

FROZEN FOOD

LOCKER PLANTS



AND HOME FREEZERS IN

Minnesota

by

Robert E. Olson and D. C. Dvoracek

UNIVERSITY OF MINNESOTA
Agricultural Extension Service
U. S. DEPARTMENT OF AGRICULTURE

This archival publication may not reflect current scientific knowledge or recommendations.
Current information available from University of Minnesota Extension: <http://www.extension.umn.edu>.

FROZEN FOOD LOCKER PLANTS and HOME FREEZERS *in Minnesota*

Robert E. Olson and D. C. Dvoracek¹

MANY RURAL AND URBAN people are using individual lockers (which they rent from community locker plants) to preserve fresh frozen foods for use throughout the year. Individual lockers are rented by the year or month. Home frozen food lockers which serve the same purpose are common now also. These recent changes in the way foods can be kept fresh longer encourage people to eat more of those foods. More food value of such foods is preserved, and people using them may be better fed and healthier.

Frozen storage of fruits and vegetables encourages home production and consumption with less labor and waste. Without doubt, modern frozen food storage in individual lockers is an aid to better and healthier living. Use of both storage plants and home lockers will increase as their construction is improved, ways of handling foods are perfected, and the cost involved can be favorably balanced with the advantage gained and the ability of people to pay.

In 1948 the University of Minnesota Agricultural Experiment Station and

the Agricultural Extension Service conducted a study of the use of frozen food locker plants and home freezers in Minnesota. Information was obtained from questionnaires filled out by 498 locker renters, 266 home freezer owners, and 59 former locker renters; and by interview from 60 locker plant operators.

NUMBER AND DISTRIBUTION OF PLANTS

The number of locker plants has risen sharply since the first plant was opened

¹ Research Assistant, Division of Agricultural Economics, and Extension Economist in Marketing, University of Minnesota, respectively.

The authors express appreciation for the help given in making this bulletin possible. Credit is given the State Department of Agriculture for supplying a list of licensed locker plants. Over 60 locker plant operators and their employees furnished the primary data on locker plant operation. About 550 locker renters answered questionnaires on locker use. Home freezer owners gave information on their use of freezers. County agents helped check original lists of lockers. Home agents furnished names of freezer owners. Members of the University of Minnesota College of Agriculture and Experiment Station staff gave freely of their advice and counsel.

at Waseca in 1935. By the end of that year, there were four plants in the state and by the end of 1936 there were 12 (figure 1). After 1936 the number increased rapidly to a total of 383 by 1941. Expansion was greatly reduced during the war period because of the shortage of materials. A second period of expansion began in 1946 and by June 30, 1949, there were 659 plants in operation.

The increase in family income and the rationing of meat during the war greatly increased the demand for lockers. Many locker plant operators responded by adding lockers or tempo-

rarily using open space within the locker room. Fifty-four per cent of existing lockers were rented in 1939. This percentage increased to nearly 100 per cent during the war years. Some plants still had lists of prospective patrons waiting for lockers at the time this survey was made. Considering both the increase in use of available lockers and the increase in the number of plants, there has been a very sharp increase in the number of people served by locker plants in recent years.

Locker plants are widely distributed in Minnesota (figure 2). There are

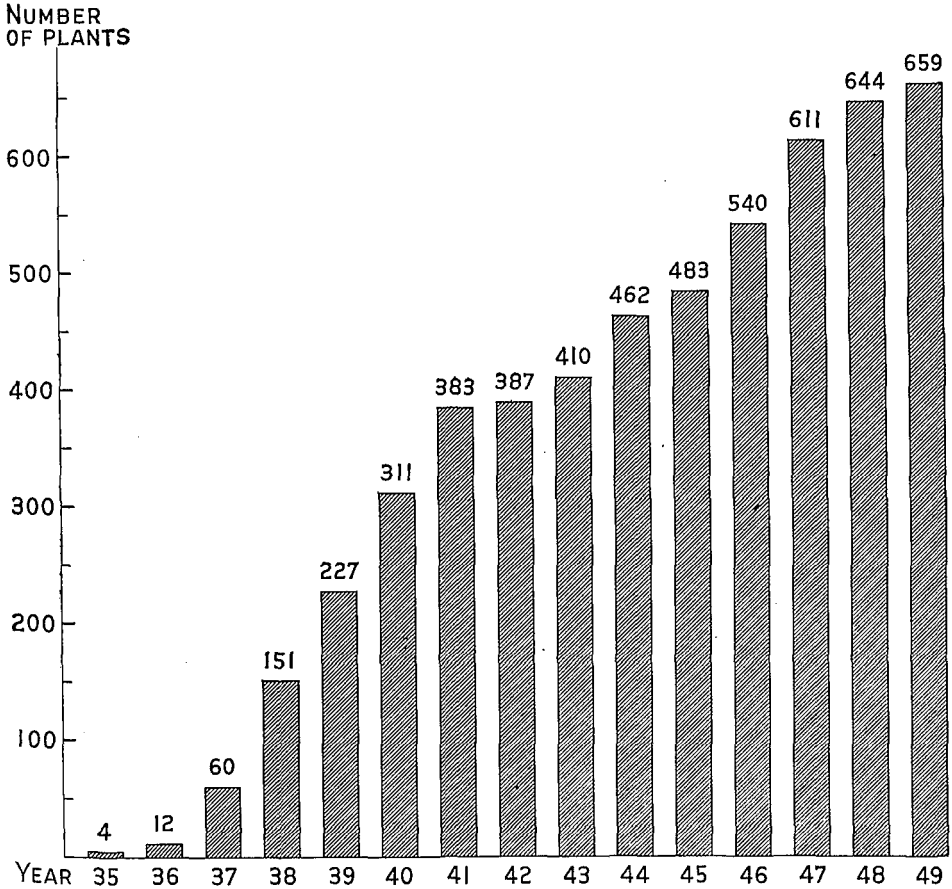


Fig. 1. Number of cold storage plants in operation, 1935-1949.

