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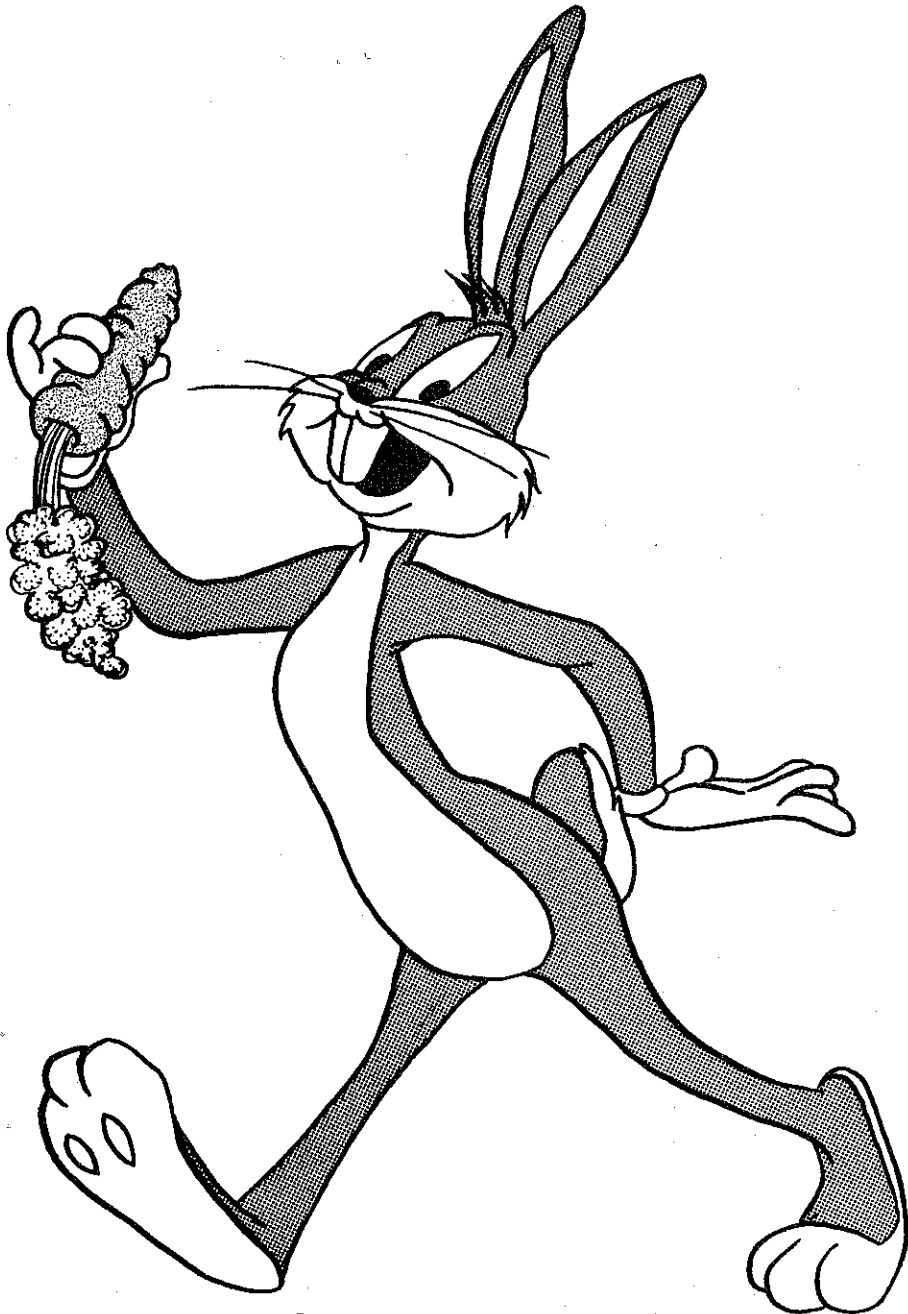
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August, 1961

A. E. Res. 71

# CARROTS



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COSTS  
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AND  
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RETURNS  
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IN  
|  
PRODUCING  
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FOR  
|  
PROCESSING  
|  
1960

D. G. WILLIAMS

Department of Agricultural Economics  
Cornell University Agricultural Experiment Station  
New York State College of Agriculture  
A Unit of the State University of New York  
Cornell University, Ithaca, New York

# WARNER BROS.

PICTURES, INC.

WEST COAST STUDIOS  
BURBANK, CALIFORNIA

WEST COAST  
LEGAL DEPARTMENT

April 28, 1961

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Department of Agricultural Economics  
New York State College of Agriculture  
353 Warren Hall  
Cornell University  
Ithaca, New York

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By *H. E. Holman*  
Assistant Treasurer

### FALL CARROTS FOR PROCESSING

California led in production of carrots, growing 45 per cent of the nation's crop in 1959. New York State was third, producing 6 per cent of the crop (table 1). When only early fall carrots, for both processing and fresh market, are considered, New York State was the leader, followed by Oregon, Wisconsin and Texas.

