

COST AND USE MADE OF

COLD STORAGES

By Apple Growers in Ulster, Orange, and Niagara Counties

by

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TABLE 1: PROPORTION OF THE APPLE CROP
PLACED IN REFRIGERATED STORAGES BY GROWERS, 1943 AND 1947

Stored by Grower	Per Cent of Total Bushels Excluding Ciders			
	Hudson Valley		Western New York	
	Ulster and Orange Counties		Niagara County	
	51 Farms 1943	54 Farms 1947	74 Farms 1943	69 Farms 1947
	Per Cent	Per Cent	Per Cent	Per Cent
Not stored	24	22	36	31
Stored on farms				
Owners' apples	48	58	11	20
Others' apples	21	12	0	1
Stored in commercial storages not on farms	7	8	53	48
	100	100	100	100
Total bushels	322,143	518,415	234,089	294,678

HUDSON VALLEY

The growers interviewed in Ulster and Orange Counties sell most of their apples at the farm. Since they are less than 100 miles from New York, buyers with trucks come to their farms for apples in relatively large numbers. Most growers have found that it pays to sell to these buyers at the farm rather than deliver the apples to commission merchants in New York.

As a result, most of the apples produced on these farms are stored in cold storages located on the farms. In 1947, twenty-two of the 54 farmers interviewed had their own storage. Many of these storages have been recently built.

WESTERN NEW YORK

On the other hand, for many years, most of the apples produced in Western New York for fresh fruit consumption have been shipped to distant cities in carload lots. The storages were therefore built on railroad sidings. These storages are large, usually holding 100,000 to 200,000 bushels or more, and some of them were built more than 50 years ago.

For the crop year 1947, there were 11 such storages patronized by 49 of the 69 growers interviewed in Niagara County. The farmer often has the manager of the storage act as his salesman. Usually, no additional charge is made for this service. The storage managers often grade and pack apples for farmers.

TABLE 2: STORAGE RATES AND APPLE PRICES, 1934-48

Year	Storage Rates Per Bushel				Apple Prices	
	Per Cent of Bushels Stored At			Average	Net	Bushels
	15¢	20¢	25¢	Rate	Return	Required to
	Per Cent	Per Cent	Per Cent	Cents	Per Bushel	On 100 Bushels
					Dollars	Bushels
Western New York						
1934	5	95		\$19.8	\$0.76	26
1935	37	62		18.1	0.49	37
1936	55	45		17.3	0.88	20
1937	34	66		18.3	0.30	61
1938	51	49		17.4	0.59	30
1939	25	48	1	17.8	0.42	42
1940	82	17		15.9	0.50	32
1941	73	16	10	16.8	0.76	22
1942	4	75	2	19.5	1.05	19
1943		58	41	22.1	2.12	10
1944		61	35	21.7	1.59	14
1945*		81	8	20.6	3.89	5
1946		20	80	24.0	1.75	14
1947		18	82	24.0	1.27	19
1948		13	87	24.4		
Hudson Valley						
1943		65		20.7	2.25	9
1944		53		20.9	1.70	12
1945		50		21.2	3.48	6
1946		21	46	23.0	1.85	12
1947		3	89	24.8	1.37	18
1948			96	24.9	1.80	14

*Crop failure, only 17 bushels per acre.

Five or ten cents would usually be added to the above rates if apples were kept in storage until April or May and a like amount deducted if taken out of storage by November 1st or before the end of the harvesting season. The rate for apples stored in a gas chamber was 40 cents per box if the room was opened in February and 45 cents if opened in April.

In Niagara County, storage rates usually vary by a nickle and in Ulster and Orange Counties, by a cent. In Niagara County, from 1934 to 1940, about one-half of the apples were stored for 15 cents and the other half for 20. By 1943, the 15 cent rate was discontinued and by 1946, most of the apples were stored at a 25 cent rate.

In the Hudson Valley, from 1943 to 1945, the most common rates were 20 and 22 cents per box. By 1947, practically all growers paid 25 cents.

During the war and post-war years, storage rates did not increase as rapidly as apple prices. Before 1942, about 30 bushels of apples were required to pay the cost of storing 100 bushels. Since 1942, it has taken less than half as many apples to pay this storage cost.