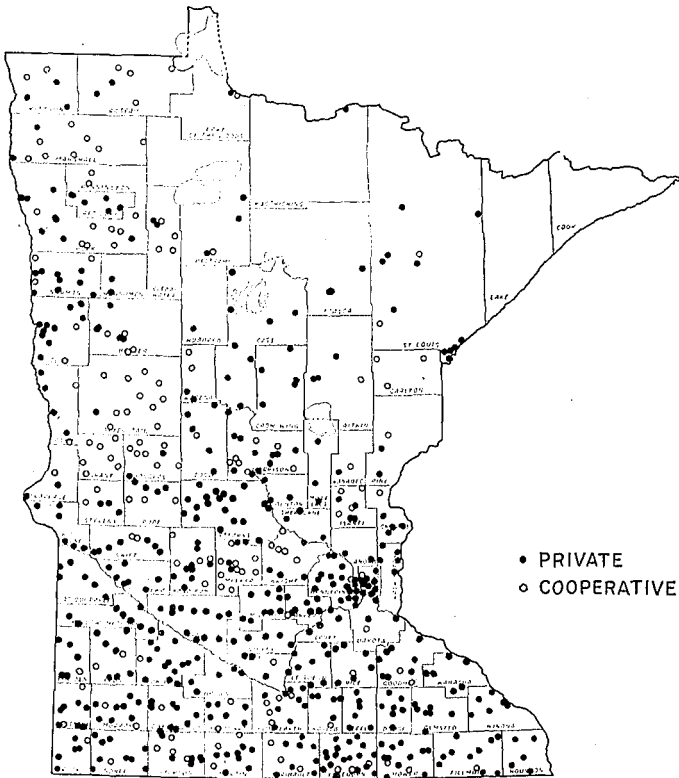


Fig. 2. Location of private and cooperative locker plants.

nearly as many locker plants in the state as there are creameries or commercial banks. Locker plants are more numerous (in relation to population) in rural areas than in urban. About three fourths of the plants are located in the southern part of the state.

Sizes of Plants

Nearly 25 per cent of the locker plants in Minnesota are cooperatively owned and over 75 per cent are privately owned. More than three-fourths of the privately owned plants, or over half of all plants, are owned by individuals, and less than a fourth by partnerships and corporations.

Locker plants vary in size from 36 to 1,900 lockers per plant. The largest number of plants have between two and three hundred lockers each. Most

lockers are operated jointly with some other enterprise. Only 23 per cent of locker plants are operated as separate businesses. Over one-half of all plants are a part of grocery stores or meat markets, one-sixth are affiliated with creameries, and the remainder with miscellaneous enterprises.

Indications are that less than 4 per cent of the plants in Minnesota are branch plants. Branch plants have storage facilities only and rely upon a neighboring plant, usually under the same ownership, for slaughtering and processing services.

SERVICES

Frozen food locker plants are equipped with individual locker boxes for storing food at below freezing temperature. The modern locker plant has separate



Fig. 3. Weighing, cutting, and wrapping are among the services performed by locker plants.

locker, sharp freezer and chill rooms, and facilities for cutting, wrapping, curing, and smoking. Some plants also provide bulk storage space in a special room or in a section of the locker room. This space is often rented to restaurants or retail stores or used by the locker plant itself. A few plants, with extra chill room space, obtain added income by renting this space for storage at chill room temperatures. The temperatures most frequently reported are as follows: locker room 0° F., chill room 34° F., and sharp freezer -10° to -20° F.

The modern locker plant offers a great variety of services besides the storage of frozen food. These services include slaughtering livestock, cooling, chilling, aging, cutting, grinding, curing and smoking meat, rendering lard, dressing fish and game, processing fruits and vegetables, and packaging and sharp freezing all foods. Locker plants also sell and exchange live animals, sell wholesale and retail cuts of meat and freezing supplies, dispose of hides and offal, and sell and service home freezers. Ninety-five per cent of Minnesota locker plants offer some or all of these services. Locker plants, on the average, receive as much or more gross

income from services as from locker rentals. Considerable business is also done with home freezer owners.

The proportion of plants offering each service, the charge for services, and rental of lockers by Minnesota locker plants are summarized in table 1.

Locker Plant Law

Patrons, perhaps, have not always known the state laws regarding the licensing of locker plants, the kinds of food that may be stored, inspection required of the plant manager, and the labeling requirements.

According to Minnesota law, no article of food except fruits, berries, or vegetables in containers or jars, may be stored in any refrigerated locker unless it is in a proper condition for storage and meets all the requirements of the Minnesota Dairy and Food Laws.