Table 1. MAJOR AREAS OF CARROT PRODUCTION

State	Production		Per cent
	1949-57	1959	Total production 1959
	1,000 cwt.		Per cent
California	6,147	6,237	45
Texas	3,088	2,435	18
New York	1,108	783	6
Oregon	389	616	5
Wisconsin	600	544	4
Arizona	985	532	4
Washington	361	520	4
Michigan	659	460	3
Eight other states	1,854	1,498	11
TOTAL	15,191	13,625	100

Source: Crop Reporting Service USDA, Vegetables - Fresh Market, Annual Summary, 1959

#### Trends

Although the acreage of carrots in New York remained fairly constant from 1955 to 1959, the average for this period was about 1,000 acres below that of the preceding 5 years. Yield per acre changed little during the period 1955 to 1959 and averaged about 15 tons. This was slightly more than the preceding 5 year average and was above the national average. The price fluctuation from year to year has been large. Generally New York prices have been above the average of the major competing states (table 2).

Table 2.

FALL CARROT PRODUCTION  
United States and New York State

Year	Area		Yield per acre		Price per cwt.	
	Early fall group*	New York	Early fall group*	New York	Early fall group*	New York
	<u>acres</u>		<u>cwt.</u>		<u>dollars</u>	
1949-54	18,910	4,200	242	283	1.87	1.65
1955	15,680	3,000	241	290	2.10	2.50
1956	18,140	3,300	254	320	1.64	1.68
1957	19,040	3,000	227	300	2.06	2.01
1958	21,090	3,000	234	320	1.55	1.95
1959	16,700	2,900	254	270	1.84	2.14

Source: Crop Reporting Board, USDA, Vegetables-Fresh Market, Annual Summaries

\*Group - Early Fall Carrots - includes the following states:

Oregon, Washington, Idaho, Utah, New Mexico, Illinois, Minnesota,  
Wisconsin, Michigan, Pennsylvania, New York, Massachusetts, Texas.

#### Relative Importance of Carrots in New York

Carrots were grown on 2,900 acres in New York State in 1959. This amounted to less than 1.5 per cent of all land in vegetables for sale in the State in 1959. The income from carrots was 5 per cent of the returns for all vegetables grown. The counties leading in both fresh and processing carrot production were Wayne, Ontario, Monroe, Genessee, and Orange in that order.

#### The Study

This study was undertaken to obtain information on costs and returns in carrot production and to determine the growing, harvesting and marketing factors affecting the costs and returns.

From lists supplied by processors and county agricultural agents a random sample of growers was selected. During November 1960 data were collected on the business organization and the costs and returns in carrot production for the 1960 year. Twenty-five complete records on the enterprise were obtained in Western New York (figure 1). Eleven records were from upland and fourteen muckland farms.

For analysis the carrot enterprises studied were divided into two groups according to kind of soil, muckland or upland (mineral soils). The size of muck carrot enterprises ranged from 4.5 to 45.0 acres and averaged 16 acres per farm. The upland enterprises ranged from 5.0 to 37.0 acres and averaged 20 acres of carrots.

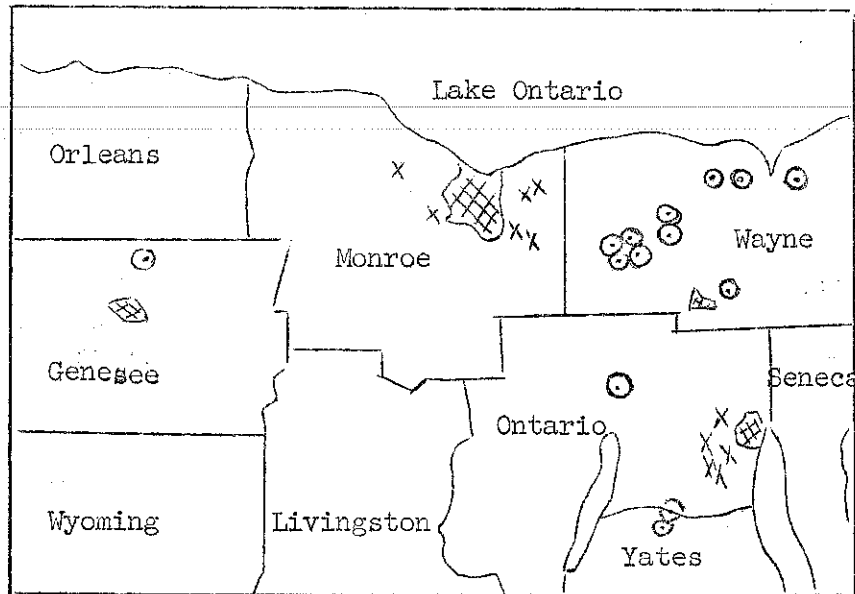


Figure 1.

