes about as long to cut an acre of peas where the yield is low as where it is high. Thus the growing labor and part of the harvesting labor varies little regardless of the yield. And so where the yield was high, the labor was divided between more tons, resulting in lower labor requirements per ton than where the yield was low. An average of 18 hours of labor were spent growing and harvesting a ton of peas on the Livingston farms with yields over .75 ton as compared with an average of 37 hours where the yield was less than .45 ton per acre. A similar relationship was found in Orleans County.

TABLE 11. RELATION OF YIELD OF PEAS PER ACRE TO LABOR REQUIREMENTS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Range	Yield of Peas Per Acre, Tons Average	Man Hours Per Acre		Man Hours Per Ton	
		Growing	Total	Harvesting	Total
Livingston County					
Less than .45	.31	6	12	17	37
.45 to .74	.56	8	18	18	32
.75 or more	.97	7	17	11	18
Orleans County					
Less than .60	.46	8	17	19	36
.60 to .89	.78	8	19	13	24
.90 or more	1.05	8	21	12	20

Relation of Yield of Peas to Returns

The growers with the highest yield of peas had the highest returns per acre and also the highest returns per hour of labor spent on the enterprise. Since the growing costs per acre increased only slightly as the yield increased, the net returns per acre increased with the yield. In Livingston County, the growers with an average yield of less than .45 tons per acre had an average loss per acre of \$24 as compared with a net return per acre of \$2 for those growers with an average yield of at least .75 tons per acre. In Orleans County the net returns per acre varied from an average loss of \$17 for those growers with a yield of less than .60 tons per acre to \$5 for those with .90 tons or more per acre (table 12).

In Livingston County, growers with an average yield of less than .45 tons per acre had a loss of \$1.70 per hour spent on the enterprise as compared with a gain of \$0.48 per hour of labor spent on the enterprise by those who had a yield of .75 tons or greater. In Orleans County the returns per hour of labor varied from an average of a loss of \$0.63 for those who had a yield of less than .60 tons per acre to \$0.65 for those who had an average yield of .90 tons or more.

TABLE 12. RELATION OF YIELD OF PEAS PER ACRE TO RETURNS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Yield of Peas Per Acre, Tons		Growing and Harvesting Cost	Returns Per Acre	Net Returns Per Acre	Returns Per Hour of Labor
Range	Average	Per Acre			
Livingston County					
Less than .45	.31	\$ 42	\$ 18	\$ -24	\$ -1.70
.45 to .74	.56	\$ 44	31	-14	-.42
.75 or more	.97	\$ 50	52	2	.48
Orleans County					
Less than .60	.46	\$ 42	25	\$ -17	\$ -0.63
.60 to .89	.78	48	42	- 6	.04
.90 or more	1.05	51	57	5	.65

Relation of Acres of Peas Per Farm to Costs

The acreage of peas grown per farm surveyed in Livingston County varied from 2 to 50 acres. On the Orleans County farms the range was from 1.5 acres to 25 acres per farm. There was no apparent relationship between the acreage of peas grown per farm and the yield per acre.

In both counties the growing cost per acre tended to be somewhat higher on the farms having the small acreages of peas than on the farms having the larger acreages. The growers with the larger acreages apparently were able to make more efficient use of labor, machinery and equipment than were the growers with the

small acreages. The differences, however, were not large. The total costs per ton were much more closely related to the yield per acre than to the acres of peas per farm. In Livingston County the farms having less than five acres of peas grew them at an average cost of \$79 per ton, while those with five acres or more of peas grew them at an average cost of \$74 per ton (table 13). In Orleans County, growers with less than five acres of peas had an average cost of \$77 per ton as compared with an average cost of \$53 per ton for those with eight or more acres per farm. At least half of this difference in cost per ton in Orleans County was accounted for by the difference in yield.

In 1941 there was little difference in yield of peas between those grown on the flats in Livingston County and those grown on the upland areas. In general, the growers on the flats had larger acreages per farm than did those on the upland areas.

