



Frozen Food Home
LOCKERS & FREEZERS
in meat distribution



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AGRICULTURAL EXPERIMENT STATION
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Foreword

FEW business enterprises in the United States have had as rapid growth as the frozen food locker plants. The number of plants increased from 200 in 1935 to approximately 11,000 by the spring of 1948. These plants are of real benefit to rural and urban families in the preservation and storage of meat, fish, fruits and vegetables, and a convenience to many farmers in slaughtering livestock. Along with the growth and development in recent years of the frozen food locker plants is the development of home freezer units for similar food preservation and storage.

Regional research has attempted to appraise the place of this development in the field of livestock marketing, meat distribution and consumption. Former research studies have related to the internal organization and operating policies, patron reactions, location problems, and business analyses—in short, to problems that were of immediate concern to plant operators and those who might be considering the construction of locker plants. The Regional Committee trusts that these results will be of value to the meat industry, the locker industry, the home freezer industry, producers and consumers. An analysis of the situation dealing with meat distribution as affected by frozen food lockers and home freezer units is presented in the last section of the bulletin.

Nine States in the North Central Region participated actively in this study, with the Bureau of Agricultural Economics cooperating. This report has been reviewed by all members of the North Central Livestock Marketing Research Committee, who assume the responsibility for its publication. The Wisconsin Agricultural Experiment Station has printed the report, and the distribution of the regional publication is being made through the State Experiment Stations, represented by the personnel of the Regional Committee listed on the previous page.

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Frozen Food Home LOCKERS & FREEZERS

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By North Central Livestock Marketing Research Committee¹

THE rapid development of frozen food locker plants and the use of home freezers have raised some important questions relative to their effect on livestock slaughtering, meat processing, and meat distribution. To throw light on this problem a study was made of data obtained in nine states in the North Central Region.*

It is important in the analysis of locker plants to give consideration to the influence which meat rationing, the shortage of meat supplies, and the rising levels of meat prices had on the development of the locker industry during and immediately following World War II. How the future development might be affected by increased supplies of meat and by the lowering of meat prices is of vital concern to the frozen food locker industry.

Summary

Development and nature of the locker industry

The use of frozen food lockers and home freezers as storages for perishable food products has become widespread throughout the North Central States. Slightly more than half of the 10,464 locker plants in the United States in 1947 were found in the 12 states of this region. One-half of the locker plants in the nine states surveyed had less than 400 lockers, three-eighths had 400 to 799 lockers, and one-eighth had 800 or more lockers. Averaging 426 lockers to a plant, these plants in the North Central States provided storage space in 2.3 million lockers in addition to bulk storage space found in hundreds of plants. Roughly nine-tenths of the storage space was represented by locker storage and one-tenth by bulk storage in nine of the states providing the information in this survey.

Although some firms operate branch plants where storage only is provided, and while some plants are run as units of a small chain of locker plants owned by one company, the vast majority of plants are independently owned and operating units serving a relatively restricted local clientele. Forty per cent of the plants were operated in conjunction with some other business. Seventy-five per cent of all plants were owned by single proprietors and partnerships, 13% were corporations, and 12% were cooperatives. In a business sense, these plants are clearly small business undertakings serving preponderantly rural customers (about two-thirds of all locker renters are farmers) few of whom reside more than 10 miles from the locker plant. Average investment per plant was \$27,421.

¹ The report was prepared by Knute Bjorka, assisted by Louis Fritts, Agricultural Economists, U. S. Bureau of Agricultural Economics, in collaboration with members of the Executive Committee.
* The nine states were: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.

In addition to the basic service of storing perishable foods for their patrons, locker plants provide a wide range of other services. Of the plants included in the study 93% furnished processing service and 41% provided slaughtering service. The plants also provided services such as chilling, aging, and cutting up carcasses; packaging, sharp freezing, curing and smoking meats; making hamburger, sausage, and lard; selling carcasses or wholesale cuts of meat at wholesale prices; merchandising meats and other foods; preparing, blanching, packing and sharp freezing of vegetables and fruits; processing fish, game, and poultry.

Renters of frozen food lockers

Of the 3,946 locker renters included in the study in 1948, 64% resided on farms and 36% in towns. Each 100 farm patrons rented on an average 146 lockers, compared with an average of 128 lockers per 100 town patrons. Most of the patrons had been renting lockers for a period of from two to five years. Only 28% had been renting lockers more than five years. The reported advantages of renting lockers greatly exceeded the criticisms. However, locker renters expressed a desire that the plants provide more complete processing services for meat, fruits, and vegetables.

Charges for services at locker plants

Charges made for the various services rendered by locker plants were neither standardized nor uniform within a state or within the region. Income from the different services performed also varied widely depending upon the rates charged and the volume of business. Proceeds from the rental of lockers constituted the most important source of income in a majority of the plants. In a few plants, however, processing of foods and slaughtering livestock yielded a greater income than locker rentals.

Types and volumes of products handled

Data regarding the volume of slaughtering, processing and storage can be recorded as approximations only since few plants maintain accurate and complete records of their total operations. The average number of livestock slaughtered by the plants, by the farmers, and by custom slaughterers in 1947 was 237 cattle, 503 hogs, 17 calves, and 2 sheep per plant reporting. At the plants that provide a slaughtering service about three-fourths of all livestock killed to provide meat for locker storage was slaughtered at the plant—the other one-fourth by farmers and custom slaughterers. Heaviest slaughter took place during the late fall and winter season—lightest slaughter during the summer months.

Many plants process more food products than are stored. In some plants, processing for storage in home freezers was the source of a significant portion of income. There were also some plants providing sharp freezing and storage only, and no processing services. Therefore, in a great many plants, the amount stored did not correspond exactly to the amount processed.

The average amount of meat processed per locker plant was 152,908 pounds in 1947 of which 55% consisted of beef and veal, 44% of pork, and less than 1% of lamb and mutton. It is estimated that 622 million pounds of red meat were processed in 1947 by all locker plants in the nine states included in this study. An average of 27,150 pounds of hams and bacon per plant were cured, 24,095 pounds of meat were smoked, 12,446 pounds of meat were ground and 6,174 pounds of lard were rendered in 1947. Processing of poultry was less extensive than that of red meats. Only 1,073 pounds of poultry were dressed and drawn per plant and 7,832 pounds were packaged and frozen. An average volume of 2,573 pounds of fish and game were processed in these plants in 1947. This was about one-fourth the poundage of fruits and vegetables frozen at the plants.

An average of 185,697 pounds of perishable foods were stored per plant during 1947 of which 88.8% consisted of meat and meat products, 6.6% fruits and vegetables, 3.5% poultry, and 1.1% fish and game. Approximately 86% of the meat stored was produced from local slaughter (by farmers, by custom slaughterers, and by locker plant slaughter), 12% consisted of carcasses and parts of carcasses purchased as wholesale cuts of meat, and 2% was cut and wrapped by the patrons before delivery to the plant.

Three-fifths of the plants sold meat wholesale—90% of which went to locker renters and 10% to non-renters. The average amount sold wholesale per plant was 23,515 pounds of which 82% was beef, 17% pork, and 1% lamb and mutton. This meat was obtained from packers (84%), from farmers (11%), from local meat markets (1%), and from other sources (4%). One-fifth of the plants also sold meat at retail, 59% of which was sold to non-locker renters and 41% to locker renters.

Home freezers

Of the 2,156 home freezer owners who furnished information for the study, 69% resided on farms and 31% in towns (this is not necessarily the ratio of all home freezer owners living on farms and in towns). The data showed that 42% of the owners living on farms and 35% of those living in cities also rented lockers. Fifty-five per cent of all home freezer owners had rented lockers before acquiring freezers. The study did not disclose how many discontinued renting lockers. While some purchasers of home freezers ceased renting lockers, others began renting them. The reason given most frequently by former locker renters for discontinuing renting lockers was the purchase of a home freezer. Of those who owned home freezers and also rented lockers two-thirds reported they planned to continue renting lockers for the reasons that lockers provide extra storage space and that the plant is a convenient place to have slaughtering and processing done and a dependable place to keep frozen foods in case of local electric power failure. Advantages of owning home freezers were reported far more frequently than disadvantages of their ownership. Farm owners of home freezers reported storing 804 pounds and city owners 555 pounds of meat, poultry, fish and game in their freezers and lockers, contrasted with 304 pounds of meat stored per locker in all locker plants in nine states. Farmers reported storing about 60% more meat but 10% less poultry in their home freezers than city folks store.

Quite naturally, farmers relied heavily upon their own home produced supply of meat for freezer storage, yet an average of 77 pounds was purchased for storage compared with 217 pounds bought by town owners (some urban owners obtained meat from farms they own).

Frozen food lockers and home freezers in meat distribution

Consistent with the basic purpose for which locker plants were originally established, namely, as storage centers for perishable food products, locker plants have continued to be primarily food banks and have not made significant inroads upon the commercial slaughter, processing, wholesaling, and retailing of meat products. Meat obtained from slaughter for storage in frozen food lockers is estimated to be equivalent to about 6% of all meat produced by commercial slaughter. The bulk of this amount represents meat that in the absence of locker plants would not have been produced by commercial slaughter, but would have been obtained from farm slaughter for home use by farmers. Locker plants have made it possible to shift storage of meat on the farm (as fresh, cured, canned, and smoked meats) to central freezer storages and have likewise enabled farmers around numerous plants to dispense with farm slaughter in favor of slaughter at the locker plant. Such operations in themselves have not lessened to any significant extent the normal volume of live-stock flowing into commercial livestock and meat distribution channels. There is some diversion to the extent that larger numbers of animals are locally killed and processed than before locker plants provided such service and that urban locker renters procure their meat from this source. Such diversion, however, has been very small.

Locker plants were distributors of packer dressed meats, estimated to total about 210 million pounds in 1947 for all plants in the United States. They likewise provide an outlet for some locally produced meat (about 16% of meat sold by locker plants to patrons was obtained from locally slaughtered livestock). Data were not obtained concerning the effect of retail sales of meat as well as storage of meat by locker plants upon the business of retail meat markets. That there is competition between these two types of establishments in local communities cannot be denied. Some retail meat markets, however, have increased their sales of wholesale cuts of meat to both locker renters and owners of home freezers.