LOCATION OF CARROT GROWERS  
25 Farms, Western New York, 1960

X Upland farms      O Muck farms

DESCRIPTION OF FARMS STUDIED

Table 3. CHARACTERISTICS OF UPLAND FARMS  
11 Farms, Western New York, 1960

Item	Average acres all farms	Farms reporting	
		Number	Acres per farm
Total crop acres	137	11	137
Woods	8	7	12
Farmstead & waste	18	9	22
Total land used	163		
Major crops:			
Carrots	20	11	20
Cabbage	5	4	14
Beets	18	5	40
Red kidney beans	20	3	75
Small grain	20	8	27
Hay	20	5	43

Upland Enterprises

The upland enterprises were located on farms which ranged in size from 5 to 366 tillable acres. These farms were located near Rochester or Geneva. Of the average of 163 acres operated, 38 acres were rented. With one exception vegetable crops were a major source of income for the farmers. Two operators reported doing some work off the farm. Dairy cattle was the predominant livestock enterprise. Two growers also reported small poultry flocks (table 3).

Table 4. CHARACTERISTICS OF MUCKLAND FARMS  
14 Farms, Western New York, 1960

Item	Average acres all farms	Farms reporting	
		Number	Acres per farm
Total crop acres	83	14	83
Woods	6	5	16
Farmstead & waste	37	11	48
Total	126		
Land double cropped	(11)	8	20
Total land used	137		
Major crops:			
Carrots	16	14	16
Spinach	13	9	20
Potatoes	5	7	10
Snapbeans	5	2	38
Celery	10	2	68
Small grain	11	4	14
Hay	9	4	32

Muckland Enterprises

The muck farms were generally smaller than the upland farms (table 4). There was an average of 83 tillable acres, 10 of which were rented. One farm had only 10 tillable acres and another had 352 tillable acres.

The growing of vegetables was the major source of income on these farms with only 3 operators reporting livestock enterprises. Seven growers worked off their farms from 12 to 150 days. Many of these growers considered carrots a major source of income

PRACTICES AND INPUTS USED IN GROWING

Labor

Growing an acre of carrots requires about 40 hours of labor on the upland and 33 hours on the muck (table 5). The upland growers performed an average of 21 separate operations including four fittings, four cultivations, three sprays and two hand weedings. The muck growers averaged 20 operations by using one less hand weeding. Fittings ranged from 2 to 7 times and spray applications from 2 to 6 times. Replanting was done by one upland grower and 6 muck growers. An average of 5 acres was replanted by each.

Variations from farm to farm in the labor required to grow an acre of carrots were large. The range was 18 to 70 hours on the upland and 8 to 56 hours on the muck farms. On the upland farms 36 and muck farms 43 per cent of the growers used less than 30 hours of labor to grow an acre. For the upland farms 36 and for the muck farms 14 per cent of the growers used more than 50 hours labor. Tractor use per acre was less variable from farm to farm than might be expected; both groups averaged 7 hours per acre (table 5). Three upland and 10 muck growers used garden tractors on their carrot enterprises.



Table 5. PHYSICAL INPUTS TO GROW AN ACRE OF CARROTS FOR PROCESSING  
25 Farms, Western New York, 1960

Item	Upland farms	Muck farms	Your farm
Number of farms	11	14	_____
Average acres of carrots	20	16	_____
Average yield per acre (tons)	19	20	_____
Tons sold per acre	19	20	_____
Labor (hours)			
Operator	9	18	_____
Family	1	3	_____
Other	30	12	_____
Total	40	33	_____
Tractor hours	7	7	_____
Truck miles	7	3	_____
Manure (tons)	1	-	_____
Fertilizer (lbs.)			
Nitrogen	123	111	_____
Phosphorus	156	182	_____
Potassium	189	171	_____
Seed used (lbs.)	1.2	1.8	_____

### Seeding

The present recommended rate of seeding is 2 to 4 pounds per acre. Only 6 growers followed these recommendations; the range of actual use was 0.8 to 3.5 pounds per acre, with an average of 1.2 pounds for the upland enterprises and 1.8 pounds for the muck enterprises. Many growers reported that their seed was supplied by the processor. The varieties most commonly used were Nantes, Chantenay Red Cored and Royal Chantenay. Row width ranged from 13 to 24 inches on the upland enterprises, averaging 19 inches; the muck enterprises ranged from 12 to 22 inches, averaging 16 inches. Planting started as early as April 20 and ran until June 28; 10 growers planted in May and 12 growers in June.