The price given in Table 2 is the "net return" to the grower for his apples. Any expense that the grower had for package, storage, commission or freight has been deducted from the price he received in calculating "net return."

TABLE 3: FARM STORAGES AND BUSHELS OF APPLES PRODUCED, 1943-1948*

Apple Crop Bushels Per Farm Excluding Ciders	Number of Farms With Indicated Apple Crop With or Without a Cold Storage			
	Hudson Valley 73 Farms in Ulster and Orange Counties		Western New York 105 Farms in Niagara County	
	Cold Storage	No Storage	Cold Storage	No Storage
None	0	0	0	18
1 to 999	0	5	0	26
1,000 to 1,999	1	5	0	15
2,000 to 3,999	0	9	0	19
4,000 to 7,999	5	19	1	14
8,000 to 15,999	11	6	0	10
16,000 to 31,999	7	2	1	0
32,000 to 46,342	3	0	1	0
Total number of farms	27	46	3	102

*For 54 farms in the Hudson Valley and for 69 farms in Niagara County, the apple crop was for 1947. For the rest of the farms, the crop was for some year between 1943 and 1948 other than 1947.

The farmers in the Hudson Valley were generally more specialized in apples than were those in Niagara County. On 40 per cent of the farms studied in the Hudson Valley, but on only 12 per cent of those studied in Niagara County, did the apple crop exceed 8,000 bushels per farm.

Cold storages have generally been built on the farms producing the most apples. When the crop exceeded 8,000 bushels, 3 farmers out of 4 had a cold storage in the Hudson Valley and 1 out of 6 in Niagara County. If the crop was less than 8,000 bushels, a cold storage was found on only 1 farm in 7 in the Hudson Valley and 1 in 93 in Niagara County.

TABLE 4: APPLE PRODUCTION, STORAGE CAPACITY, STORAGE INVESTMENT PER BUSHEL
73 Hudson Valley Farms in Ulster and Orange Counties, 1947*

Cold Storages On Farms	Number of Farms	Total Production Other Than Ciders	Total Capacity of Refrigerated Storages	Inventory Value of Storage Per Bushel Stored
		Bushels	Bushels	
None	46	248,827		
Built before 1943	19	232,563	462,500	\$0.75
Built before 1943, since enlarged	5	126,495	273,000	0.87
Built since 1943	3	62,721	90,000	1.54
Totals	73	670,606	825,500	\$0.89

*See note bottom Table 3.

In spite of the high costs during the war and post-war years, one-fifth of the storages on the farms studied in the Hudson Valley have been enlarged since 1943, and the number of farms having storages has been increased by 10 per cent.

For the storages built from 1944 to 1946, the investment "per bushel stored" was twice the pre-war average.

The farmers interviewed in this study have all the cold storage space needed to store present crops.

TABLE 5: FARM COLD STORAGES THAT WERE ENLARGED IN 1944

Year	Apples Sold Per Farm	Apples in Storage			Capacity of Storage	Inventory Value of Storage, Packing Room and Storage Equipment	
		Own	Others	Total		Total	Per Packed Bushel Stored
	Bushels	Bushels	Bushels	Bushels	M	Dollars	Dollars
Farm Number 1							
1943	27,030	20,130	21,364	41,494	45	22,122	0.53
1944	34,482	30,438	60,000	90,438	90	52,122	0.58
1945	13,876	9,570	51,284	60,854	"	"	0.86
1946	38,813	32,946	27,868	60,814	"	"	0.86
1947	46,342	44,421	54,000	98,421	118	54,000	0.55
1948	35,566	30,477	65,000	95,477	"	"	0.57
Farm Number 2							
1943	21,680	20,075	27,027	47,102	50	16,500	0.35
1944	22,494	21,850	46,079	67,929	83	44,500	0.66
1946	35,142	34,155	42,675	76,830	"	"	0.58
1947	36,413	34,036	31,793	65,829	"	47,200	0.72
1948	25,263*	24,518	37,859	62,377	"	49,000	0.79
1949					93	54,792	
Farm Number 3							
1943	6,624	7,041	9,960	17,001	20	9,500	0.56
1944	13,338	16,478	24,123	40,601	45	27,500	0.68
1945	3,956	2,800	13,480	16,280	"	"	1.69
1947	19,500	17,801	5,809	23,610	50	52,000	2.20
1948	12,915	5,179	0	5,179	"	56,400	10.89
Farm Number 4							
1943	8,143	4,455	0	4,455	4	5,000	1.12
1944	6,002	6,002	0	6,002	8	9,500	1.58
1945	3,005	2,096	0	2,096	"	"	4.53
1946	5,881	5,845	0	5,845	"	"	1.63
1947	1,613	0	0	0	"	"	0
1948	2,442	1,412	0	1,412	"	"	6.73