All food except fruits, berries, or vegetables in containers or jars, must be inspected by plant manager and sharp frozen before it may be placed in a refrigerated locker, and must be kept at a temperature of not more than 10° F. during the period it is kept in the locker. The date of entry into a locker must be stamped on each package.

Table 1. Charges for Services Offered by Locker Plants in Minnesota, 1947.

Kind of service	Number of plants	Service Charges		
		Range	Average	Most frequent
			dollars	
Locker rental (per year):				
Drawer type	58	8.00-15.50	12.50	12.00
Door type	60	6.00-14.50	10.43	10.00
Slaughtering livestock (per head):				
Cattle	43	1.50-6.00	2.41	2.00
Calves	43	0.50-3.50	1.58	1.50
Hogs	44	1.25-3.75	1.76	1.50
Sheep and Lambs	43	0.50-2.50	1.26	1.50
			cents	
Processing meat and meat products (per pound):				
Chilling, cutting, wrapping, and freezing ...	57	1.00-3.00	2.13	2.00
Freezing only	33*	0.50-2.50	1.30	1.00
Curing only	15	2.00-6.00	3.50	3.00
Smoking only	16	1.00-3.00	2.13	2.00
Curing and smoking	34	4.00-7.25	5.52	5.00
Grinding only	54	1.00-4.00	1.51	1.00
Grinding and making sausage	31	1.50-20.00†	7.48‡
Rendering lard	12	2.45-4.50	3.33	3.00
Processing poultry (per bird):				
Dressing and drawing chickens	20	10.00-35.00	18.13	15.00
Dressing and drawing turkeys	18	25.00-75.00	43.57	35.00
Wrapping and freezing chickens	41	5.00-25.00	9.36	5.00‡
Wrapping and freezing turkeys	22	10.00-25.00	18.33	25.00
Processing fish (per pound):				
Wrapping and freezing	39	1.00-5.00	2.70	2.00
Processing fruits and vegetables:				
Freezing only (per pint)	42	1.00-4.00	2.40	2.00
Freezing only (per quart)	53	2.00-7.00	3.68	3.00

* Some plants charge same for freezing only as for chilling, cutting, wrapping, and freezing.

† Charges varied greatly due to differences in kind of sausage.

‡ Almost as many plants charged 10 cents as 5 cents.

For more complete information you may write for a copy of *Minnesota Dairy and Food Laws*, published by Department of Agriculture, Dairy and Food, State Office Building, St. Paul, Minnesota.

Rental and Processing Fees

Locker rentals ranged from \$6 to \$12.85 per year in 1938. Rentals in 1949 ranged from \$8 to \$15.50.

Locker rentals have not changed much with the years in spite of the fact that the cost of building locker plants has increased a great deal. In 1935, the average cost of a plant was

roughly \$35 per locker. Plants built during and since the war cost from \$80 to \$150 per locker. During the war, practically every locker was in use and paying rent, with a long list of patrons waiting. This helped plants that were built at high costs.

As wages and costs of wrapping and processing material went up, rates had to be advanced until the average rate for chilling, cutting, wrapping, and freezing has increased from a range of \$.65 to \$1.50 per hundredweight in 1938 to a range from \$1.00 to \$3.00 in 1949. The usual rates are summarized in table 1, but there are some exceptions as explained below. Most of the plants

make some adjustment for the size of the animal in fixing the slaughtering fee. Over one-third of the plants set up a schedule of charges for slaughtering cattle. These schedules vary with the live weight. Nearly two-thirds of the plants do this for hogs. A few plants charge at the rate of \$.50 to \$1.00 per hundredweight dressed weight for slaughtering all species. Some plants charge from 2 to 4 cents per pound for wrapping and freezing poultry. The charge for freezing fruits and vegetables is sometimes made on a lot or package basis. Small lots of from 10 to 15 packages are frozen for a flat charge of 15 to 25 cents, while package rates vary from 1 to 5 cents.

Generally, the more conveniently located lockers, the drawer type, and the lockers in the lower tiers pay the highest rentals. Usually the 2 to 4 tiers consist of drawer type lockers. Nearly all plants charged more for the drawer type locker, but not all plants made a differential charge for lockers in the different tiers. Lockers are generally rented for a period of a year. Rentals on a monthly basis are slightly higher and are used primarily to take care of overflow from regularly rented lockers.

Slaughtering

Most of the pork, beef, veal, lamb, and mutton that is processed and stored in locker plants in this state is from locally slaughtered animals. Only about 12 per cent of the beef and veal, 11 per cent of the lamb and mutton, and 1 per cent of the pork is bought from packing plants.

Of the animals slaughtered locally, the locker plants slaughter two-thirds of the cattle, more than two-thirds of the hogs and lambs, and more than one-half of the veal calves. The remainder are slaughtered mostly by farmers.

Nearly three-fourths of the locker plants slaughtered livestock for their patrons. There seems to be a tendency to have slaughtering done at the locker

plant whenever possible. Eighty per cent of the plants which slaughter use facilities in the locker building. Slaughtering is done on the patron's farm by 11 per cent of the plants, and the rest use a separate building in or near town.