The extent to which locker plants and home freezers are responsible for any change in the volume and type of meat consumed is not too clear from the data. Locker renters reported that family meat consumption increased, especially that of beef, since renting lockers. To what extent the availability of freezer storage space, the general prosperity of farmers and urbanites, and the increased supply of meat in the country were responsible for the increase in meat consumption is not too clearly evident. Per capita red meat consumption in 1947 for the country as a whole was 7% above that of 1945.

The extremely rapid growth of the locker plant industry in most of the states took place during the war and immediate postwar period. The conditions so favorable to the expansion which occurred during this period cannot

be expected to continue to support the locker industry. The principal factors that will probably influence the use of lockers in the future (not necessarily in order of importance) are:

1. Cost of locker plant service and rental charges.
2. Location and availability of plants and type of service provided.
3. Use of home freezers.
4. Marketing margins on meat.
5. Trend in prices of meat.
6. Management of plants.

Locker plants provide a service which millions of locker renters desire. They are relatively small business undertakings serving their local communities. Home freezers are likewise apparently filling a need for many farmers and city people. The initial costs of the freezers and the expenses of operation are perhaps the principal deterrents to their even wider use. Although home freezers compete with locker plants as storages, they also supplement the locker plants in that their owners often rent lockers for additional storage space, have some or all of their slaughtering and processing done at the plants, and buy wholesale cuts of meat from the locker operators.

Objectives and Source of Data

The objectives of the study were to appraise the position of frozen food locker plants and home freezers in the over-all pattern of livestock and meat marketing, livestock slaughter, and meat distribution. Such appraisal should provide information as a basis for giving direction to this developing industry in the future.

More specifically this involves the extent to which locker plants constitute a market for livestock, how the use of lockers and home freezers have affected local slaughter, and what opportunities there are for improving local slaughtering and for handling and selling edible and inedible offal. Other objectives were to determine the source and volume of meat and other products stored in lockers, the extent to which various kinds of processing was done in these plants, what other services were performed, and the volume of different kinds of meat and other products sold wholesale and retail at locker plants.

The study was also designed to determine the extent to which home freezers tend to supplement locker plants or to compete with them in the storage of frozen foods and to ascertain the influence that frozen food lockers and home freezers have had on the volume of meat and other frozen food consumed by farm and urban families, the reaction to frozen meat by locker patrons, former locker patrons, and owners of home freezers, and the services provided by locker plants.

The study was based on conditions in 1947, except in instances noted. Data were obtained for 576 frozen food locker plants, from 3,947 patrons who rented lockers, 1,112 former patrons who had discontinued renting lockers, and 2,156 users of home freezers.

Frozen Food Lockers

Development and Nature of the Locker Industry

Number of locker plants

Frozen food locker plants constitute a young industry that has made phenomenal growth in recent years. Only a few plants had been built in the nine states included in the study by the late 1920's, but by 1938, there were 658 plants in these states, and in 1943, 2,349 plants. The number of plants more than doubled during the next five years, and a total of 4,869 were in operation in 1948 (Table 1).² The number of locker plants per state ranged from 328 in Indiana to 866 in Iowa. When adding the number of plants in North Dakota, South Dakota and Nebraska, it brings the total to 5,989 in the North Central Region.

The total number of frozen food locker plants in the United States was estimated at 1,269 in 1938, 4,559 in 1943, and 10,900 in the spring of 1948. According to this estimate, roughly one-half of the locker plants in operation are located in the North Central Region. Outside this region, 18 states had more than 100 plants each, and 21 states had smaller numbers. Locker plants are highly important in the Pacific states. In 1948, there were 665 in Washington, 355 in Oregon, and 514 in California. Locker plants were also numerous in Texas, where 514 operated that year.

² Data on locker plants located in the states outside those included in this study were obtained from K. F. Warner, Extension Service, U. S. Department of Agriculture.

TABLE 1—Number of frozen food locker plants, average number of lockers per plant, and total number of lockers per state, 1948.

State	Locker plants	Average number of lockers per plant ¹	Total lockers
	Number	Number	Number
Kansas.....	506	475	240,350
Missouri.....	469	428	200,341
Iowa.....	866	346	299,636
Minnesota.....	644	337	216,971
Wisconsin.....	659	455	300,000
Michigan.....	375	573	215,000
Illinois.....	576	469	270,000
Indiana.....	328	559	183,249
Ohio.....	446	586	261,421
Totals and average nine States.....	4,869	449	2,186,968
North Dakota.....	272 ²	312 ³	84,864
South Dakota.....	296 ²	293 ³	86,728
Nebraska.....	521 ²	370 ³	192,770
Totals and average North Central Region.....	5,989	426	2,551,330

¹The number of lockers per plant is available from records in Missouri, Iowa, Minnesota, and Indiana. For the other states the average number of lockers per plant was estimated by applying the average number of lockers per plant of the plants included in the study to the total number of plants in the state.

²Information furnished by K. F. Warner, Extension Service, U. S. Department of Agriculture.

³Mann, L. B. and Wilkins, Paul C. "Frozen Food Locker Plants, Location, Capacity, Rrtes, and Use", Farm Credit Administration, Cooperative Research and Service Division, Feb. 1947, p. 2

The growth in the number of locker plants in the North Central Region may be far less rapid in the years ahead than in the past 15 years. Perhaps continued growth may be represented by additions to existing plants or building of small branch plants as locker storage service is demanded rather than by the construction of many new plants. Most locker plants are located in rural trading centers, and as the large numbers of plants in the North Central States indicate, a large portion of the rural population has access to locker plant service. Most of the larger centers are now provided with a plant and in some instances with two or more competing plants. Furthermore, the large increase in the use of home freezers may deter the construction of more plants that might have been considered by enterprising investors in absence of this development.

Some of the expansion in the industry may come from the erection of plants in larger urban areas where few plants are found today, but such expansion is not anticipated to be very large for several reasons:—(a) urban families are acquiring home refrigerators with freezer storage units in them or are purchasing regular home freezer storage cabinets; (b) meats are readily available and less incentive to store large quantities now presents itself; (c) the backbone of the industry is the patronage of rural customers.

Number of lockers

The total number of individual lockers in the plants located in the nine states included in the study was estimated at 2,186,968 in 1948, with an average of 449 lockers per plant (Table 1). Records of the total number of lockers per plant were available in four states. The number in each of the other five states was estimated by applying the average number of lockers per plant of those included in the study to the total number of plants in the state. The average number of lockers per plant ranged from 337 in Minnesota to 586 in Ohio.

The number of lockers per plant varies widely. Of the 576 plants included in this study, 51% had less than 400 lockers each, 37% had from 400 to 799 lockers, and 12% had 800 or more lockers per plant (Table 2). The most common size plants range from 100 to 400 lockers (Appendix Table 20).^{*} The smallest plant reporting had 30 lockers and the largest 5,000.

The fact that plants with less than 600 lockers are the predominant size in the industry partially indicates that such sizes are sufficient to serve the usual patronage area about a plant. Locker plants are expected to remain relatively small businesses unless a series of plants are operated as a chain organization. Convenience of location for the customer is an important consideration in attracting his patronage and therefore in limiting the size of plants. Long distances to locker plants are deterrents in attracting customers. When plants were relatively few in number, some patrons travelled as far

^{*} Tables 20 to 51 appear in Appendix B. Appendix B is published separately and may be obtained free by writing to any of the 13 Agricultural Experiment Stations in the North Central Region listed on the cover of this bulletin. In requesting these Appendix Tables ask for Appendix B—Tables 20 to 51—for Wisconsin Agr. Exp. Station Bulletin No. 490 (Regional Publication No. 21) entitled "Frozen Food Lockets and Home Freezers in Meat Distribution."

as 15 to 30 miles to avail themselves of the service, but this is no longer necessary as plants nearer by have been erected. For many communities, therefore, plants of 400, 600, or 800 lockers are of ample size to serve the potential patronage in the area. Furthermore, a plant of 400 to 600 lockers is also of a size to keep two persons fully employed whereas one of 800 to 1,000 lockers has more difficulty in attracting a processing business of sufficient volume to regularly employ three or four persons. It is, therefore, highly probable that the average size of plants in the states studied will change little.

Volume of storage space

The 1,987,159 lockers in 1947 in the nine states included in the study had an estimated 11,724,237 cubic feet of storage space (Appendix Table 21). This estimate is based on the average size of locker being 30 inches deep, 20 inches wide and 17 inches high, having a volume of 5.9 cubic feet.

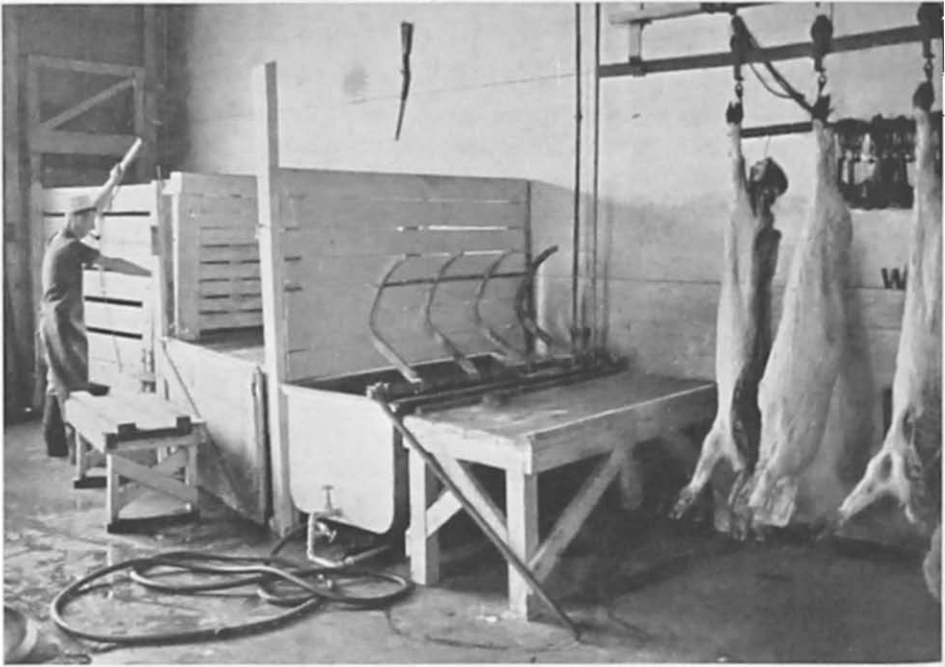
Twenty percent of the plants reporting also made available to patrons some bulk storage space at sub-freezing temperatures. Such bulk storage space may be in separate rooms, compartments, in the locker room, in the aisles, or on top of the lockers. There is a great deal of variation among plants in this respect, and the volume of bulk storage space indicated below is a rough estimate at best. Forty-seven percent of the plants providing bulk storage had less than 1,000 cubic feet of space for this purpose, 33% had from 1,000 to 4,999 cubic feet, and 20% 5,000 cubic feet and over. It is estimated that the 4,376 plants in the nine states covered by the study had an aggregate volume of 1,582,903 cubic feet of bulk storage space (Appendix Table 21).