*Bushels Harvested

Since 1943, farmer No. 1 has more than doubled the capacity of his storage and, according to the inventory values, has kept his investment "per bushel capacity" down to about 50 cents. He has also kept his investment "per bushel stored" low by filling his storage to 81 per cent capacity.

Farmer No. 2 has also enlarged his storage and kept the investment down to the 50 cent level. His investment "per bushel stored" has also been low, for he has operated his storage at an average of 84 per cent capacity.

Farmers No. 3 and 4 now have an investment "per bushel capacity" exceeding \$1.00. Farmer No. 4 doubled the capacity of his storage from 4,000 to 8,000 bushels, but, due to crop failures, he has made little or no use of the extra space.

In the table below for 1948 an account with storage on farm No. 3 is given. At the beginning of the year, the storage and storage equipment were valued at \$42,000. It was depreciated 4 per cent. The difference between this value and that given in table 5 represents that part of the value of the storage that was used for packing the apples.

Farmer No. 3, in 1948, sold most of his apples at harvest time. He stored only 5,179 bushels. His 50,000 bushel storage showed a loss of \$5,090.56 and a cost per bushel stored of \$1.22. Even if he had not operated the cooler, his loss would have been at least \$4,500.

Fire insurance, taxes, interest, and depreciation have to be met whether a storage is empty or full.

The 88 acres of apples of bearing age on this farm were inventoried on July 1, 1949 at \$53,788 which was approximately the value placed on the cold storage. The apple orchard has shown a profit in six years and a loss in one. The annual profit amounted to \$2,611. The storage has shown a profit in five years and a loss in two. The loss on the storage in 1948 was almost as large as the total profits previously made.

TABLE 6: FARM NUMBER 3, ACCOUNT WITH STORAGE, 1948
Only 10 Per Cent of Storage Space Used

Débit		Credit	
Inventory, beginning year	\$42,000.00	Inventory, end of year	\$40,320.00
Salt for brine spray	28.50	Apples stored	
Services	70.00	350 bushels @ 10¢	35.00
License	15.00	4,829 " @ 25¢	1,207.25
Insurance, fire	570.70		
Insurance, liability	30.00		
Electricity	444.91		
Use of equipment	29.86		
Labor - 932 hours	1,068.91		
Taxes	252.50		
Interest @ 5%	2,047.50		
Miscellaneous	94.93	Loss	5,090.56
	\$46,652.81		\$46,652.81

TABLE 7: APPLE FARM STORAGES BUILT IN 1944 AND 1946

Year	Apples Sold Per Farm	Apples in Storage			Inventory Value of Storage and Storage Equipment	
		Own	Others	Total	Total	Per Packed Bushel Stored
	Bushels:	Bushels	Bushels	Bushels	Dollars	Dollars
Farm Number 5, Capacity 22,000 Bushels						
1944	12,940	12,784	9,596	22,380	\$27,000	\$1.21
1945	8,799	8,755	8,335	17,090	"	1.58
1946	22,230	16,128	3,670	19,798	"	1.36
1947	14,691	9,022	2,495	11,517	"	2.34
1948	16,432	16,062	6,085	22,147	"	1.22
Farm Number 6, Capacity 70,000 Bushels						
1944	70,348					
1945	14,539					
1946	65,845	65,625	0	65,625	122,000	1.86
1947	37,757	37,601	2,184	39,785	130,700	3.29
1948	52,661	52,661	0	52,661	"	2.48
Farm Number 7, Capacity 60,000 Bushels						
1944	26,186					
1945	8,409					
1946	25,015	23,659	0	23,659	55,000	2.32
1947	35,029	35,029	4,128	39,157	"	1.40
1948	13,105	10,970	4,409	15,379	"	3.58
Farm Number 8, Capacity 15,000 Bushels						
1944	5,164					
1945	2,809					
1946	3,712	3,414	0	3,414	15,853	4.64
1947	8,873	8,459	4,500	12,959	"	1.22
1948	5,520	5,302	2,500	7,802	"	2.03

For the four storages built since 1943, the cost "per bushel capacity" was lowest on farm No. 7, 92 cents; and highest on farm No. 6, \$1.87.