In 1947, locker plants in Minnesota slaughtered an average per plant of 172 cattle and calves, 463 hogs, and 2 sheep.

There has been some change in the time of year when slaughtering is done by the locker plant. Over one-half of the locker patrons reported that they now slaughter when the meat is needed rather than in winter and spring as they did when slaughtering was done on the farm.

Nevertheless, there are slack periods in the locker business. This makes it difficult for the operator to make efficient use of labor and equipment. Figure 4 shows the seasonal variation of slaughtering at the 11 locker plants.

More hogs are slaughtered in December than at any other time of the year and the fewest in August. This simply means that farmers have more hogs ready for slaughter in winter than in summer. March is the heavy month for cattle slaughter, and August is again the low month. Custom slaughtering for locker plant patrons by other than the locker plant was reported by one-fourth of the plants and is relatively unimportant. Rates charged by custom slaughterers are similar to those charged by locker plants. This type of custom slaughtering is most prevalent where the locker plant does not have slaughtering facilities.

Amount Processed

Locker plants process most of the meat they store, and in addition, process some meat for home freezer owners. The amount of meat chilled, cut, wrapped, and frozen by Minnesota locker plants for the year studied was 146,572 pounds per plant. The volume varied from less than 40,000 pounds per

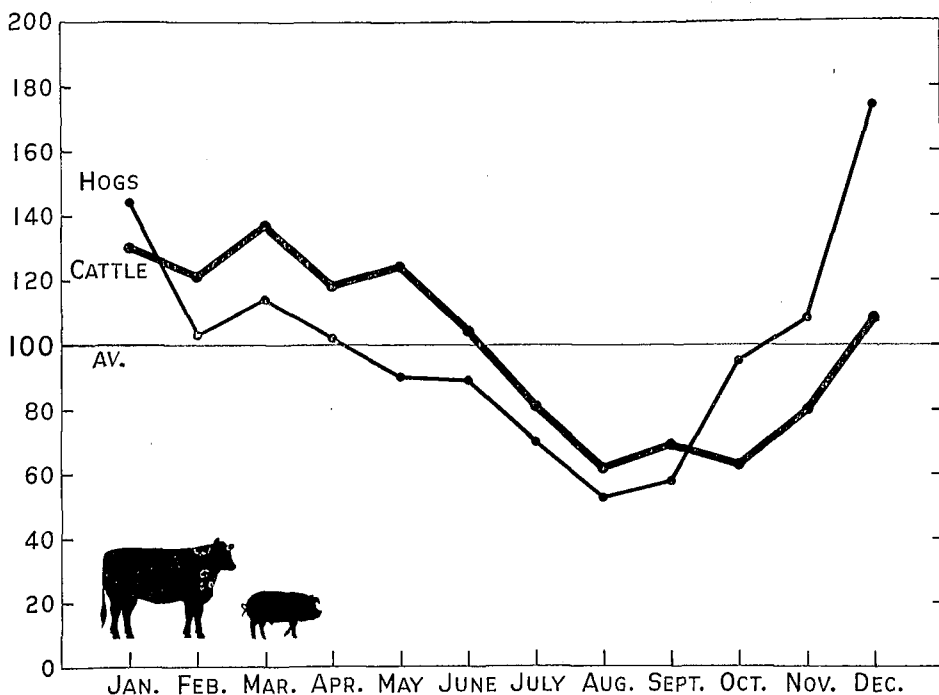


Fig. 4. Seasonal variation of slaughter in eleven Minnesota locker plants.

plant to over 168,000 pounds per plant. The plants also handled an average of about 2,600 pounds of poultry, 3,000 pounds of fish and game, 1,000 pounds of rendered lard, 9,000 pounds of cured and smoked meat, and 3,200 pounds of fruits and vegetables.

Amount Stored

Locker plants are primarily storage plants and are an appreciable factor in the marketing of meat. Storage of food at below freezing temperatures remains their basic function. The estimated amounts of various food products stored in the 644 locker plants in the state are shown in table 2. The indicated amounts of the different kinds of meat would be roughly equivalent to the product from 80,900 head of 900-pound cattle, 303,000 head of 240-pound hogs, and 2,700 head of 95-pound lambs.

Pork is the most important item, followed closely by beef, including veal. These together make up nearly 94 per cent, by weight, of all products stored.

Only two and one-half per cent of the total products stored are vegetables. This percentage can be expected to increase very much. Poultry, fish, and game amount to a little less than 2 per cent each, and mutton and lamb only a little over one-tenth of 1 per cent of the total.

The average amounts of the various food products stored per locker plant, per locker box, and per patron are also shown in table 2.

Amount of Storage Space Available per Family

If a home freezer owner also rents a locker in a storage plant he greatly increases the amount of food he can store.

Table 2. Kind and Amount of Food Stored in Locker Plants, Minnesota, 1947.