TABLE 13. RELATION OF ACRES OF PEAS PER FARM TO COSTS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Range	Acres of Peas per Farm	Number of Farms	Yield per Acre Tons	Costs per Acre		Total Cost per Ton
	Average			Growing	Total	
Livingston County						
Less than 5	3.3	22	.62	\$ 42	\$ 49	\$ 79
5 to 9	6.7	18	.62	40	46	74
10 or more	20.5	19	.60	39	45	74
Orleans County						
Less than 5	3.1	17	.72	\$ 47	\$ 55	\$ 77
5 to 7	5.8	19	.69	40	46	67
8 or more	12.9	15	.89	40	47	53

Relation of Acres of Peas to Labor Requirements

Growers with larger acreages of peas were able to make more efficient use of their labor in growing and harvesting them than were those with the small acreages. In Livingston County the growers with less than five acres of peas used an average of 18 hours of labor per acre to grow and harvest them as compared with an average of fourteen hours used by those with ten acres or more (table 14). In Orleans County growers with less than five acres used an average of 24 hours of labor and those with eight or more acres used an average of 18 hours of labor.

A ton of peas was harvested with less labor on farms with large fields of peas than on those with small fields. In Orleans County, part of the decrease from eighteen hours per ton spent on farms with less than five acres to twelve hours per ton spent on farms with eight acres or more is accounted for by the higher yield on the farms with the larger acreages. Orleans growers with less than five acres of peas used an average of 33 hours of labor per ton of peas as compared with 20 hours per ton used by growers with eight acres or more of peas per farm.

TABLE 14. RELATION OF ACRES OF PEAS PER FARM TO LABOR REQUIREMENTS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Acres of Peas per Farm		<u>Man Hours per Acre</u>		<u>Man Hours per Ton</u>	
Range	Average	Growing	Total	Harvesting	Total
Livingston County					
Less than 5	3.3	8	18	15	29
5 to 9	6.7	8	17	15	28
10 or more	20.5	6	14	13	24
Orleans County					
Less than 5	3.1	11	24	18	33
5 to 7	5.8	9	19	14	27
8 or more	12.9	7	18	12	20

Relation of Acres of Peas to Returns

In Livingston County there was little difference between the returns on the farms with the small acreages of peas and on those with the large acreages. The growing cost was somewhat higher on the farms with the small acreages, but on all three groups the net returns per acre showed a loss. The returns per hour of labor varied from an average loss of \$0.37 per hour on those farms with from 5 to 10 acres of peas to an average loss of \$0.49 an hour for those with less than five acres of peas. (table 15).

In Orleans County the growers with the larger acreages showed a higher net return and return per hour of labor than did those with the small acreages. Part of this difference was due to a greater efficiency of operation on the large acreages and part was due to higher yields on the farms with the larger acreages.

TABLE 15. RELATION OF ACRES OF PEAS PER FARM TO RETURNS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Range	Acres of Peas per Farm	Average	Growing and Harvesting Cost per Acre	Returns per Acre	Net Returns per Acre	Returns per Hour of Labor
Livingston County						
Less than 5		3.3	\$ 49	34	\$ -15	\$ -0.49
5 to 9		6.7	46	33	-13	- .37
10 or more		20.5	45	33	-12	- .43
Orleans County						
Less than 5		3.1	\$ 55	\$ 39	\$ -16	\$ -0.33
5 to 7		5.8	46	38	- 8	- .05
8 or more		12.9	47	48	+ 1	+ .45

The total costs per acre were \$8 less on the farms with eight or more acres than on the farms with less than 5 acres and the returns per acre were \$9 per acre greater because of the larger yield. This made a total difference of \$17 an acre in the net returns between the two groups of farms. Those with less than five acres had an average loss per hour of labor of \$0.33 as compared with a return per hour of \$0.45 for those with 8 acres or more of peas.