Even though farmer No. 7 was the most economical in the construction of his storage, his investment "per bushel stored" has been high, since he has only about half filled his storage.

If the lowest investment "per bushel stored" is to be obtained, it is necessary to fill the storage. Except for 1947, farmer No. 5 did this and had the lowest investment "per bushel stored" of the four farmers listed.

TABLE 8: FARM NUMBER 2, ACCOUNT WITH COLD STORAGE, 1948

Debit	Credit
Inventory, beginning year	Inventory, end of year
\$40,000.00	\$40,000.00
Repairs, parts, new equipment	Storage, own apples
3,725.45	20,616 bushels @ 25¢
Ammonia, salt, soda, etc.	5,154.00
586.71	3,902 " @ 45¢
Fuel oil; 1,797 gallons	1,755.90
217.00	Storage, others' apples
Gas	10,635 bushels @ 45¢
53.90	4,785.75
Insurance, fire	315 " @ 40¢
1,074.40	126.00
Insurance, liability	26,899 " @ 25¢
34.05	6,724.50
License, \$15.00, Phone, \$194.92	10 " "
209.92	1.55
Taxes	62,377 Total bushels stored
262.23	
Electricity	
1,857.43	
Use of auto	
345.71	
Use of equipment	
602.93	
Interest on \$40,000 @ 5%	
2,000.00	
Labor	
Stacking, 1,852 hours	
1,712.79	
Maintenance, 1,117 hours	
1,032.57	
Management, 1,341 hours	
1,240.06	
Bookkeeping, 729 hours	
364.80	
Miscellaneous	
156.20	
Gain	
3,071.55	
\$58,547.70	\$58,547.70

On farm No. 2, the storage was valued at \$49,000, (table 5): \$40,000 was charged to the storage account (table 8), and \$9,000 to a packing account.

One-fourth of the apples were stored in modified air chambers: 14,537 bushels at the rate of 45 cents a box, and 47,515 bushels in regular storage at the 25 cent rate. The net return was 29.7 cents per box stored.

It was assumed that the outlay of \$3,725.45 on the storage and storage equipment was sufficient to cover repairs and depreciation. The total expense for the year amounted to \$15,476.15, or 24.8 cents per bushel stored. The account showed a profit of \$3,071.55, or 4.9 cents per box.

This farmer has 100 acres of bearing apple orchards which were inventoried on July 1, 1949 at \$28,305, or a little more than one-half the value of his storage. Since this farmer has kept cost accounts, the apple orchards of bearing age have shown a loss in 6 years, and a profit in 11. Because of the unusually large profits made during the war and post-war years, the average annual profit for the 17-year period amounted to \$4,824.

For 12 years this farmer has had a storage. The storing and packing of apples have been included in one account. In the above "Account With Cold Storage", an attempt has been made to eliminate packing. The storage and packing account has shown a profit in 11 years, and a loss in only one. On this farm, storing and packing apples has been less speculative than growing them, and has been about as profitable.

TABLE 9: PRODUCTION OF LEADING VARIETIES AND PROPORTION STORED BY GROWERS
Hudson Valley, 54 Farms in 1947; 49 Farms in 1948;
Niagara County, 69 Farms in 1947