Kind of food	Amount Stored			
	Total for 644 plants	Average per plant	Average per locker box	Average per locker patron
Beef and veal	40,765,932	63,301	174.4	232.2
Pork	49,401,252	76,713	211.3	270.5
Lamb and mutton	127,908	199	.5	.7
Poultry	1,594,544	2,476	6.8	8.8
Fish and game	1,692,432	2,628	7.2	9.3
Fruits and vegetables	2,244,340	3,485	9.6	12.3
Total	95,826,408	148,802	409.8	533.7

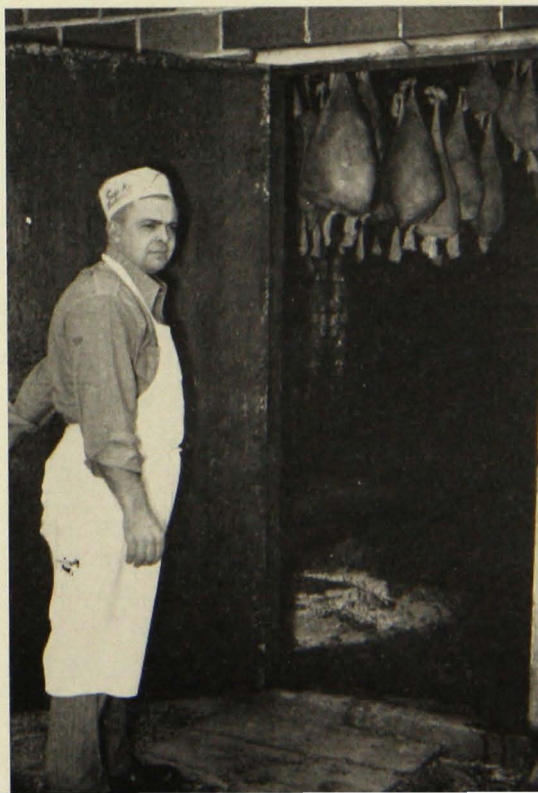
The most common capacity of home freezers is 15 cubic feet for farm families and 8 cubic feet for town families. Considering both the home freezers and the lockers rented, the average total frozen food storage capacity was 16 cubic feet per farm family and over 13 cubic feet per town family. The average farm family that does not have a home freezer rents 1.33 lockers and feeds 4.36 people. The average town family rents 1.15 lockers and feeds 3.36 people. With an average capacity 5.9 cubic feet per locker, the total space available is 7.8 cubic feet and 6.8 cubic feet respectively per family. The average home freezer owner, some of whom have lockers, would be able to store from 400 to 500 pounds of food at one time compared with 230 to 265 pounds for the average locker renter who does not own a locker.

LOCKER PLANT PATRONS

From information supplied by locker patrons, it appears that about two thirds of the patrons live on farms and one third in towns. Only about 17 per cent of the patrons of locker plants in this state lived in town in 1939. The increase in the proportion of locker patrons living in town since then may be due in part to direct cash savings, but is probably due more to meat rationing during and meat shortages after World War II. A further reason for town people to rent lockers was that meat prices rose following the war and the locker

renter gained on meat stored in his locker. Further evidence of the increase in town locker rentals is found in the fact that nearly 78 per cent of the town renters had rented a locker only a short time (five years or less) compared with 33 per cent of farmers renting 5 years or less.

Fig. 5. Among the advantages listed by patrons of locker plants is the elimination of work of curing and smoking at home. Here, a locker plant employee inspects an outer smoke house.



Locker patrons live relatively close to locker plants. Over 83 per cent of the farmers studied lived within ten miles of a locker plant and 43 per cent lived within 5 miles. Fourteen per cent of the town residents traveled an average of nearly ten miles to another town to get locker plant service. In the sample of 498 locker patrons, five families lived 30 miles or more from the nearest plant.

The advantages of lockers are many. Without a doubt, greater advantages are derived by farmers who produce the food stored. They have more definite control over the quality of food they bring in for storage, with only the cost of processing and storage added to their own cost of production. Consuming food produced by themselves is no small source of satisfaction. Greater uniformity of quality of food, particularly meat, is assured both rural and urban towns. Buying and storing quantity when prices are lowest is an advantage to all if they have the money to buy in quantity. When asked to report advantages of lockers, patrons placed the most emphasis on having fresh frozen meat available throughout the year, money savings, and elimination of the work of home butchering, processing, and can-

ning. Saving money and a higher quality of meat seems to be more important to urban than to rural patrons. The disadvantages given by patrons are listed in order of how often each was mentioned in table 3.

Locker patrons are generally well pleased with their locker service. Many gave no answer to questions as to disadvantages or listed no disadvantages. The disadvantages and criticisms cited, however, indicate the problems that need to be faced by the locker operator in order that the operator and the patron may cooperate intelligently in their solution with mutual advantage.

Sanitation. Cleanliness, order, and freedom from locker odor are important. Part of the problem of sanitary conditions in the locker plant may be due to faulty construction or inadequate facilities. Alert operators can maintain a high standard of cleanliness in most plants. Poor construction requires more care and labor. Clean attractive plants are an asset to building patronage. Unsanitary conditions in a locker plant should not be tolerated by either locker operators or patrons.