### Fertilizer

The 1960 recommended rate of fertilizer for muck soils for carrots was 1200 pounds of 5-10-15 or equivalent per acre, for upland sandy soil 600 to 900 pounds 8-16-16 and for loam soils 500 to 700 pounds 10-20-10. The general practice was to use more than this amount of fertilizer, depending on the farmer's past experience and estimate of the existing level of fertility of his soil.

## Cultivation and Spraying

Only 3 upland growers cultivated more than the group average of 4 times, with one grower reporting 7 cultivations. These growers hand weeded twice; however, one grower reported hand weeding 4 times.

The muck growers as a group averaged 4 cultivations with one grower indicating he cultivated 8 times. These growers, as a group only, hand weeded once, but one grower hand weeded 4 times.

Spraying was done, on the average, 3 times by each group.

## COSTS IN GROWING

The average cost of growing carrots on upland farms was \$172. On muck farms it was \$210. The difference was \$38 or about 20 per cent. Although higher labor requirements on upland farms, as previously noted, resulted in higher labor cost on those farms, this was more than offset by higher costs elsewhere, especially the land costs, in the production of muck carrots (table 6).

Table 6. COSTS TO GROW AN ACRE OF CARROTS FOR PROCESSING  
25 Farms, Western New York, 1960

Item	Upland farms	Muck farms	Your farm
Number of farms	11	14	_____
Average acres of carrots	20	16	_____
Average yield per acre (tons)	19	20	_____
Tons sold per acre	19	20	_____
<b>Growing cost:</b>			
Labor	\$ 52	\$ 47	_____
Power	10	11	_____
Weed spray	21	26	_____
Insect spray	2	6	_____
Fertilizer and lime	42	45	_____
Manure	5	1	_____
Seed	2	3	_____
Land	20	42	_____
Special equipment	4	7	_____
General equipment	5	5	_____
Overhead	7	8	_____
Interest	1	1	_____
Other	1	8	_____
<b>TOTAL GROWING COST</b>	<b>\$172</b>	<b>\$210</b>	

Most growers spent between \$150 and \$210 per acre to grow carrots. Three growers, all muck farmers, spent more than \$240 per acre (table 7). The upland growers generally had a lower level of costs than the muck farmers.

Table 7. DISTRIBUTION OF GROWING COST PER ACRE  
25 Farms, Western New York, 1960

Growing cost	Number of farms	
	Upland	Muck
\$120 - 150	3	-
151 - 180	2	3
181 - 210	5	4
211 - 240	1	4
241 or more	-	3

Labor was the greatest single cost. This was followed by fertilizer and lime, land and spray material costs. These four items were approximately three quarters of the total cost of growing carrots (figure 2 and figure 3).

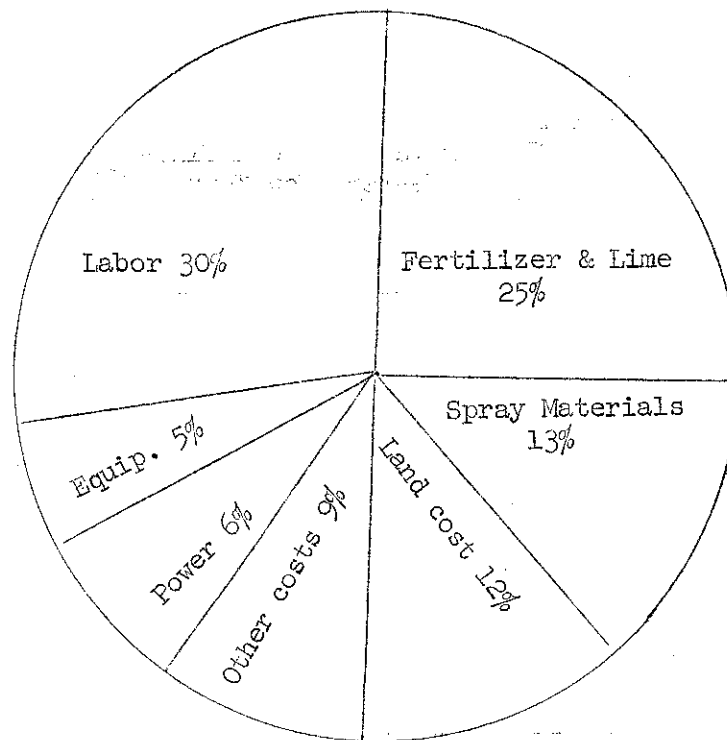


Figure 2. PERCENTAGE DISTRIBUTION OF AVERAGE COSTS TO GROW AN ACRE OF UPLAND CARROTS  
11 Upland Farms, Western New York, 1960