According to these estimates, the total storage space in the plants in these states amounted to 13,307,140 cubic feet, of which 88% represented locker storage and 12% bulk storage. If all of this space were devoted to meat storage and assuming that 30 pounds of meat can be stored per cubic foot of space, there is a possibility of storing 399 million pounds of meat at a time. If there were a turnover of meat in the lockers three times a year, it is possible for the plants to store 1,197 million pounds per year—with a turnover of twice per year about 800 million pounds. Bulk storage space was more commonly provided by plants in Ohio and Wisconsin than by plants in other states.

Branch plants

Branch plants are storage plants operated by parent plants where food products are stored at freezing temperatures in individual lockers under lock and key. Ordinarily, a branch plant provides storage service only with the processing and other services rendered at the parent plant. The sharp frozen food is transported to the branch plant by the parent plant and placed in the lockers for the patrons. Generally, arrangements are made with someone in the community where the branch is located to open and close the plant, attend to the lighting, cleaning, and refrigeration, and generally watch the branch.

Few branch plants were found in the area covered by this study. In the 9 states, the 576 plants called upon in this survey reported having 42 branch



(Courtesy J. C. Allen and Son)

SLAUGHTERING PLANT

Many locker plants slaughter livestock for locker renters and home freezer owners. City and village ordinances often regulate the location and operation of the slaughter plants.

plants. Although there appears to be some economy in providing branch plants in some communities instead of constructing and operating full service plants, the trend in the industry has not been toward such development. Branch plants are usually small—generally under 250 lockers—represent less investment than full service locker plants, require little attention, and also provide a limited service for the patrons.

Other businesses associated with locker plants

A total of 229 locker plants, or 40% of those included in the study, were operated in combination with some other business. Nearly two-thirds of such plants were in conjunction with meat markets or grocery stores, 12% with cold storage or ice plants, 7% with dairy plants, and 7% with frozen food and general merchandise stores. A number of other types of businesses were also reported, such as refrigerator sales and service establishments, produce houses, household electrical appliance stores, liquor stores and restaurants. About one-fourth of the locker plants sold home freezers, and a slightly smaller proportion serviced such freezers.

In some cases, the other businesses were added to existing locker plants as sidelines; in other cases, a locker plant was added to an existing business. In dairy plants, for example, locker plants were added to the dairies, either in space available for such purpose or in separate buildings or additions newly

constructed. Thus, the locker plant is found in many cases as a side line to some other business and in other cases as the main line business to which other business activities have been added.

Locker operators are interested in operating some associated business along with their locker plant for a number of reasons. There is a limit to income possibilities from a given number of lockers even if a complete service is provided. Income from rentals is fixed and processing income is limited by the amount of the product that the average patron can put through one locker or store in a home freezer in one year. In the plant of two hundred to five hundred lockers which is so commonly found, necessary office and processing equipment is seldom used to capacity for locker plant business alone. For example, any meat cutting equipment needed for locker operation can serve a retail meat counter also. Many times additional business is necessary to utilize labor efficiently. Personnel trained to operate refrigerating equipment can use this knowledge to handle ice making equipment. The personnel that must be kept ready to meet customers as they bring in products for storage or come in the plant for any reason can take care of retail sales at the same time. Farmers especially appreciate the opportunity to fill all, or a great many, of their needs at one stop when they come to town to get food from the locker plant. Attractive displays of groceries and food products in the lobby through which patrons must pass stimulate impulse sales.

Various reasons can also be given for tying in a locker plant with other businesses. In some instances, the locker plant service was started to attract additional patronage or retain customers for the previously operated business. In other cases, the physical plant lent itself well to conversion into a locker plant; the experience and training of employees in meat markets adapted themselves to the type of work found in a locker plant; some businesses, the ice companies, for example, found that a locker plant supplemented very well the seasonal peak in the ice business; others looked for additional sources of income and opportunities to utilize labor, capital, and management to greater capacity and efficiency. Since the plants can be constructed of different sizes, they can be built to suit the purposes of the operator and the businesses with which they are associated.

Types of ownership

Being relatively small business undertakings, it is not surprising to note that nearly three-fourths of the plants were individual proprietorships and partnerships and only one-fourth were corporations. Of the plants sampled in the nine cooperating states, about 55% were operated by sole proprietors, 20% by partnerships, 13% by ordinary corporations, and 12% by non-profit cooperative organizations (Appendix Table 22). In Illinois, Ohio, and Minnesota a larger proportion of the plants were cooperatively owned than in the other states. In some states, Michigan, Missouri, and Indiana, for example, cooperative ownership is indeed exceptional, comprising less than 5% of all plants. No apparent difference was noticeable in the types of operation growing out of the legal type of business ownership.

Investment in locker plants

The average investment per frozen food locker plant was \$27,421 for the 429 plants for which this information was reported. This varied from an average of \$11,698 in Iowa to \$54,117 in Illinois (Appendix Table 23).

Twenty-six percent of the plants had investments of less than \$10,000, 25% from \$10,000 to \$19,999 and 20% from \$20,000 to \$29,999. Investment of \$60,000 and over applied to 7% of the plants. Nearly 3% of the plants had investments of \$100,000 and over. The smallest investment reported was \$1,500 and the highest investment \$256,821.

In view of the widely different level of costs of construction in the years when the plants were built, the average original costs for each state or for locker plants within a state do not in themselves indicate differences in the size or quality of plants erected. Generally, plants built prior to 1939 had a lower cost per locker than those built after that year. Conventional plants built during 1945, '46 and '47 frequently had over-all costs on a per locker basis which ranged from \$60 to \$100 whereas plants built before World War II had costs of one-third to one-half this amount. Although the major portion of the increase has been due to the general rise in costs of construction, a portion was due to additional fixtures, improved facilities and better methods of construction incorporated in plants built during the later period.

Services provided at locker plants

All frozen food locker plants provide locker storage for meat and other perishable products. Of the plants included in this study, 93% also furnished processing service, and 41% provided slaughtering service (Appendix Table 24). Processing meat and meat products included such operations as chilling, cutting, wrapping, freezing, curing, smoking, grinding, making sausage, and rendering lard. Processing also included wrapping and freezing fish and other sea food; and preparing, blanching, wrapping and freezing fruits and vegetables. Some livestock was slaughtered under the direction of the plant management in their slaughtering plant or on farms. Some were slaughtered by custom slaughterers, and some by farmers or other owners of the livestock.

Adding new services to those already existant was planned at a number of the locker plants in 1948. Slaughtering services were to be added at 20 plants, curing and processing meat at 39 plants and rendering lard at 13 plants. To enlarge plant facilities and provide bulk storage space was planned for 32 plants. Selling meat at retail was planned at 16 plants, and selling meat at wholesale at 2 plants. Poultry processing was to be added at 12 plants, the processing of fruits and vegetables at 8 plants, the manufacturing of ice cream at 13 plants, and miscellaneous services at 14 plants.

Buying livestock for slaughter and selling meat to patrons was done at 22% of the plants reporting. This practice was followed by more than 30% of the plants in Iowa and Wisconsin but by less than 10% of the plants in Michigan and Ohio. The sale of meat to the public was done at 15% of the plants reporting. No such sales were reported for plants in Ohio but for 33% of the plants in Wisconsin.

TABLE 2—Percentage of frozen food locker plants of different sizes included in the sample by states, 1947.¹

State	Plants in sample	Number of lockers per plant		
		Less than 400	400 to 799	800 and over
	Number	Percent	Percent	Percent
Kansas ²	51	55	92	13
Missouri.....	41	43	40	17
Iowa ²	78	71	23	6
Minnesota ²	60	72	24	4
Wisconsin.....	57	47	39	14
Michigan.....	41	42	46	12
Illinois.....	112	40	46	14
Indiana ²	61	38	46	16
Ohio.....	75	22	53	25
Nine States.....	576	51	37	12

¹In some states separate schedules were received from branch plants and they were counted as a sample plant.

²Size based on all plants in the state.

Renters of Frozen Food Lockers

Residence of locker renters

Of the locker renters included in the study in 1948, 64% resided on farms and 36% in towns (Appendix Table 25). In Wisconsin, Minnesota, Missouri, Kansas, Iowa, and Illinois, patrons who resided on farms constituted two thirds or more of those renting lockers. In no state did the number of urban renters exceed the number of rural renters. Historically locker plant service started as a service for farmers who were confronted with a meat storage problem and who were desirous of preserving meat by means other than curing, smoking, and canning. Later, additional products such as poultry, fruits, vegetables, and other foodstuffs were added to the list of storable products. Urban residents also found locker service appealing to them. Thus far, however, as these figures show, the "backbone" of the industry is rural patronage.

Some patrons who resided in town probably rented lockers because they owned farms from which they obtained meat and other perishable products for locker storage. Of the 1,427 town residents renting lockers who furnished information in the study, 24% reported that meat was supplied for locker storage from farms they owned. Only 17% obtained fruits and vegetables from their own farms for storage in lockers.

Of the 1,112 persons who reported having discontinued renting lockers, 54% resided in towns and 46% on farms. The relatively large proportion of town residents that discontinued the use of lockers may have included many who had rented lockers during the war when meat was scarce and supplies at meat markets were low and often hard to obtain. Their desire for lockers diminished when it became less troublesome to obtain meat through regular markets. The increase in locker rental and processing rates during 1947 at many plants also discouraged some urban renters from continuing to rent lockers.

Distance from locker plants

Thirty-six percent of the locker renters included in the study lived in town (Appendix Table 25). Thirty percent lived in the same town in which the locker plants were located (Appendix Table 26). The other 7% lived in other towns. The remaining 64% of the locker renters lived on farms. Of those town patrons who discontinued to rent lockers in 1948, 43% resided in the same town where the locker plants were located.

Of all locker renters 32% resided within a distance of 5 miles of the plants, but outside the towns where the plants were located. An additional 26% resided between 5.0 and 9.9 miles from the plant. Those who resided 15 miles or more from the plant comprised 3.0% of the locker renters (Appendix Table 26).