Maintaining identity of food packages. As reported in table 3, the most

Table 3. Disadvantages of Renting Lockers Specified by 498 Locker Patrons, Minnesota, 1948.*

Disadvantages	Number of Times Mentioned		
	Farm patrons	Town patrons	All patrons
1. No answer	116	41	157
2. No disadvantages	98	54	152
3. Suspect meat lost or taken from locker	25	10	35
4. Locker plant too far away or inconveniently located	16	11	27
5. Inconvenient hours	10	13	23
6. Off flavor of food	17	5	22
7. Poor processing and curing	12	8	20
8. Service cost too high	12	1	13
9. Frozen foods less palatable	4	7	11
10. Locker rental too high	8	3	11
11. Meat improperly cut and wrapped	5	2	7
12. Temperature too high and fluctuating	5	2	7
13. Poor sanitation and care of lockers	4	2	6
14. Necessity of going into cold place to get food	4	2	6
15. No record kept of packages put in and out of locker	3	3
16. Poor arrangement of packages in locker	1	1	2
17. Other	13	6	19
Total	353	168	521

* Some patrons gave more than one disadvantage.



Fig. 6. Packages of food are frozen quickly in a freezer room (left) and stored until needed in the drawer- (right) or door-type lockers.

frequent and serious complaint of patrons is suspicion that their food has been lost or misplaced in other lockers. Since packages are numbered before they are placed in the lockers, the locker operator must be positive that all packages are put in the right locker. Detailed records of every item out of the locker may be impracticable. Some locker plants have the keys to all lockers on a board which is accessible to the public. The wrong key, however, may be mistakenly taken from the board. The patron may be prevented from getting the wrong key if he must apply for the key each time he forgets his own. Operators of some plants take the patron's orders and get the package from the locker for him. This also makes it unnecessary for the patron to go into the frigid locker room, but requires more labor, and so increases cost. In

plants where groceries are sold and checked out by a cashier, the patron may be required to check out food from the locker as well. This method has limitations during the rush hours when the patrons have to wait.

Location. A disadvantage sometimes mentioned is that the locker plant is too far away or inconveniently located. Study of the present location of plants shows that plants are widely distributed and that only about 17 per cent of the patrons live over 10 miles from the plant. In fact, plants are so distributed that most patrons have a choice among accessible plants. Some plants remain open one or more evenings a week.

While locker operators should be particularly mindful of the disadvantages cited, most need the mutual understanding and cooperation of both operator and patron.

HOME FREEZERS

Increasing use of home freezers by individual families has aroused considerable interest in this new type of frozen food storage. A few freezers have been in use in Minnesota for a decade, but the majority have been acquired since the war. According to information

supplied by 224 farm and town owners of home freezers in 1948, about 50 per cent had owned their freezers less than one year and 84 per cent less than three years.

The capacity of home freezers reported averages 15 cubic feet for farm-

Table 4. Size of Home Freezers Owned by 266 Families, Minnesota, 1948.

	Size of Home Freezer (cubic feet)						Not reporting	Total
	Less than 5	5 to 9.8	10 to 14.9	15 to 19.9	20 to 25.9	25 and over		
Farm	6	54	36	78	11	30	9	224
Town	5	17	6	10	2	1	1	42

Table 5. Number of Freezers That Were Acquired at Specified Costs.

	Number	
	Farm	Town
Under \$100	1	1
\$100-\$199	6	3
200- 299	38	13
300- 399	65	13
400- 499	57	6
500- 599	32	4
600- 699	8
700- 799	2
800 and over	2
Total	211	40

ers and 11 cubic feet for town residents, the most usual sizes being 15 cubic feet for farmers and 8 cubic feet for town users (table 4). Most home freezer owners indicated that their freezer was of adequate size. Seventeen per cent of the farm families and 26 per cent of the town families consider their freezer

too small. No one reported owning a home freezer too large for his needs.

Most of the freezers are commercially made models. Only 20 out of the 266 freezers studied were home-made. Indications are that about one-third of the freezers have a separate compartment for sharp freezing. The home freezer owners reported the original cost of their freezers (table 5). These costs reflect differences in prices at different times as well as differences in sizes and models. Three to four hundred dollars is about average.

Distance from a locker plant apparently is not a major factor influencing the purchase of a home freezer. Home freezer owners living on farms lived closer to a locker plant, on the average, than the locker renters studied, and over 40 per cent lived 5 miles or less from a locker plant. Over 80 per cent of the town residents who had a home freezer had access to a locker plant in

Table 6. Kind and Amount of Food Stored and Per Cent Purchased by Farm and Town Owners of Home Freezers, Minnesota, 1948.*

Kind of food	Amount in pounds				Per cent purchased	
	Per family		Per capita		Farm	Town
	Farm	Town	Farm	Town		
Beef and veal	307.5	204.4	65.4	53.8	29.7†	82.3†
Pork	252.5	109.8	53.7	28.9	8.7†	85.5†
Lamb and mutton	2.1	3.7	.5	1.0	46.2†	100.0†
Poultry	61.5	69.3	13.1	18.2	15.4	59.7
Turkeys	5.2	15.0	1.1	3.9	63.3	99.0
Fish and game	18.9	34.0	4.0	9.0	30.1	32.8
Total meat	647.7	436.2	137.8	114.8	20.5	76.5
Fruits and vegetables	89.0	85.4	19.0	22.4	18.8	12.2
Prepared food	20.1	24.4	4.3	6.4‡‡
Ice Cream	52.1	29.5	11.0	7.8‡‡
Total food	608.9	575.5	172.1	151.4	46.2	85.8

* Includes food stored in locker plants by those who also rented a locker.