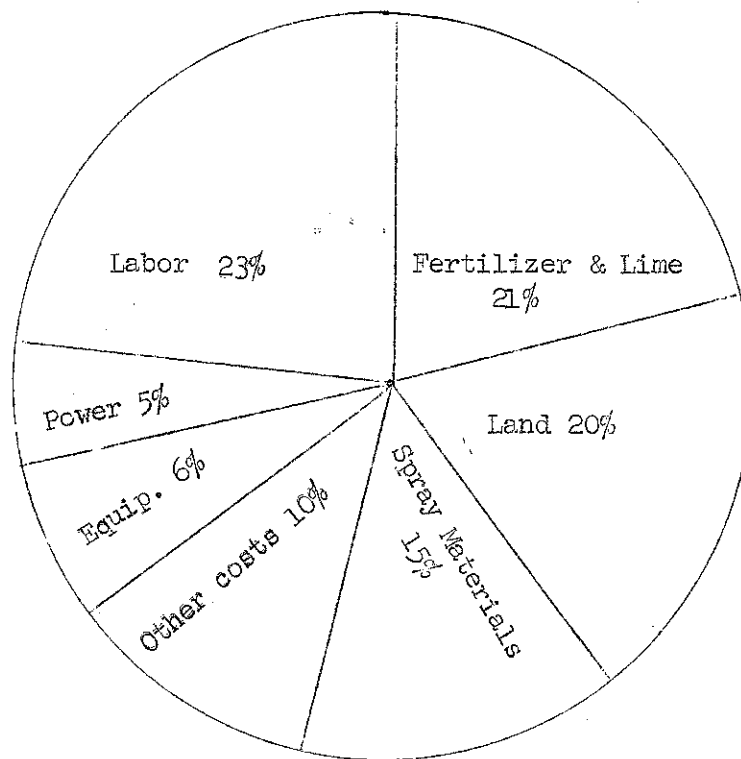


Figure 3. PERCENTAGE DISTRIBUTION OF AVERAGE COSTS TO GROW AN ACRE OF MUCK CARROTS  
14 Muck Farms, Western New York, 1960

#### PRACTICES AND INPUTS USED IN HARVESTING

##### Labor

In harvesting very slightly less labor was spent per acre of carrots on the muck as compared with the upland farms. The averages were 47 and 49 hours respectively (table 8). The tractor hour requirements were about the same for each group of farms with about 5 hours per acre.

Table 8. PHYSICAL INPUTS TO HARVEST AN ACRE  
OF CARROTS FOR PROCESSING\*  
25 Farms, Western New York, 1960

Item	Upland farms	Muck farms	Your farm
Number of farms	11	14	
Average acres of carrots	20	16	
Average yield per acre (tons)	19	20	
Tons sold per acre	19	20	
<hr/>			
Labor (hours)			
Operator	9	18	
Family	3	8	---
Other	37	21	---
Total	<u>49</u>	<u>47</u>	---
Tractor hours	5	6	---
Truck miles	51	89	---

\*Includes store and sell labor

There were several different methods used in harvesting carrots. Some growers used a plow and hand labor to dig, top, sort and grade the crop. Others used a completely mechanical harvester which performed these operations and transferred the carrots to pallet boxes. There were all degrees of mechanization between these extremes. Most of the growers included in the study used more than one method because of varying soil and weather conditions.

#### COST IN HARVESTING

The cost per acre for harvesting carrots was \$122 for upland and \$125 for muck growers (table 9). The largest single charge was for labor. This was followed by the cost of special harvesting equipment. With three exceptions, all the harvesting was completely done by the grower. In those cases where custom harvesting was hired the grower supplied some of his own labor and that of his regular hired help and paid \$2.50 per ton for the custom work.

Table 9. COSTS TO HARVEST AN ACRE OF CARROTS FOR PROCESSING\*  
25 Farms, Western New York, 1960

Item	Upland farms	Muck farms	Your farm
Number of farms	11	14	
Average acres of carrots	20	16	
Average yield per acre (tons)	19	20	
Tons sold per acre	19	20	
<b>Harvesting cost:</b>			
Labor	\$ 71	\$ 64	_____
Tractor	7	9	_____
Truck	9	17	_____
Custom work	8	14	_____
Special equipment	22	19	_____
Other	5	2	_____
<b>TOTAL HARVESTING COST</b>	<b>\$122</b>	<b>\$125</b>	_____

\*Includes store and sell costs

Because of the somewhat higher yields on the muck farms the cost per ton tended to be less than on the upland farms. The harvesting cost per ton ranged from \$2 to \$13 for muck farms and \$4 to \$12 for upland. Ten of the muck and six upland growers kept their harvesting costs below \$7 (table 10). One muck grower, however, had a per-ton harvest cost of \$13.

Table 10.

DISTRIBUTION OF HARVESTING COST PER TON  
25 Farms, Western New York, 1960

Cost per ton	Number of farms	
	Upland	Muck
\$ 2 - 4.99	2	5
5 - 6.99	4	5
7 - 9.99	3	1
10 or more	2	3

RETURNS AND PROFITS

The upland farms had lower average yields than did the muck farms. Eight upland growers reported from 10 to 18 tons per acre; only three had 19 or more tons per acre. Seven muck growers had a yield of 19 or more tons per acre (table 11).