Long distances to plants are positive deterrents to the renting of lockers. Ideally, the locker plant should be so located as to enable the patron to bring food or get food on his regular trips to town. Extra trips to the plant or trips to plants that are off the beaten path for the patron quickly add to the cost of such service. Assuming a car could be run at 5¢ per mile, a farmer living seven miles from a locker plant would have an extra cost of 70¢ if the trip were not justified for any other purposes. If only 10 pounds of food were gotten from the locker, the transportation cost alone (disregarding the value of the time spent by the one making the trip) would add 7¢ per pound to the food items. It is apparent, therefore, that patrons will attempt to patronize plants that are conveniently located. As plants have multiplied, the average distance that patrons live away from the plants has become less. It is, therefore, quite reasonable that in the nine states studied, only 2.5% of all locker renters should live 15 miles or more from the plant.

Size of families of farm and town locker renters

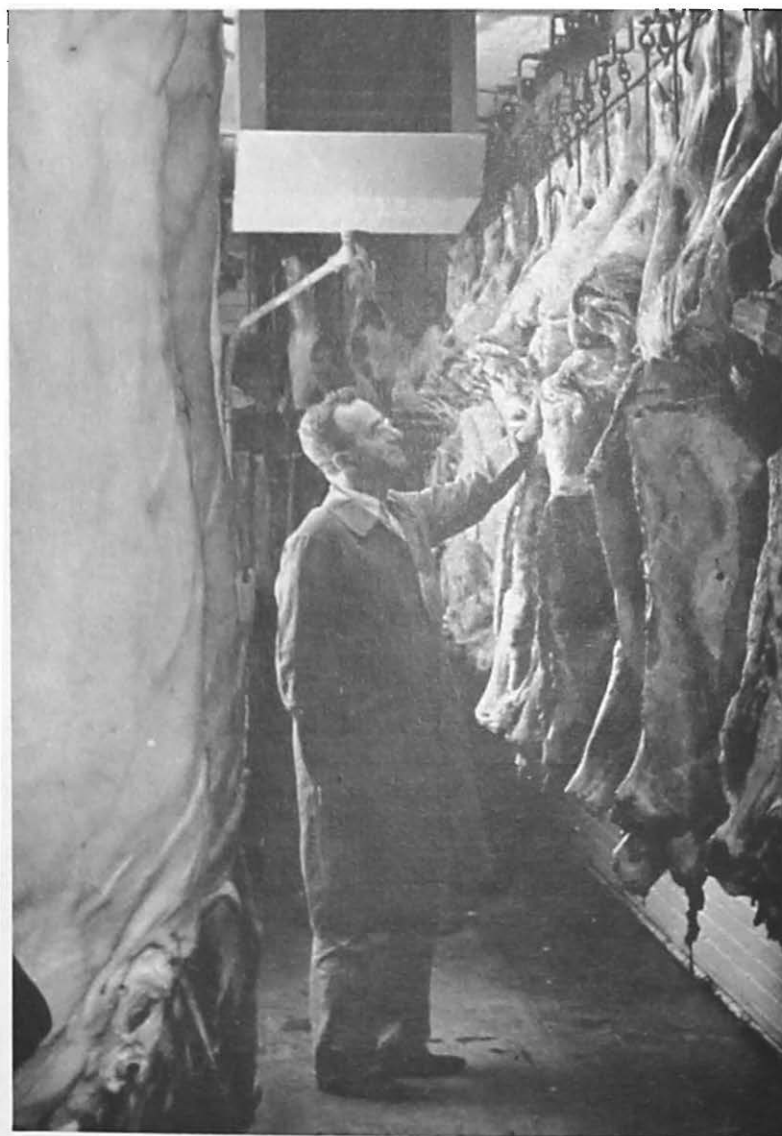
Rental of lockers does not appear to be limited to households of any particular size. Households of one and two persons as well as those of eight or more persons were found among both rural and urban renters. The average household of farm renters had 4 persons eating one or more meals regularly at the home,—among the urban renters 3.4 persons. These averages compare closely with the average size families found on farms and in urban centers. Households with two, three, four, and five persons accounted for 83% of the rural renters and 91.4% of the urban renters. According to the 1940 Census 75.2% of all farm families in the United States were of these sizes,—79.6% of the urban families. This suggests that fewer of the very small families (1 person) and the large families (6 persons and more) are found among urban and rural locker renters than are found in the population as a whole. The comparison of size of family households renting lockers in the nine states with the size of families in these same states is shown in Table 3.

Number of lockers rented by each farm and town patron

Of the farm patrons furnishing reports, 60% rented one locker and 40% rented 2 or more lockers (Appendix Table 27). Among the town patrons, 76% rented one locker and 24% rented 2 or more lockers. Three lockers each

were rented by 4.5% of the farm patrons and 2.4% of the town patrons. Less than 1% of each group rented 4 lockers or more. The use of 5 and 6 lockers by patrons was unusual.

Each 100 farm patrons in the nine states rented on an average 146 lockers, compared with an average of 128 lockers per 100 town patrons. Information was not obtained on the extent to which lockers were rented jointly by two families, but this probably was of negligible importance.



CHILLING AND AGING ROOM

Carcasses are thoroughly chilled and, in the case of beef, aged before being cut up into the kinds and size of cuts requested by patrons. The chill room is generally kept at 34° F. Some plants have separate chilling and aging rooms.

TABLE 3—Percentage distribution of locker renters in the 9 States of the North Central Region by size of household, 1948, compared with percentage of families of different sizes in the same States based on 1940 U. S. Census.

Households and Families	Number of Persons Per Household or Family							
	1	2	3	4	5	6	7	8 or more
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Farm Households renting lockers	.4	18.5	23.0	24.8	16.7	9.1	3.4	4.1
Families 1940 Census.....	6.3	23.5	20.9	18.2	12.6	7.9	4.6	6.0
Urban Households renting lockers	1.3	30.3	26.2	23.3	11.6	4.8	1.2	1.3
Families 1940 Census.....	10.1	23.2	23.5	18.0	9.9	5.1	2.6	2.6

It is apparent that the average family of four to five persons would normally get along with one or two lockers. If the family ate as much red meat as the average annual per capita consumption of 155 pounds (1947), then the total red meat consumption for a family of four would be 620 pounds and for a family of five 775 pounds. Not all of this meat would be stored in a locker before consumption—some would be eaten fresh and some would consist of cured, smoked, and canned meat. On the other hand, the locker would be used to store some poultry, fruits, and vegetables as well. If we assume, therefore, that as much as 600 to 700 pounds of food is stored by a family per year, it is apparent that one or two lockers may easily suffice except perhaps immediately after butchering or during the height of the fruit and vegetable season. A standard locker will hold approximately 200 pounds of meat and if the meat is not stored for more than 4 months, it can be refilled an average of three times a year.

During World War II and the immediate postwar period many plants limited their patrons to the rental of one locker. Such practice may also have had some bearing upon the number of lockers rented by families at the time of the survey.

Number of years lockers have been rented

Of those renting frozen food lockers, about 11% had rented for a year or less and 47% had rented for three years or less (Appendix Table 28). Only 28% had been renting lockers more than five years, and only 1% more than ten years. The relative newness of locker plants accounted for the short rental period by many patrons. One half of the plants sampled in this survey began operations after 1943.

Although no study was made of turnover in locker renters as a part of this research project, it is believed that such turnover is not high and that the loss of patrons resulted largely from purchasing home freezers and patrons

switching to newly opened plants located closer to their homes. Reports from operators indicate that at many plants numerous patrons have continued renting lockers uninterruptedly from the time of the first rental.

A larger proportion of the patrons located in Minnesota and Iowa had been renting lockers over relatively longer periods than in other states. This is due in part to the fact that locker service became available earlier in these states than in the other states of the North Central Region. In Minnesota, 45% of the patrons had rented lockers more than five years and in Iowa 46% had been renting lockers that long. In Michigan on the other hand, only 14% of the renters reported they had rented lockers more than five years and in Missouri 15% had been renting that long. Those who had rented lockers ten years or more represented less than 2% of the patrons in Michigan, but more than 13% in Minnesota and Iowa.

Expressed preferences for fresh and frozen meat

In the questionnaires sent to locker renters, former locker renters, and users of home storage units, the question was asked, "What form of meat does your family prefer—(check) (a)—Fresh ----- (b)—Frozen ----- (c)—No preference -----." The results from the three groups receiving the schedules in the nine states were as follows (Table 4):

TABLE 4—*Preferences for fresh and frozen meat as expressed by locker renters, ex-locker renters, and home freezer users, 1948.*

	Prefer frozen meat	Prefer fresh meat	Indicated no preference	Total number reporting
	Percent	Percent	Percent	Number
Locker Renters				
Rural.....	21.2	20.8	58.0	2424
Urban.....	18.6	26.6	54.8	1395
Weighted average.....	20.8	22.9	56.8	3819
Ex-Locker Renters				
Rural.....	36.4	22.8	40.8	514
Urban.....	19.1	39.8	41.1	492
Weighted average.....	27.9	31.1	41.0	1006
Users of Home Freezers				
Rural.....	30.6	10.0	59.4	1319
Urban.....	31.3	14.3	54.4	566
Weighted average.....	30.8	11.8	57.9	1885
All Groups				
Rural.....	25.9	17.7	56.4	4257
Urban.....	21.6	26.5	51.9	2453
Weighted average.....	24.4	20.9	54.7	6710

Considerably more than half of the respondents who used frozen storage, either in a locker plant or in a home unit, indicated no preference for one over the other. Of the 1006 former locker patrons surveyed, 59% indicated a preference—28% for frozen meats and 31% for fresh meats. Locker plant patrons were about equally divided in their preferences for fresh and frozen. Of the home freezer users, the expressed preference was for frozen meat over

fresh by almost three to one. Many of these users had only recently acquired home freezers and may therefore have been unduly enthusiastic about frozen foods.

It can be noted that of the groups surveyed, the largest percentage of expressed preferences for frozen meat came from the rural group of former locker renters. This suggests that a dislike for frozen meat probably was not a major reason for discontinuing to rent lockers.

Preferences for frozen meat were expressed somewhat more frequently by farmers than by town residents. Whether such favoritism to frozen meats reflected a reaction to the use of cured and canned meats on farms or whether there is a clear-cut liking for frozen meat over non-frozen fresh meat is not readily apparent. Furthermore, whether better quality of meat was frozen than that normally consumed fresh and therefore having an influence on the decision is not deducible from the data.