† Includes dressed meat purchased but not live animals purchased.

‡ Not available.

Table 7. Number of Home Freezer Owners Who Reported Advantages of Having Home Freezers.

Advantages	Number of times mentioned		
	Farm patrons	Town patrons	All patrons
1. Conveniently located in the home	95	15	110
2. Fresh frozen food available at all times	63	12	75
3. Especially advantageous for freezing small quantities of fruit, vegetables, baked goods, etc.	38	7	45
4. Saves trips to town	33	1	34
5. Economical	20	7	27
6. Better quality food is available	22	4	26
7. A greater variety of foods can be stored	18	4	22
8. Can process and freeze whenever desired	11	2	13
9. Eliminates work of home canning	11	1	12
10. Saves food that would otherwise spoil and less spoilage than other methods	8	2	10
11. More storage space than at locker plant	8	1	9
12. Large quantities of food can be processed at one time and stored until needed	4	3	7
13. Avoid possibility of losing food at locker plant	5	5
14. Other	6	1	7
Total	342	60	402

the same town. A question may be raised as to whether freezer ownership saves trips to town except from greater distances.

Farm families store more food per person per year than town families (table 6). Farmers also store more of all meats combined (but less lamb, mutton, poultry, turkeys, fish, and game) per capita than town residents. Farmers store relatively more pork and less beef. Town freezer owners store more fruits, vegetables, and prepared foods per capita. It must be remembered that farmers' freezers are nearly twice as large as freezers owned in town.

As might be expected, town families who use home freezers purchase a larger proportion of all foods stored except fruits and vegetables than farm families. Farmers purchase only about 20 per cent of all meat stored compared with 76 per cent purchased by town residents. Home freezer owners bought most of their meat from farmers. Frozen food locker plants and retail meat dealers are the next most important sources.

The advantages of having a home freezer as given by home freezer owners are listed in table 7 in order of the number of times mentioned. Conven-

ience is the advantage emphasized by the tabulation and only 27 replies stated the economy of this method of frozen food preservation.

Apparently, the majority of home freezer owners are well satisfied. Over 84 per cent specified no disadvantage or listed none. The most frequent disadvantage reported was too high original and operating cost. Other disadvantages which were mentioned only a few times include the space taken up in the home, difficulty of chilling, cutting, and wrapping meat, difficulty of getting repairs and service, undependable power supply, and inadequate sharp freezing capacity.

COST OF FROZEN FOOD STORAGE

Locker patrons and freezer owners have a definite interest in the cost of frozen food storage. The cost of slaughtering livestock can be reduced to cost per pound of meat by dividing slaughtering charge per head by weight of dressed carcass. The cost of processing must also be considered. The actual cost of processing is usually a fixed charge per pound for each service and

product for each plant. Slaughtering and processing costs per pound are the same whether storage is a locker or home freezer. If slaughtering and freezing are done at home, only actual costs of material used need be taken into account. A fair charge for labor and equipment will make the cost figures more accurate.

Figuring the cost of storage per pound is relatively simple in locker plants. Locker rentals are fixed and vary only with the number of lockers rented. Storage cost per pound depends on how many pounds or units of food pass through the storage space in a given period. The inventory of food on hand at the beginning of the year is added to the total amount of foods added during the year, less the inventory of food at the end of the year. Dividing the locker rentals paid by the amount of food used will give the cost per pound. This figure, while not accurate, will be close enough for use.

For example, if a patron rented the average of 1.28 lockers at a rental of \$10.00 per year (table 2) and stored the average amount of food per locker, (409.8 pounds), the cost would be 2.4 cents per pound. At the typical drawer type rental of \$12.00 per year the cost would be 2.9 cents per pound. The highest cost per pound stored in a drawer type locker is balanced by greater convenience.

Cost of processing for the home freezer depends on how much is done on a custom basis by a locker plant and how much is done in the home freezer. Unless the home freezer has a special low-degree space, freezing might be done better in a locker plant, except for fruits and vegetables in small quantities.

The cost of storage in a home freezer must be based on the original cost of the freezer; interest at the going rate; depreciation based on 10 years of estimated life; power cost—current consumed times rate per Kilowatt hour.

Accurate figures are not available. A careful study should be made. This annual cost divided by the net amount of food put through the locker, will give the average cost per pound.

The cost of storing food in home freezers is somewhat higher than in community locker plants. The convenience of having food stored in the home, however, and of processing and freezing foods in season will lead many families to use this method of frozen food storage.

Turnover of product in the locker or freezer is an important factor in cost. The lowest cost per pound would be achieved by using the smallest storage unit and using the food as rapidly as possible. Thus, the low total cost would be divided by the largest amount of food practicable.

RELATIONSHIP OF HOME FREEZERS AND LOCKER PLANTS

The home freezer undoubtedly competes with the locker plant. Most locker patrons stop renting a locker when they buy a home freezer. Yet, some home freezer owners continue to rent lockers, and they are, to a large extent, dependent on locker plants for processing services.

Locker operators interviewed had varying opinions on the effect of home freezer use on the locker industry. Some said the loss of patrons had greatly reduced their volume while others reported an increase in processing patronage as a result of home freezer use. Some operators provide information on proper home processing methods of fruits and vegetables and solicit the processing of meats.