Relation Between Date of Planting and Yield of Peas

In general it has been recommended that peas should be drilled as early as the soil can be worked properly. The pea is a cool season plant and is injured by warm weather. This was evident in the lower yield of peas planted late in both Livingston and Orleans County. In both counties the fields planted latest had the lowest average yield and the fields planted during the middle of the planting season had the highest average yield per acre (table 16). The yields obtained by those growers who planted earliest, however, averaged only 100 to 200 pounds less than did those who planted somewhat later. Seasons vary greatly and many factors affect the yield of peas. If records were available over a period of years on these farms, perhaps the group who planted the earliest would have the highest average yields.

TABLE 16. RELATION BETWEEN DATE OF PLANTING AND YIELD OF PEAS
59 LIVINGSTON AND 51 ORLEANS COUNTY FARMS, 1941

Date of Planting	Number of Fields	Acres	Yield per Acre, Pounds
Livingston County			
April 15 - April 24	20	181	1,234
April 25 - May 4	34	221	1,410
May 5 - May 28	24	181	972
Orleans County			
April 15 - April 24	30	150	1,625
April 25 - April 29	30	134	1,728
April 30 - May 28	26	72	1,381

Yield of Peas Per Acre by Variety

The grower has little choice of variety, because the canner supplies the seed. The three varieties: Surprise, Perfection, and Alaska predominated in the Livingston County Area. Of these three varieties, Surprise and Alaska are considered as early varieties and Perfection as a late variety. Of the three, Surprise yielded the highest with an average yield of 1,500 pounds per acre (table 17). Perfection was second with 1,282 pounds per acre, and Alaska yielded an average of 1,214 pounds per acre.

TABLE 17.
YIELD OF PEAS PER ACRE BY VARIETIES
LIVINGSTON AND ORLEANS COUNTIES, 1941

Variety	Livingston County		Orleans County	
	Acres	Yield per Acre, pounds	Acres	Yield per Acre pounds
Climax	---	---	143.25	1,737
Surprise	75	1,500	173.25	1,476
Perfection	169	1,282	*	*
Alaska	222.5	1,214	---	---
Other Varieties	116.25	957	41.	1,690
Total	582.75	1,220	357.5	1,605

* Included in "Other Varieties"

Two varieties of peas predominated in the Orleans County area. Surprise was planted as an earlier variety and Climax as a mid-season or later variety. The Surprise variety yielded an average of nearly 1,500 pounds or about the same as in Livingston County, but Climax out-yielded Surprise in 1941 with an average of 1,737 pounds per acre.

Many of the growers had two varieties of peas. This diversification tends to spread the labor at harvest time and also gives a small amount of insurance, since some years the earlier variety may yield best and other years, as in Orleans County in 1941, the later variety may give the best yield.

Method of Applying Fertilizer and Pea Yields

In general it has been recommended that fertilizer for peas be drilled as deeply as possible before planting the seed. If the fertilizer is drilled in contact with the seed, there is danger of injuring the stand. In both Livingston and Orleans Counties, growers who drilled fertilizer in a separate operation from drilling the peas obtained higher yields than when both fertilizer and peas were drilled together. In both counties, those who applied no fertilizer obtained higher yields than did those who drilled fertilizer with the peas.

In Livingston County, growers who drilled fertilizer in a separate operation obtained an average yield of about 1,600 pounds of peas, as compared with an average yield of 966 pounds obtained by those who drilled fertilizer with the peas, and 1,065 pounds by those who applied no fertilizer (table 18). In Orleans County, growers who drilled fertilizer separately obtained an average of about 500 pounds more peas per acre than did those who drilled fertilizer with the peas. Those who applied no fertilizer obtained an average of about 200 pounds more peas than did those who drilled the fertilizer with the peas.