Variety	Per Cent of Total Bushels Sold		Proportion of Bushels Placed in Cold Storages by Growers	
	Excluding Ciders			
	1947	1948	1947	1948
	Per Cent	Per Cent	Per Cent	Per Cent
Hudson Valley				
McIntosh	45.4	47.3	83	75
Cortland	11.1	12.7	69	79
Red Delicious	9.1	8.5	84	87
Rome	7.8	9.0	88	88
R. I. Greening	6.6	4.7	70	73
Baldwin	4.4	1.0	75	68
Ben Davis, Gano	2.3	1.8	88	98
Wealthy	1.7	3.2	24	12
Northern Spy	1.6	0.9	86	92
Jonathan	1.6	1.1	58	58
Golden Delicious	1.5	2.4	90	92
Stayman Winesap	1.4	1.2	84	79
All Others	5.5	6.2	48	40
	100.0	100.0	78	74
Total Crop	518,415 bu.		336,874 bu.	
Niagara County				
McIntosh	21.0		80	
R. I. Greening	19.5		63	
Baldwin	19.1		71	
Cortland	14.0		80	
Wealthy	6.3		28	
Red Delicious	4.1		89	
Rome	3.6		89	
Jonathan	1.7		43	
Tompkins King	1.6		77	
Golden Delicious	1.1		94	
All Others	8.0		42	
	100.0		69	
Total Crop	294,678 bu.			

Almost one-half of the apples sold by the farmers interviewed in the Hudson Valley were McIntosh. Cortland was the next most important variety, but only one-fourth as many Cortlands were sold as McIntosh.

In Niagara County, in 1947, McIntosh, R. I. Greening, and Baldwin each accounted for about one-fifth of the apples sold. Cortland production has been increasing, and these four varieties made up three-fourths of all the apples.

For each variety listed above, except Wealthy and Jonathan, the growers stored from 60 to 100 per cent of the packable apples sold.

TABLE 10: GRADING OF APPLES IN AND OUT OF STORAGE
Hudson Valley, 1947, 1948; Niagara County, 1947

Variety, Storage	Per Cent of Apples in Storage			
	Sold Tree Run	Graded as They		Total
		Came In Storage	Went Out of Storage	
	Per Cent	Per Cent	Per Cent	Per Cent
<u>McIntosh</u>				
Hudson Valley, 1947; (196,099 bushels)				
Growers' storage, owners' apples	2.2	23.5	42.4	68.1
Hired storage	4.6	14.3	13.0	31.9
	<u>6.8</u>	<u>37.8</u>	<u>55.4</u>	<u>100.0</u>
Hudson Valley, 1948; (119,674 bushels)				
Growers' storage, owners' apples	3.5	34.2	34.8	72.5
Hired storage	4.5	18.4	4.6	27.5
	<u>8.0</u>	<u>52.6</u>	<u>39.4</u>	<u>100.0</u>
Niagara County, 1947; (49,172 bushels)				
Growers' storage, owners' apples	0.0	2.1	30.4	32.5
Hired storage	8.6	12.3	46.6	67.5
	<u>8.6</u>	<u>14.4</u>	<u>77.0</u>	<u>100.0</u>
<u>Other Varieties</u>				
Hudson Valley, 1947; (207,626 bushels)				
Growers' storage, owners' apples	4.9	35.9	39.6	80.4
Hired storage	1.7	10.6	7.3	19.6
	<u>6.6</u>	<u>46.5</u>	<u>46.9</u>	<u>100.0</u>
Hudson Valley, 1948; (130,716 bushels)				
Growers' storage, owners' apples	3.8	40.8	33.4	78.0
Hired storage	1.0	20.5	0.5	22.0
	<u>4.8</u>	<u>61.3</u>	<u>33.9</u>	<u>100.0</u>
Niagara County, 1947; (153,089 bushels)				
Growers' storage, owners' apples	0.3	4.4	22.8	27.5
Hired storage	7.3	25.2	40.0	72.5
	<u>7.6</u>	<u>29.6</u>	<u>62.8</u>	<u>100.0</u>

In 1947, the Hudson Valley growers who had their own storages packed most of their McIntosh when taken out of storage. The next season, however, about as many were packed when they went in as when they came out. For the other varieties the proportion packed was about equal.

If a grower cannot fill his storage with packed apples, it will cost very little more to store his crop tree run.

In Niagara County, in 1947, most apples were packed as they came out of storage. When the grower's apples were stored in his own storage, about six bushels were "packed out" to one bushel "packed in". When the storage space was hired, the ratio was two to one.