Table 11.

DISTRIBUTION OF YIELD PER ACRE  
25 Farms, Western New York, 1960

Tons per acre	Number of farms	
	Upland	Muck
10 - 15	2	3
16 - 18	6	4
19 - 22	1	1
23 - 25	1	2
26 or more	1	4

The average return per acre of muck carrots were \$465. The return was slightly less, \$439 per acre, on the upland (table 12). This was mostly the result of difference in average yield. Both groups received an average price of \$23 per ton for their carrots.

Table 12.

COST AND RETURN IN PRODUCING AN  
ACRE OF CARROTS FOR PROCESSING  
25 Farms, Western New York, 1960

Item	Upland farms	Muck farms	Your farm
Number of farms	11	14	
Average acres of carrots	20	16	
Average yield per acre (tons)	19	20	
Tons sold per acre	19	20	
Growing cost	\$172	\$210	
Harvesting cost	122	125	
Total production cost	\$294	\$335	
Return	439	465	
PROFIT	\$145	\$130	

In spite of the lower yields, the lower total production cost (primarily lower growing cost) on the upland farms allowed those farmers to have a profit of \$145 per acre as compared with \$130 for the muck farms (table 12).

### Distribution of Profit

Profit per acre varied greatly with both groups. Although the average was highest on the upland farms, the range was \$26 to \$370 per acre. Six upland farms had profits of \$151 or more (table 13).

The muck enterprises net returns varied from - \$108 to \$499, with 7 muck enterprises having profits of \$151 or more.

Table 13. DISTRIBUTION OF PROFIT PER ACRE OF CARROTS  
25 Farms, Western New York, 1960

Profit per acre	Number of farms	
	Upland	Muck
\$ 0 or less	-	2
1 - 50	3	1
51 - 100	1	4
101 - 150	1	-
151 - 200	3	4
201 or more	3	3

### FACTORS AFFECTING COSTS, RETURNS AND PROFITS

#### Yield

There appears to be a strong relationship between yield and profit. While higher yields generally cost more, the returns more than offset the added cost. The return per dollar of cost was greater with higher yields on both the upland and muck farms (table 14).

Table 14. AVERAGE YIELD PER ACRE AS RELATED TO COSTS AND PROFITS  
25 Farms, Western New York, 1960

	Upland farms		Muck farms	
	Low yield	High yield	Low yield	High yield
Number of farms	6	5	7	7
Average acres of carrots per farm	20	20	19	14
Range of yield, tons per acre	14-17	18-28	13-18	20-33
Average yield, tons per acre	16	22	15	25
Growing cost per acre	\$166	\$180	\$212	\$208
Harvesting cost per acre	120	124	103	148
Production cost per acre	\$286	\$304	\$315	\$356
Returns per acre	355	540	358	572
Profit per acre	\$ 69	\$236	\$ 43	\$216
Return per dollar of cost	\$ 1.27	\$ 1.80	\$ 1.17	\$ 1.65

Break-Even Point

At the average price of \$23 per ton it took 10 tons of carrots per acre for upland farmers and 12 tons for muck farmers to break even on their carrot production. These are, of course, average relationships and vary with the efficiency of production of the growers. Figures 4 and 5 relate yield to profit and show that almost any reasonable effort to increase yield would probably increase profit.