It is possible that those expressing a preference for frozen meat were actually expressing their preference for, or even satisfaction with, the system of preservation afforded by locker storage rather than a preference for the taste of frozen meats over fresh meats. The high percentage of preferences for frozen meats over fresh meats among home freezer users may be more nearly a reflection of their enthusiasm for their locker boxes than an actual preference in taste. Others may have preferred the frozen meat because of its convenience, the variety in menu afforded, and similar reasons other than taste.

From the standpoint of an industry desiring to sell frozen meats, the importance of the above data rests in the fact that there is evidently no apparent aversion to frozen meats. The data do not show, however, whether those who profess to prefer frozen meat would purchase frozen meat if fresh meat were available at the same price, or if such preference would also exert itself if frozen meats were priced higher than fresh meats.

Principal advantages and criticisms of locker service

Information was obtained to determine the patron's reaction to the services offered at locker plants. In some cases more than one advantage or criticism was given by a patron. A comparison of the advantages and criticisms of locker services should give the plant operator an indication of the services desired by his patrons and thereby encourage not only continued but increased patronage. It is important to know the nature and relative importance of the advantages and criticisms reported by locker renters in order to establish better patron relations.

According to the number of times each advantage was given, money saving through quantity buying was the most important (Table 5). Other advantages given were the availability of fresh-like quality meat, fruits, and vegetables the year around, a saving in work and time of home butchering, processing, and canning, and a greater variety and supply of food made available.

TABLE 5—Principal advantages of locker plant services as given by patrons, 1948.

Advantage	Number of times given		
	Farm	Town	Total
1. Saves money through quantity purchase.....	873	595	968
2. Meat, vegetables, and fruit of fresh like quality available the year-round.....	698	243	941
3. Saves work, time, and trouble of home butchering, processing and canning.....	594	129	723
4. Better quality foods available.....	272	223	495
5. Convenience.....	307	186	493
6. A greater variety and supply of foods available.....	183	264	447
7. Provides adequate and sanitary storage.....	165	171	336
8. Freezing reduces waste and spoilage.....	245	59	304
9. Satisfaction of using home grown foods.....	161	63	224
10. Frozen foods tastier and more palatable than home canned or cured.....	105	70	175
11. Provides reliable freezing and storage facilities.....	62	87	149
12. Improved method of preservation and care of food.....	39	26	65
13. Skilled processing services available.....	37	22	59
14. Can butcher any time during the year.....	46	6	52
15. Improves menu and diet.....	9	2	11
16. Consumption of meat increased.....	5	2	7
17. Simplifies shopping.....		5	5

The criticisms of the locker service as reported by the same group of patrons were given less frequently than the advantages. The two disadvantages mentioned most frequently were the suspicion that meat was misplaced or taken from the locker and the locker plant being too far away (Table 6). Other criticisms were inconvenient hours that the plant stayed open, locker rental too high and processing and service charges too high.

Additional services desired by locker renters

Locker renters were asked what services they would like the plant to provide that was not then available. The service most frequently given was that the

TABLE 6—Principal criticisms of locker plant services as given by patrons, 1948.

Criticism	Number of times given		
	Farm	Town	Total
1. Suspect meat lost or taken from locker.....	196	80	276
2. Locker plant too far away.....	174	76	250
3. Inconvenient hours (not open evenings and holidays).....	106	62	168
4. Processing and service charges too high.....	85	58	143
5. Locker rents too high.....	76	27	103
6. Inadequate services and facilities.....	66	31	97
7. Meat improperly cut and wrapped.....	57	25	82
8. Food develops off-flavor.....	52	21	73
9. Poor processing and curing.....	43	25	68
10. Meat develops bad odor and locker burn.....	42	18	60
11. Careless, inefficient management and employees.....	25	29	54
12. Frozen meat less palatable than fresh.....	21	26	47
13. Poor sanitation and care of lockers.....	25	21	46
14. No record of packages put in and taken out of lockers.....	25	9	34
15. Lockers too small and overcrowded.....	19	11	30
16. Necessity of going into cold place to get food.....	14	14	28
17. Poor arrangement of packages in lockers.....	17	8	25
18. Unsatisfactory slaughter and cutting.....	17	8	25
19. Spoilage due to improper control of locker temperature.....	12	10	22
20. Lockers inconveniently located.....	9	3	12

plant provide more complete processing of meat, fruits and vegetables (Table 7). Others desired that the plant open at hours more convenient to them, that the plant provide slaughtering services, and that wholesale meat, fruits, and vegetables be made available at the plant.

TABLE 7—Additional locker plant services desired by locker renters, 1948.

Additional service	Number of times given		
	Farm	Town	Total
1. More complete processing of meat, fruits, and vegetables.....	136	89	225
2. More convenient hours.....	103	58	161
3. Provide slaughtering services.....	90	20	110
4. Handle wholesale meat, fruit, and vegetables.....	48	54	102
5. Complete record and assured safety of locker contents.....	50	28	78
6. Pick-up and delivery services.....	14	19	33
7. Up-to-date wrapping and packaging of food.....	19	9	28
8. More and bigger locker space.....	16	4	20
9. Bulk cold storage and sharp freeze.....	7	8	15
10. Complete labeling of packages (specie, cut, weight, etc.).....	10	4	14
11. Provide divisions for different foods in locker boxes.....	7	2	9
12. Handle frozen foods.....	4	3	7
13. Different colored containers for different meats, fruits, and vegetables.....	4	1	5
14. More convenient location of locker boxes.....	2	3	5

Reasons given for discontinuing renting lockers

Many of those who discontinued renting had been locker patrons for several years. In fact, the average period during which they rented was not much less than the average period for those who were renting lockers. Information was obtained from 1053 former renters of lockers to determine the reasons for their discontinuing renting lockers. The reason most frequently given was the purchase of a home freezer (Table 8). The replies showed that 60% of the farmers who had discontinued renting lockers owned home freezers. However, home freezers were owned by only 33% of the town

TABLE 8—Reasons given by former locker renters for discontinuing renting lockers, 1948.

Reason	Number of times given		
	Farm	Town	Total
1. Bought home freezer.....	202	131	333
2. Too expensive and not economical.....	91	133	224
3. Inconvenient.....	99	76	175
4. Lost food from locker.....	98	48	146
5. Didn't care for frozen food stored too long.....	45	75	120
6. Too far away from locker, moved from locality.....	61	50	111
7. No longer needed storage space.....	28	81	109
8. Not satisfied with service.....	50	38	88
9. Wartime food-rationing ended.....	3	51	54
10. No longer produce own food.....	9	20	29
11. Locker too small.....	20	9	29
12. High cost of meat and other food stored.....	1	11	12
13. Fewer in family.....	2	7	9

residents who had discontinued renting lockers. Inconvenience, expense of locker rental, and loss of food from lockers accounted for others discontinuing renting lockers.

Plans to acquire home freezers

Fourteen percent of the 3,092 renters of lockers who replied to the question stated they planned to buy home freezers, 64% had no plans to buy, and 22% were uncertain. Of those planning to buy, about an equal number expected to do so in 1948 and 1949. Several planned to buy in 1950 and a few later.

Only about 1% of the renters reporting planned to build home freezers. An additional 2% stated their plans were uncertain.



CUTTING OR PROCESSING ROOM

Many plants are equipped with electric saws and meat grinders to expedite the processing operations. After the carcasses are cut, the meat is packaged and labelled in this room preparatory to sharp freezing. Special types of papers and cartons are used to package the foods.

Charges for Services at Locker Plants

The income of locker plants is obtained from numerous sources: rental of lockers, slaughtering livestock, processing operations, commissions and margins for handling wholesale and retail cuts of meats, sale of inedible offal, hides and pelts, and merchandising miscellaneous products. Much of this income depends on the rates charged and the volume of business involved. These two items, rates and volume, are considered in this and the following section of the report.

Charges for rental of lockers

The rental of lockers for storing meat and other perishable foods is a service provided at all frozen food locker plants, and at some plants it constituted the most important source of income to the plants. In the case of a few plants, however, processing foods and slaughtering livestock yielded greater income than locker rentals.

Rates charged for locker storage in frozen food locker plants were on both a monthly and on a yearly basis. Yearly rates generally were lower than the rental for a year would be on a monthly basis. Rates charged varied according to (1) location of plant, (2) type of locker (door or drawer), and (3) the size of locker and its accessibility or position in the tier.

Rental rates varied among states and within states. For the drawer type lockers the average rates by states were below \$13.00 per year in Kansas, Minnesota, Iowa, and Wisconsin, but were more than \$15.00 per year in Michigan, Indiana, and Ohio. Door type locker rentals average less than \$11.00 per year in Kansas, Minnesota, and Wisconsin but were slightly more than \$13.00 per year in Indiana.

Because of their location (usually the first three tiers), the accessibility of packages, and in some cases greater capacity, drawer type lockers usually commanded a higher rent than did door type lockers. In 1947, the average rental charge for drawer type lockers at the plants in the nine states was \$13.78 per year (Appendix Table 29). This compares with an average of \$11.54 per year for door type lockers.

Rental rates in the region as a whole were slightly less at the smaller plants than at the larger ones. Such difference may be due to the fact that larger plants are frequently located in larger urban centers where costs of operation are higher than in small towns.

The rates charged for lockers of the same type also tended to vary according to tier in which the lockers were located.⁴ The rates are generally higher for the most accessible lockers and slightly lower for the less accessible ones.

Charges for processing meat

As was pointed out above, in addition to the income from locker rentals, the income from processing was a major source of revenue in the plants. This revenue depended upon the individual processing rates charged and the volume of processing performed. Although the overwhelming portion of processing was done for those who rented lockers, some was done for non-renters of lockers. With the increase in the use of home storage cabinets, such processing service for non-renters is assuming more importance than formerly at numerous plants. The processing charges for meat were paid for largely on a per pound basis. Reference to Figure 1 (and Appendix Table 30) will show the average

⁴ Lockers next to the floor are in the first tier, second are in the second tier, etc.

rates charged in the nine states for the principal processing services. Summarized, these rates were as follows (Table 9):

TABLE 9—Average rate and range in average rate charged by locker plants for performing specific processing services in preparing meat and meat products, October 1, 1947.