TABLE 18. METHOD OF APPLYING FERTILIZER AND PEA YIELDS,
59 LIVINGSTON AND 51 ORLEANS COUNTY FARMS, 1941

Method of Applying Fertilizer	Livingston County			Orleans County		
	Number of Farms	Value Fertilizer per Acre	Pounds Peas per Acre	Number of Farms	Value Fertilizer per Acre	Pounds Peas per Acre
Drilled separately	19	\$ 3.81	1,604	20	\$ 4.19	1,776
Drilled with peas	18	3.72	966	8	3.32	1,270
Sown by hand	--	----	---	8	3.76	1,663
No fertilizer	22	----	1,065	15	----	1,478
All farms	59	\$ 2.39	1,220	51	\$ 2.75	1,605

Use of Land Following the Harvest of Peas

Peas for canning occupy the land a relatively short part of the growing season and often permit the growing of a second crop following their harvest. Many growers also find that the peas act as an excellent nurse crop for clover and alfalfa. Some growers feel that they can get a better seeding of alfalfa with peas than with any other nurse crop. These are all factors in favor of growing peas which some growers consider in addition to the returns from peas. Some growers feel that where a second crop follows peas the land and fertilizer costs should not all be charged to the peas.

In Livingston County nearly 43 per cent of the acreage in peas was seeded to alfalfa, and about 15 per cent was seeded to sweet clover (table 19). Of the 87 acres seeded to sweet clover, 80 were plowed under the following spring as a green manure crop. A total of 25 per cent of the acreage in peas was planted to a second crop in 1941 which was harvested that year. Buckwheat, silage corn, beets for canning, snap beans for canning, and sweet corn for canning made up most of the acreage of these second crops. Only about one per cent of the land in peas was followed by a crop of wheat sown in the fall in Livingston County and no other crop followed peas that year on about one-sixth of the acreage.

TABLE 19 USE OF LAND FOLLOWING THE HARVEST OF PEAS
LIVINGSTON AND ORLEANS COUNTIES, 1941

Crop Following Peas, 1941	Livingston County		Orleans County	
	Acres	Per cent	Acres	Per cent
Alfalfa seeding	249	42.7	25	7.0
Sweet clover seeding	87	14.9	--	---
Buckwheat	48.8	8.3	30.5	8.5
Silage corn	29	5.0	14	3.9
Canning beets, beans, corn	50	8.6	--	---
Wheat	5	.9	126	35.2
Other crops	18	3.1	17.5	4.9
None	96	16.5	144.5	40.5
Total	582.8	100.0	357.5	100.0

The use of land following peas was considerably different in Orleans County and in general was less intensive. No crop followed peas the same year on more than 40 per cent of the acreage in Orleans County in 1941. Thirty-five per cent of the acreage in peas was sown to wheat in the fall in Orleans County. Only 7 per cent of the acreage was seeded to alfalfa. Buckwheat followed peas on about 8.5 per cent of the acreage and silage corn on about four per cent.

S U M M A R Y

This report gives the results of a farm-to-farm survey of the costs and returns from producing peas for canning on 59 Livingston and 51 Orleans County farms in 1941.

The cost of growing and harvesting peas on these farms in 1941 averaged \$74.46 per ton in Livingston County and \$59.54 in Orleans County. Yields on these farms averaged 1,220 pounds per acre in Livingston County and 1,605 pounds per acre in Orleans County. The price per ton averaged \$52.70 in Livingston and \$52.42 in Orleans County for peas grown on these farms in 1941. In addition, the value of vines and silage averaged \$1.69 per ton of peas in Livingston and \$1.56 per ton in Orleans County. Seed represented about 40 per cent of the cost of production. An average of 15 hours of labor was used in Livingston County and 19 hours in Orleans County to grow and harvest an acre of peas.

The results indicate that:

1. Yield per acre is the most important factor affecting costs per ton and net returns. Higher than average yields result in lower than average costs per ton and higher than average returns.
2. Larger than average acreages of peas per farm permitted more efficient use of labor and equipment. Growing costs per acre and per ton were lower on farms with the larger than average acreages.
3. Peas drilled early in the season or in the mid-planting season yielded better than those drilled late.
4. The method of applying commercial fertilizer appeared to be more important than the amount applied. Growers who drilled fertilizer in a separate operation from drilling the peas obtained higher yields than did those who drilled the fertilizer and peas in one operation. Growers who applied no fertilizer obtained higher average yields than did those who drilled the peas and fertilizer in one operation.