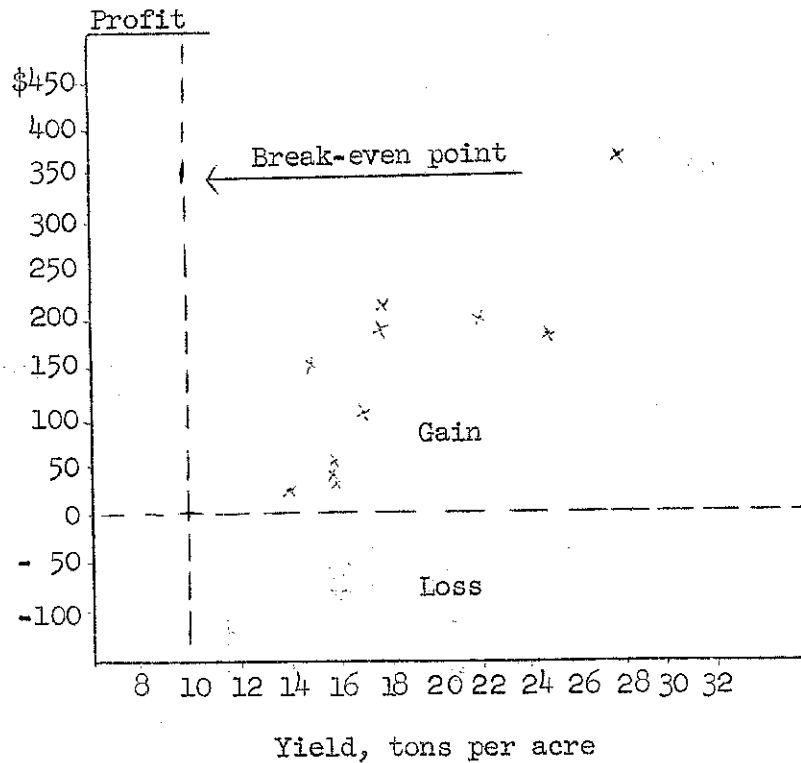


Figure 4.

RELATIONSHIP BETWEEN YIELD AND PROFIT PER ACRE  
11 Upland Farms, Western New York, 1960



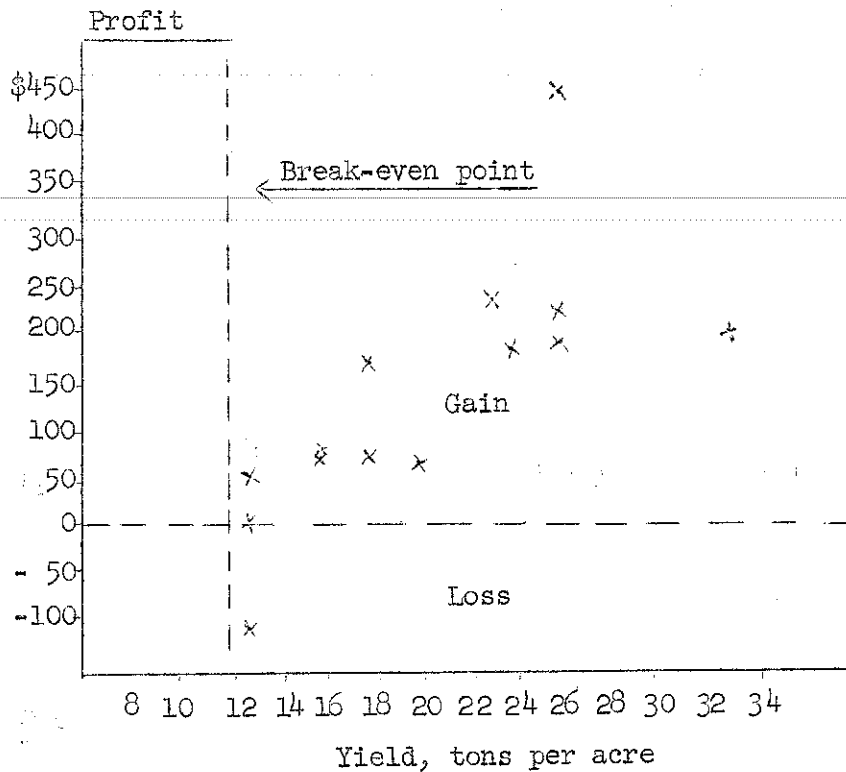


Figure 5. RELATIONSHIP BETWEEN YIELD AND PROFIT PER ACRE  
14 Muck Farms, Western New York, 1960

Fertilizer Use

As fertilizer costs increased (on both upland and muck enterprises) the total nutrients applied 1/, average yield per acre, profit and return per dollar of cost also increased (table 15).

Table 15. FERTILIZER COST PER ACRE OF CARROTS AS RELATED TO TOTAL NUTRIENTS APPLIED, YIELD AND PROFIT PER ACRE  
25 Farms, Western New York, 1960

	Upland farms		Muck farms	
	Low cost	High cost	Low cost	High cost
Number of farms	5	6	7	7
Average yield, tons	18	19	19	22
Average acres carrots	14	25	12	21
Cost of fertilizer per acre	\$ 33	\$ 49	\$ 35	\$ 56
Pounds of nutrients applied per acre	358	559	397	532
Profit per acre	\$121	\$165	\$ 64	\$196
Return per dollar of cost	\$ 1.48	\$ 1.54	\$ 1.18	\$ 1.64

1/ Nutrients: Nitrogen, phosphorus and potash

Any relationship of nitrogen alone was obscured by the other nutrient factors. There does not appear to be the same yield response to nitrogen for carrots as for table beets and some other vegetable crops.