Service	Average rate for nine States All plants (per pound)	Range in average rates between States All plants (per pound)
Chilling, Cutting, Packaging, Freezing ¹	2.6c	2.1c to 3.2c
Freezing only.....	1.5c	1.8c to 1.8c
Curing only.....	3.2c	2.7c to 4.6c
Smoking only.....	2.1c	1.7c to 2.8c
Curing and smoking combined.....	5.2c	4.7c to 5.7c
Grinding only.....	1.5c	1.8c to 1.9c
Grinding and making sausage.....	3.3c	1.8c to 7.5c
Rendering lard.....	3.0c	2.2c to 3.4c

¹The charge for these services is based on the "hook weight" of the carcasses at time they are received.

Some observations relative to these rates as shown above and in Appendix Table 30 may be made:

1) Percentagewise, the rates for individual services from one state to another varied considerably amounting to 40% for freezing only, the service with the least variation, and ranging up to 317% for grinding and making sausage. Even within a state, the charges at individual locker plants for each of the services covered a considerable range. It was not uncommon for some plants to charge rates double those of another plant for the same service.

2) Although competition between plants in some areas may keep rates closely in line with one another, still the wide variations found indicates considerable independence of action in establishing rates at a given plant. The distance between plants, the desire of patrons to patronize the most conveniently located plant, and the highly personalized character of the locker plant service are some of the reasons for this independence of action in rate making.

3) Rates for the various services are not always related to the cost of rendering the services, but may reflect other than cost elements as well. Thus, the average charge for merely freezing meat prepared and packaged at home by the customer was 1.5¢ in the nine states whereas the average rate for chilling, cutting, packaging and freezing was 2.6 cents. The difference of 1.1¢ appears to be in comparison a relatively low return for the labor involved in handling meat in the chill room, cutting the carcasses, supplying the wrapping material, packaging the meat, and labeling the parcels.

4) The wide variation in rates for processing services also reflects variations in the character of service provided. In one state the range in rates for grinding meat and making sausage was from 1.5 cents per pound at one plant to more than 10 cents per pound in four plants. The high rates, however, were found in plants that prepared stuffed sausage and furnished the casings,

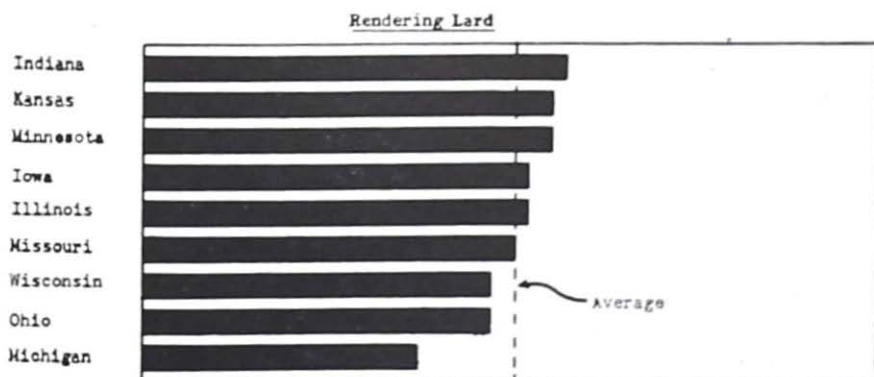
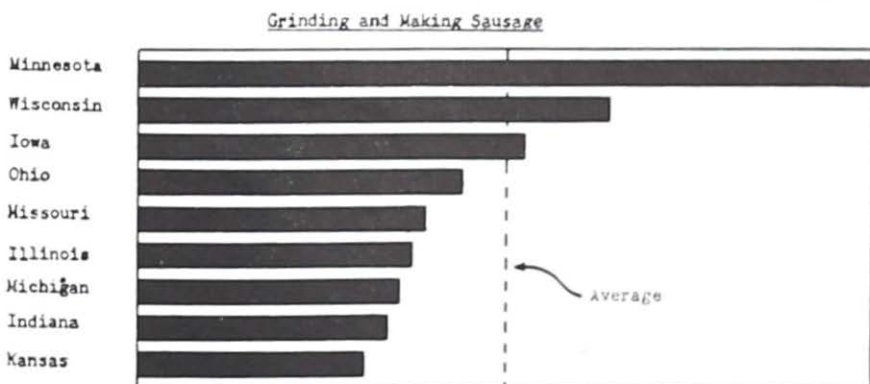
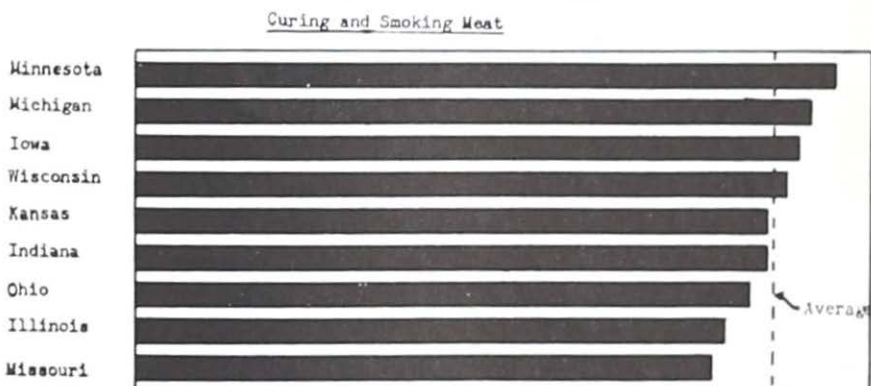
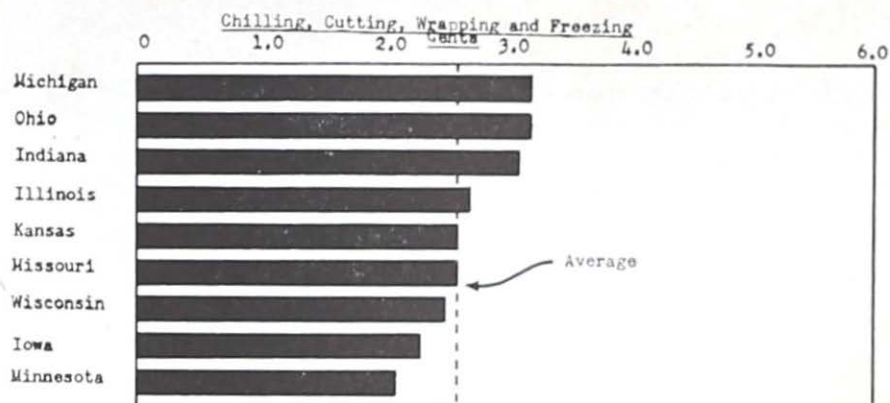


Fig. 1—Average charge per pound for performing specified processing services, by states, 1947.

and that made summer sausage and did the curing. It is clear, therefore, that the rates reported for processing services did not always cover identical types of services.

5) At some plants both separate and combined rates were quoted for related services. For curing and smoking, as an example, a single rate for curing and another rate for smoking are charged at some plants whereas at other plants a combined rate covering both services are quoted. Also, in the case of curing hams and bacon, some plants assessed the rate on a piece basis while other plants quote it on a poundage basis. Separate and combined rates are also found for the services of grinding meat and hamburger and smoking sausage.

6) Rates charged by plants of different sizes did not vary greatly. Several of the average rates in the nine states were higher in the large plants of 800 and more lockers than in the smaller plants, but for certain services (rendering lard, grinding and making sausage) the largest plants had the lower average rates (Appendix Table 30). The exceptions within a given state to this apparent relationship of size of plant to rates charged are found so often that little statistical significance can be attached to the relationship as shown for the nine states combined.

Charges for processing poultry, fish, and fruits and vegetables

Although about 85% of all products processed consisted of red meats, the processing of poultry, fish, and fruits and vegetables made a significant contribution to total income. At some plants this latter type of processing accounted for a major part of the plant's processing income. The rates charged for these services are discussed in the following paragraphs.

The average charge for dressing and drawing chickens at locker plants in the nine states was 21.6 cents per bird (Appendix Table 31). The charges varied from an average of 18.1 cents per bird in Minnesota to 26 cents in Ohio. For dressing and drawing turkeys the charges were higher, and varied among states more widely than the rates charged for dressing and drawing chickens. The rates for turkeys ranged from 28.5 cents per bird in Iowa to 75.0 cents per bird in Kansas. The average rate for the nine states was 38.6 cents per bird.

For packaging and freezing chickens it was common at some plants to charge on a per bird basis and at other plants on a per pound basis. The average rate per pound varied less among the states than the average rates per bird. The average charge per bird in the nine states was 8.8 cents but the rate ranged from 5.0 cents in Iowa to 12.6 in Ohio. On a per pound basis, the average for the nine states was 2.7 cents. The rate varied from 2.4 cents per pound in Wisconsin to 3.5 cents per pound in Indiana.

For packaging and freezing turkeys the rate varied more among the states when the charge was made per bird than when the charge was on a per pound basis. The rate per bird averaged 20.6 cents but it ranged from 6.7 cents in Missouri to 29.2 cents in Kansas. The charge per pound for



SMOKING MEATS

Hams, bacon, and sausage are smoked at numerous plants. This service and that of curing meats are much appreciated by many patrons. Although it is not necessary to freeze the smoked and cured meats, many patrons store such meats in their lockers.

packaging and freezing turkeys averaged 2.7 cents, the same as for chickens, but ranged from 2.3 cents per pound in Minnesota to 3.3 cents per pound in Indiana.

Charges for packaging and freezing fish were lowest in Kansas where the rate was 2.4 cents per pound. In Michigan, Indiana, and Ohio the rate was more than 3 cents per pound. The average for all states was 2.8 cents per pound.

Charges for freezing fruits and vegetables were based on rates per pound, per pint, and per quart, the basis varying among the plants. The average rates

charged in the nine states were 1.7 cents per pound, 2.3 cents per pint, and 3.5 cents per quart.

In considering the above mentioned rates for the various processing services, it is to be observed that the precise character of the services rendered is not identical at all plants. For example, some plants double-wrap the meat, some glaze fish before packaging and some add seasoning to sausage, whereas other plants do not give as much service. Although there is considerable comparability in the services performed for the charges shown, the exceptions at individual plants may account for some of the rate variations referred to.