TABLE 11: PRICES RECEIVED FOR APPLES GRADED IN AND OUT OF STORAGE
Hudson Valley, 1947, 1948; Niagara County, 1947

Variety, Storage	Average Net Return Per Bushel For Apples In Storage			
	Sold Tree Run	Apples Graded As They		Total
		Came In Storage	Went Out of Storage	
<u>McIntosh</u>				
Hudson Valley, 1947				
Growers' storage, owners' apples	\$1.43	\$1.34	\$1.59	\$1.49
Hired storage	1.18	1.05	1.47	1.24
Modified air storage	2.59	1.79	2.02	2.02*
Hudson Valley, 1948				
Growers' storage, owners' apples	1.58	1.81	1.88	1.83
Hired storage	1.40	1.68	2.37	1.75
Modified air storage	3.22	2.44	3.94	3.18
Niagara County, 1947				
Growers' storage, owners' apples		1.85	2.07	2.06
Hired storage	1.17	1.13	1.55	1.42
<u>Other Varieties</u>				
Hudson Valley, 1947				
Growers' storage, owners' apples	1.15	1.22	1.31	1.26
Hired storage	0.88	1.28	1.24	1.23
Hudson Valley, 1948				
Growers' storage, owners' apples	1.51	1.76	1.88	1.80
Hired storage	1.75	1.91	2.79	1.93
Niagara County, 1947				
Growers' storage, owners' apples	1.49	1.05	1.51	1.43
Hired storage	1.11	0.90	0.98	0.97

*Included are 1,433 bushels that were damaged by improper operation of gas chamber and were disposed of at an average net return of 82 cents per bushel. If these were not included, the average price for modified air McIntosh would be \$2.18.

In 13 of the 14 comparisons given above, the growers received more per bushel for apples packed as they came out of storage than they did for those packed as they went in. In calculating "net return", cost of storage has been deducted as well as package, freight and commission.

It has been unusually profitable to store McIntosh in gas storage. Compared with ordinary cold storage, the McIntosh out of gas storage returned 53 cents more per bushel in 1947 and \$1.35 more in 1948.

Apples in the growers' own storages usually returned more than did apples placed in commercial storages. In Niagara County, in 1947, the difference in favor of the growers' storage was 64 cents per bushel for McIntosh and 46 cents for all other varieties. A difference of 7 to 8 cents was due to lower storage costs. The growers who owned their storages estimated their cost of storage below the commercial rate. However, most of the difference in the net return per bushel was due to better quality of fruit and to better market outlets.

There is more incentive for the owner to sell his apples at a high price than for anyone else to do so. It would naturally follow that a large volume of quality fruit in the grower's own storage would be marketed better than if placed in a commercial storage and handled by an outsider.

TABLE 12: BUILDING COSTS

	Cost Per 2 1/2 cu. ft.*	Cost Per Bushel Capacity			
		Farm No. 5	Farm No. 6	Farm No. 7	Farm No. 8
1939	\$.62				
1940	.66				
1941	.69				
1942	.76				
1943	.74				
1944	.76	\$1.23			
1945	.88			\$.92	
1946	1.01		\$1.87		\$1.06
1947	1.21				
1948	1.36				
3/1949	1.42				
Total cost of cold storage and storage equipment		\$27,000	\$130,700	\$55,000	\$15,853
Approximate cost if built in -					
1939:		22,000	80,000	38,000	10,000
1949:		51,000	185,000	89,000	22,000

*A two-story and full basement brick building containing store on first floor and six-room dwelling unit on second floor. The Real Estate Analyst, Vol. XVIII, March 17, 1949, Roy Wenzlick & Co., Saint Louis.

SUMMARY

From 1943 to 1948, storage rates were increased by 2.3 cents per box in Niagara County and 4.2 cents in the Hudson Valley (table 2). This increase of 10 and 20 per cent is hardly sufficient to encourage the building of more storages. Building costs have doubled and farm labor costs have increased 70 per cent. Since there is adequate storage space for present production (table 4), building costs may be out of line with storage rates for several years to come.

According to the prices paid for McIntosh stored in controlled atmosphere, it will pay either to build gas storages or to change some of the cold storage space into gas chambers.

Some growers producing large crops of high quality apples, if conveniently located for truckers, will probably build storages at relatively high costs and find them profitable if they are able to sell their apples at the farm for more than they could get at a commercial storage.

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