Table 16 RANGE OF PHYSICAL FACTORS IN PRODUCING CARROTS FOR PROCESSING 1/  
25 Farms, Western New York, 1960

Total cropland acres	Total acres carrots	Yield per acre tons	Labor hours		Total hours		N	P	K	Planting date	Average distance between rows inches
			to grow an acre hours	to grow & harvest an acre hours	Pounds per acre	date					
5.0	5.0	14	18	39	50	100	100	100	5/1-6/10	13	
30.0	6.0	15	20	53	66	100	100	100	5/5-6	14	
56.0	6.5	16	21	58	96	100	150	150	5/15	16	
64.0	10.0	16	21	60	100	120	160	160	5/15	17	
77.0	10.0	16	35	79	110	120	180	180	5/30-6/22	18	
108.0	22.0	17	41	84	120	160	180	180	6/1-3	18	
139.0	26.0	18	48	87	132	180	192	192	6/1-6	18	
150.0	30.0	18	52	89	147	192	200	200	6/1-10	24	
201.0	30.0	22	57	99	170	200	200	200	6/7-13	24	
308.0	35.0	25	62	156	178	200	240	240	6/9	24	
366.0	37.0	28	70	181	185	240	375	375	6/10-12	24	
<u>UPLAND FARMS</u>											
<u>MUCK FARMS</u>											
10.0	4.5	13	8	12	75	100	88	88	4/20-5/20	12-20	
15.5	5.5	13	9	27	75	150	100	100	4/25-5/4	14	
17.0	6.2	13	24	46	88	150	150	150	4/25-5/15	14	
19.8	7.0	16	24	51	90	150	150	150	5/3	14	
26.0	7.0	16	26	61	100	150	150	150	5/4	14	
32.0	7.0	18	29	68	100	175	159	159	5/9-7/1	14	
34.0	9.0	18	30	75	100	180	171	171	5/15-6/5	14	
65.0	10.0	20	32	78	113	200	180	180	5/15-6/15	15	
67.0	16.0	23	38	85	120	200	200	200	6/1	15	
91.2	18.0	24	43	86	123	200	200	200	6/5-7/6	15	
92.0	18.0	26	44	88	125	200	200	200	6/10	15-18	
102.5	32.0	26	45	90	133	208	200	200	6/10-20	20	
235.0	40.0	26	52	96	141	240	208	208	6/12-15	22	
352.0	45.0	33	56	262	171	246	240	240	6/20-28	22	

1/ All items arrayed independently - columns are not related to each other.

Table 17.

RANGE OF DOLLAR FACTORS IN PRODUCING CARROTS FOR PROCESSING <sup>1/</sup>  
25 Farms, Western New York, 1960

Fertilizer cost per acre	Land cost per acre	Spray cost per acre	Growing cost per acre	Harvesting cost per acre	Total cost		Return per hour of labor	Returns per acre	Profit per acre	Return per dollar of cost
					dollars	dollars				
24.70	10.00	7.88	122.54	62.30	199	1.32	282	26	1.08	
26.92	10.00	17.04	136.52	66.85	224	1.46	306	33	1.09	
32.00	18.00	18.08	140.94	76.22	227	1.92	316	42	1.14	
38.85	20.00	18.91	161.03	83.23	228	1.93	347	55	1.24	
40.20	20.00	20.46	165.07	101.38	279	3.15	424	107	1.54	
41.97	20.00	21.49	188.91	114.26	290	3.37	432	153	1.55	
42.50	20.00	22.85	189.12	142.49	305	3.59	443	189	1.55	
46.35	25.00	24.25	190.92	152.72	345	3.68	450	196	1.55	
50.10	25.00	26.16	191.51	155.69	348	4.77	534	205	1.86	
53.10	25.00	26.33	192.58	159.59	375	5.64	580	219	1.98	
61.58	30.00	44.56	214.64	227.79	417	7.36	718	370	2.06	
<u>UPLAND FARMS</u>										
<u>MUCK FARMS</u>										
20.00	12.00	20.00	159.32	37.20	243	0.39	309	- 108	0.75	
32.25	25.00	20.90	177.94	80.02	260	1.45	318	0	1.00	
33.00	25.28	24.00	179.83	89.70	275	1.96	319	49	1.15	
33.37	30.00	24.00	188.95	90.05	280	2.02	341	57	1.19	
39.99	35.00	26.40	189.96	95.90	300	2.25	352	66	1.19	
41.13	38.89	27.87	197.33	97.01	302	2.26	406	66	1.24	
44.46	41.67	30.50	203.78	100.52	340	2.42	425	70	1.28	
45.86	45.00	31.05	211.22	105.22	345	3.24	461	159	1.40	
49.40	45.83	33.65	213.28	111.95	351	3.78	522	177	1.51	
50.96	48.00	35.54	223.07	128.14	352	3.89	531	185	1.52	
54.07	50.00	39.00	232.60	139.01	359	4.60	544	198	1.53	
58.12	50.00	39.88	249.94	170.42	368	5.92	568	217	1.62	
63.50	75.00	40.54	256.03	208.40	427	6.00	688	231	1.77	
69.21	75.00	55.01	258.13	300.95	490	19.28	729	449	2.60	

<sup>1/</sup> All items arranged independently - columns are not related to each other.