Charges for slaughtering livestock

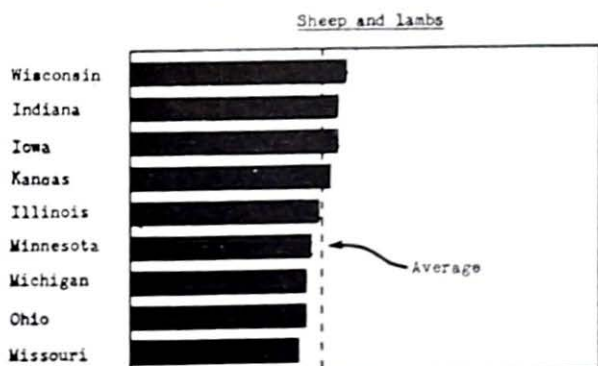
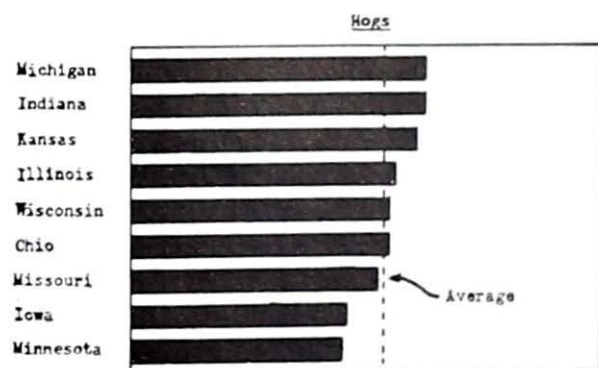
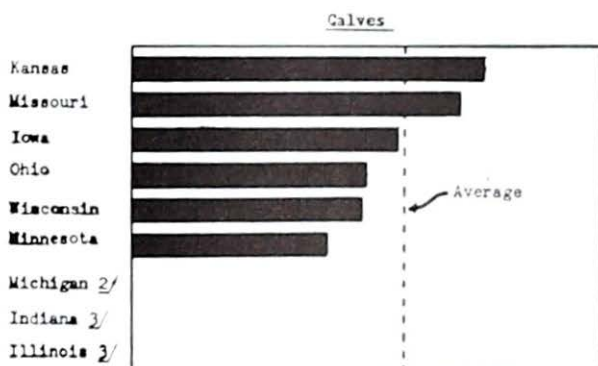
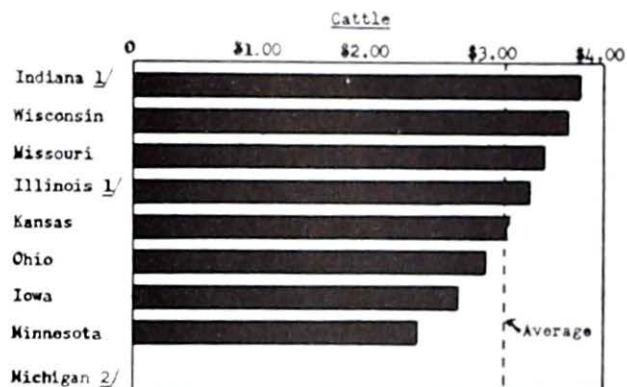
Charges reported for slaughtering livestock at frozen food locker plants were most generally on per head basis. At some plants the charge for slaughtering was based on the dressed weight of the carcass, and at a few plants on the live weight of the animal. The rates per head for slaughtering not only varied by species, but for a given species it was common for two or more rates to apply to the same species, depending on the weight of the animal. In the case of cattle, one rate might apply to animals weighing up to 800 pounds and a different rate to animals of heavier weight.

The average rate per head for slaughtering cattle in the nine states was \$3.19 (Figure 2). In Minnesota and Iowa the average rates were less than \$3.00 per head, and in Indiana and Wisconsin more than \$3.50 per head (Appendix Table 32). In Illinois and Indiana, the same rates were reported for both cattle and calves. In all states, the rates for slaughtering cattle varied considerably among plants. The rates per head charged in some plants were two or three times as high as those charged at other plants in the same states.

The average rate for slaughtering calves was \$2.34 per head, for hogs \$2.18, and for sheep and lambs \$1.62. Average slaughter rates by states for calves varied from \$1.58 per head in Minnesota to \$2.97 in Kansas. This does not include Illinois and Indiana where the rates on calves were included with those on cattle. Average slaughter rates for hogs in the different states varied from \$1.76 in Minnesota to \$2.50 in Indiana. Sheep and lamb slaughter rates were more constant, the average rate among states ranged from \$1.26 per head in Minnesota to \$1.85 per head in Wisconsin.

Commissions for handling wholesale cuts of meat

Rates for handling meat wholesale as reported for 263 frozen food locker plants ranged from one-half cent per pound to more than 15 cents per pound. The most common rate was 2 cents per pound which was charged by 44% of the plants reporting. A 3% margin was charged by 22% of the plants. Margins of less than 2% were charged by 13% of the plants, and of 5% and more by 7% of the plants. No commission was charged in some plants for handling meat wholesale. It was felt in these plants compensation for this service was derived from the increased volume of processing.



^{1/} Includes calves

^{2/} Hides, skins and offal generally accepted as payment for slaughtering

^{3/} Included with cattle

Fig. 2—Average charge per head for slaughtering livestock, by species and by states, 1947.

Types and Volume of Products Handled

Volume slaughtered

The average number of head of livestock slaughtered in 1947 per plant reporting slaughtering was 237 cattle and 503 hogs (Appendix Table 33). Only 17 calves and 2 sheep and lambs were slaughtered on an average by these same plants. These averages include animals slaughtered at frozen food locker plants and also those slaughtered on farms and by custom slaughterers for locker storage.

The livestock slaughtered per plant were highest in numbers in Illinois, Ohio, Missouri, and Indiana where the averages exceeded 250 cattle and 590 hogs. Plants in Michigan reported the smallest average number of cattle slaughtered per plant, and plants in Michigan and Wisconsin the smallest number of hogs.

The plants themselves slaughtered 74% of the cattle, 73% of the calves, 76% of the hogs, and 72% of the sheep and lambs. Most of the rest were slaughtered by farmers. Custom slaughtering was relatively unimportant.

It is estimated that approximately 275,735 cattle, 21,692 calves, 650,906 hogs, and 2,816 sheep and lambs were slaughtered by frozen food locker plants in the nine states in 1947 (Table 10). These estimates were arrived at by assuming that at the plants where slaughtering was done in a given state the average number of livestock of each species slaughtered was the same as the average number slaughtered in the plants for which data were not reported. For Illinois and Indiana where the slaughter of cattle and calves was reported as combined totals the slaughter of cattle and calves was estimated separately.

TABLE 10—*Estimated total number of livestock slaughtered by frozen food locker plants in the nine states, by species, 1947.¹*

State	Plants where slaughtering was done	Cattle	Calves	Hogs	Sheep and lambs
	Number	Number	Number	Number	Number
Kansas.....	149	23,434	1,889	26,598	218
Missouri.....	77	13,498	447	31,286	131
Iowa.....	583	78,628 ²	5,012 ²	186,629	2
Minnesota.....	396	63,658	5,644	183,348	792
Wisconsin.....	266	20,506	4,377	38,768	2
Michigan.....	20	1,160	270	5,340	220
Illinois.....	226	52,260 ²	3,336 ²	128,797	339
Indiana.....	81	12,578 ²	803 ²	37,017	2
Ohio.....	63	10,213	614	13,234	212
Nine States.....	1,841	275,735	21,692	650,906	2,816

¹The estimate of total slaughter for each species of livestock is the product of the average number slaughtered per locker plant reporting this information and the number of plants reporting slaughtering done in each State.

²Basic data for making estimates not available.

³Slaughter of cattle and calves was reported together for Illinois, Iowa and Indiana but the total slaughtered in all frozen food locker plants in these states has been estimated separately. This was done by assuming that 94 percent of the combined number were cattle and 6 percent were calves. This was the average relationship between the number of cattle and calves slaughtered in plants in the states where they were reported separately.

The largest proportion of the cattle and hogs slaughtered at frozen food locker plants took place during the fall and winter. In 1947, 31% of the cattle and 29% of the hogs were slaughtered during January, February, and March (Fig. 3 and Appendix Table 34). Slaughter during October, November, and December comprised 26% of the cattle and 32% of the hogs slaughtered

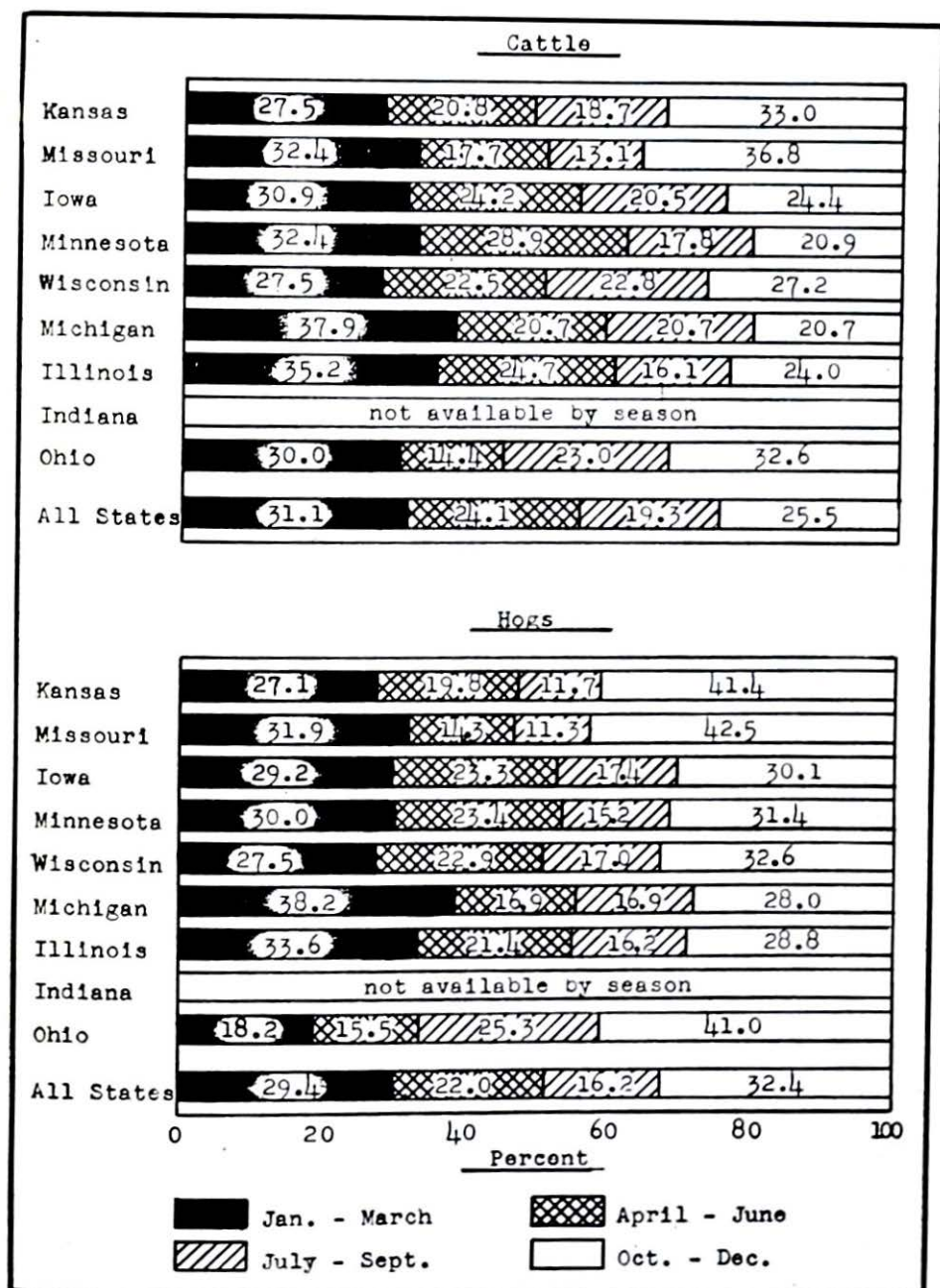


Fig. 3—Percent of cattle and hogs slaughtered at frozen food locker plants in different seasons, by states, 1947.