For many farmers, the shift to locker plants or home freezer methods represents a change from home canning and curing methods rather than a shift from purchase at retail. The advantages of locker plants and home freezers cannot be judged by cost alone, for the

change in quality of the product and the desirability of eliminating the work of home slaughter, canning, and curing must be judged by each family.

Users of home freezers are to a great extent dependent on nearby locker plans for processing services and additional storage space. Of 266 home freezer owners reporting, 110 have all of their meat cut, wrapped, and sharp frozen at a locker plant and 49 have a part of their meat processed in that way. Over 20 per cent of the home freezer owners surveyed also rent a locker at a locker plant. Since the sharp freezing capacity of most home freezers is limited, there is need for this service when large quantities of food are to be frozen at one time. Not all freezer owners have the know-how or equipment to perform the processing services at home. Plant operators have access to processing supplies at lower cost because they buy larger quantities.

The disadvantage for a home freezer owner who processes at the locker plant is the necessity of transporting the food to and from the locker plant. Perhaps the best solution is a combination of methods—sending large quantities to the locker plant for processing and handling small quantities in the home. Many home freezer users find it advantageous to rent a locker at a locker plant as the principal place of storage and also maintain a small home freezer or utilize the frozen food section of a refrigerator-freezer combination. This reduces the number of trips to the locker plant and provides a convenient supply of frozen foods for daily use.

Some indication of the effect of home freezers on locker rentals can be found in the replies of locker patrons about their intentions to buy or build home freezers. Nearly 60 per cent of the patrons stated that they do not plan to buy or build a home freezer (table 8).

About 80 per cent of the home freezer owners rented a locker at a locker plant before acquiring a home freezer. At

the time of the survey over 24 per cent of the farmers and less than 38 per cent of the town residents continued to rent lockers. Over one-fifth of the freezer owners indicated they planned to continue renting lockers in the future.

The rapid growth of frozen food storage in the past few years has been due largely to the relatively high incomes enjoyed by people generally; the rationing and scarcity of meat, the high and rising price of meat, and the increasing consumer interest in the quality of frozen foods. This growth was made possible by the increasing availability of materials for constructing locker plants and home freezers.

It appears that the rate of increase in the number of locker plants has slowed down, waiting lists for lockers have practically disappeared, home freezers are in plentiful supply, and some locker operators are not renting all the lockers available.

Future developments in frozen food storage depend on a number of factors including:

1. **Cost of locker plant service and rental charges.**
2. **Cost of home freezers.**
3. **Income of consumers.**
4. **Marketing margins for meat.**
5. **Plant services.**

Indications are that locker rentals have increased less proportionately than the service charges since the pre-war period. Locker rentals are closely related to locker plant investment. Since many plants were built with lower than present replacement costs and a higher proportion of lockers have been rented, the rates have not increased in proportion to the increased costs. Locker plant services are more directly related to labor costs. It is probable that pressure to maintain rental rates will occur as the higher construction costs for new plants and repairs will be reflected in more plants. Wage rates can be expected to remain high, but operators may be able to

Table 8. Intentions of 312 Farm and 151 Town Locker Renters Regarding Buying or Building Home Freezer Units.

	Plan to buy	Plan to build	Do not plan to buy or build	Undecided	Total
Farm	107	9	172	24	312
Town	39	2	103	7	151
Total	146	11	275	31	463

effect some savings by increasing the efficiency of their employees.

The initial cost of the home freezer is the primary item in the cost of storing food by this method. It is likely that these costs will be reduced somewhat if a high volume of sales is to continue.

The magnitude of the effect of changes in consumer income on the volume of frozen food storage needed is not clear. The great expansion has taken place at the same time that incomes have increased but other factors have been working. There is no experience upon which to base judgment as to the effect of declining incomes. It is probable that a serious decline in income may reduce use of storage capacity, and discourage building new plants or buying new freezers.

Storage of frozen meat is more attractive in times of rising meat prices than when meat prices are declining.

Both meat prices and marketing margins have increased. When meat prices decline and marketing margins remain relatively stable the margin becomes a larger proportionate share of the consumers' outlay for meat. Consequently, the possibility of savings by using the locker plant or home freezer is increased.

Indications are that patrons are not influenced entirely by cash cost. The

patrons rated the convenience of having the locker plant perform services high on their list of advantages. Several respondents listed services which they wanted their locker plant to add. The success of an individual plant and the volume of food preserved in frozen state will both be influenced by the degree to which locker plant services are improved and expanded. Patrons are likely to be more critical of the number and quality of locker plant services offered. This should be a challenge to operators to improve their operations.

The importance of improved quality of frozen foods compared with other methods of storage is another factor not entirely dependent on the relative cost. About three-fourths of the respondents said they liked frozen food as well as fresh food. The improvement in quality is especially striking in meats and in fruits and vegetables as compared with canning. No doubt the added quality and the weight which consumers place on it will influence the development of frozen food storage facilities.

Preservation of food by freezing is here to stay. Whether food is stored in a community locker plant or in a home freezer depends on the comparative costs, satisfactory service, and consumers' income and willingness to pay somewhat more for the convenience of the home freezer.

UNIVERSITY FARM, ST. PAUL 1, MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Division and United States Department of Agriculture Cooperating. Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.