during the year. Slaughter was smallest during the summer quarter (July, August, and September). The relationship of slaughter among different seasons was fairly uniform in all of the states. The small slaughter of calves, and sheep and lambs does not justify an analysis by seasons.

Apparently, a significant proportion of the slaughter at locker plants represents slaughter for farmers and for town patrons owning farms who previously had slaughtered on farms. Replies received from 2,113 locker patrons indicated that about two-thirds of them had made shifts in the seasonality of slaughtering, and about one-third reported no change. Most of the patrons reporting stated that livestock was now slaughtered any time during the year instead of largely in the fall and winter. Some stated they slaughtered earlier in the fall, later in the spring or more during the summer. Others stated that the seasonality of slaughtering had changed, but the nature of the change was not indicated.

The disposal of hides and pelts from animals slaughtered at locker plants varied. Reports from 246 locker plants showed that at 45% of the plants the hides and pelts were returned to the farmers or others who furnished cattle, calves, and sheep and lambs for slaughter. At 27% of the plants the hides and pelts were retained at the plant as part of the slaughtering fee, and at 28% of the plants the hides and pelts were purchased from the owners of the animals slaughtered.

The 325 locker plants that reported slaughter practices by custom slaughterers in their areas indicated the disposal of hides and pelts as follows: 41% returned them to the owners, 40% retained them as all or part payment for slaughtering, and 19% bought them.

Reports from 3,947 locker patrons showed that 64% slaughtered cattle or had them slaughtered for storage in frozen food locker plants. Slaughter of hogs for storage was reported by 65% of the locker patrons and slaughter of calves by 8%. Only 3% of the patrons reported slaughter of sheep and lambs.

Slaughtering was done by the patrons themselves, by custom slaughterers, and by locker plants. Custom slaughterers and patrons slaughtered 65% of the cattle; locker plants slaughtered 35%.

Sixty-eight percent of the hogs, 66% of the calves, and 68% of the sheep and lambs were slaughtered by patrons and custom slaughterers. The remainder was slaughtered by the locker plants.

Of the patrons who reported cattle slaughtered for locker storage, 88% slaughtered 1 head, 10% 2 head, 2% 3 head or more. Of those slaughtering hogs, 50% slaughtered 1 head, 30% 2 head, 13% 3 head, and 7% 4 head or more.

Volume processed

Approximately 95% of the beef, veal, pork, lamb and mutton, and sausage, and hamburger processed at locker plants was for locker storage (Appendix Table 35). The rest of the meat processed was not stored in lockers. This was processed primarily for storage in home freezers. In contrast about a third of the cured and smoked hams and bacon, and two-thirds of

the rendered lard processed at the plants were not stored in lockers. Some of these processed products apparently were stored in home freezers, some were kept at home without freezing and some were stored in special rooms at the locker plants.

Of the poultry, fish and game, and fruits and vegetables wrapped or packaged and frozen at the plants, 90% or more was stored in the lockers (Appendix Table 36). However, of the poultry dressed and drawn at the plants, only 83% was stored in lockers. This indicates that locker plants dressed chickens for a number of patrons who did not rent lockers.

Meat

An average of 152,908 pounds of meat per plant was processed in the 424 locker plants for which information was obtained in 1947 (Appendix Table 37). Of this total, 55.6% was composed of beef and veal, 44.0% of pork, and 0.4% of lamb and mutton. Data on beef and veal were combined because this was the form in which information was obtained in three of the states. Veal was not processed in locker plants to any appreciable extent, as it amounted to less than 2% of the combined amount of beef and veal processed. The processing of lamb and mutton also was unimportant at most plants, and was not processed at all in many plants.

The amount of meat processed naturally varied with the size of the plant. In plants having less than 400 lockers the average meat processed per plant was 100,613 pounds; in plants with 400 to 799 lockers, 164,919 pounds per plant, and in plants with 800 and more lockers, 241,173 pounds per plant (Appendix Table 38).

It is estimated that 622,183,000 pounds of meat were processed in all of the locker plants in the nine states included in this study in 1947 (Table 11). This estimate was derived by applying the average pounds processed in the plants for which data were furnished to the total plants estimated to be processing meat in each state. This formula was modified slightly in a few of the states where supplementary information was available which would permit more reliable estimates to be made.

Information was also obtained on the extent to which meat was cured, smoked, ground, and rendered into lard. In 1947, an average of 27,150 pounds of hams and bacon per plant were cured at the locker plants for which data were available (Appendix Table 39). The average amount of hams and bacon cured per plant varied widely among plants in the different states. In Kansas, the average amount of hams and bacon cured was about 3,143 pounds, whereas, in Illinois it was nearly 66,780 pounds. Hams and bacon were also extensively cured in plants in Indiana and Ohio.

Curing and smoking meat are commonly carried on jointly. However, for plants in most of the states the amount smoked was reported separately from the amount cured. In cases where the amounts cured and smoked were reported together, these figures were added to both the amount cured and the amount smoked. An average of 24,095 pounds of meat was smoked per plant in these states. An examination of the table shows that the average

TABLE 11—*Estimated total pounds of meat (beef, veal, pork, and lamb and mutton) processed for storage and not for storage in all frozen food locker plants, by states, 1947.*

State	Plants reporting amount processed	Average amount processed per plant reporting	Total plants processing meat	Estimated total meat processed in all plants
	Number	Pounds	Number	Pounds
Kansas.....	43	102,353	351	35,925,908
Missouri.....	38	108,832	309	33,629,088
Iowa.....	54	204,829	653	133,753,337
Minnesota.....	44	146,572	613	75,191,436
Wisconsin.....	47	129,606	598	77,504,388
Michigan.....	34	114,404	330	37,753,320
Illinois.....	86	226,728	576	130,596,328
Indiana.....	28	139,257	290	40,384,530
Ohio.....	50	128,802	446	57,445,692
Nine States.....	424	153,021	4,066	622,183,022

amounts of meat smoked and cured in each state did not vary greatly. An exception to this was in Ohio where nearly twice as many pounds of hams and bacon were cured as were smoked.

Grinding meat for sausage and hamburger was important in a large number of plants. The average amount of meat ground per plant was about 12,446 pounds. This average was fairly uniform for plants in all of the states except Illinois where grinding meat averaged about 20,344 pounds per plant.

An average of 6,174 pounds of lard was rendered at the locker plants included in the study. Plants in Minnesota and Kansas averaged less than 2,000 pounds of lard per plant and plants in Iowa, Wisconsin and Indiana averaged more than 15,000 pounds per plant.

Poultry

The amount of poultry packaged and frozen was nearly 5 times as much as the amount of poultry dressed and drawn. The poultry dressed and drawn averaged 1,073 pounds per plant and the poultry packaged and frozen averaged 7,832 pounds per plant (Appendix Table 40). Dressing and drawing poultry was most important in plants in Illinois and Michigan and least important in Kansas and Missouri from a volume standpoint. Packaging and freezing poultry was more important in Indiana and Illinois than in the other states and least important in Minnesota and Wisconsin. At some plants services were not provided for dressing and drawing poultry but poultry was accepted for storage if dressed and drawn upon delivery.

Fish and game

An average of 2,573 pounds of fish and game was processed in these locker plants in 1947. More fish and game were processed per plant in Michigan, Ohio, and Minnesota than in other states. Indiana and Kansas reported the lowest averages. It is probable that some of the game placed in storage was reported under poultry instead of being included under fish and game.

Fruits and vegetables

More than 10,000 pounds of fruits and vegetables were frozen per plant on an average. In states where the amounts of fruits and vegetables were reported separately the amount of fruits processed was greater than the amount of vegetables processed. Vegetable processing also included blanching at many of the plants but data on the importance of this service were not considered sufficiently complete to be reliable.



LOCKER ROOM

The drawer and door-type lockers of metal construction as used in most plants are shown above. The standard size locker of nearly 6 cubic feet will hold a little over 200 pounds of meat. Temperatures in these rooms vary from -10° F. to 0° F. Foods can be safely stored for several months at these low temperatures.

Volume stored

A variety of foods are stored in frozen food locker plants but for purposes of this study only the following will be considered: meat and meat products, fruits and vegetables, poultry, and fish and game. An average of 185,697 pounds of perishable foods was stored per plant during 1947 in the 9 states included in the study, according to information obtained from 542 plants furnishing information on storage (Appendix Table 41). Of this amount, an average of 164,914 pounds, or 88.8% of the total, comprised meat and meat products. Fruits and vegetables amounted to an average of 12,338 pounds, or 6.6% of the total. Poultry averaged 6,456 pounds per plant, or 3.5% of the total, and fish and game 1,989 pounds, or 1.1%.

The average amount of products stored per plant in the different states ranged from 128,324 pounds in Kansas to 295,975 in Illinois. In Iowa, Minnesota, Wisconsin, and Illinois, more than 90% of the products stored, based on weight, comprised meat and meat products. In the other states, meat comprised from 82% to 89% of all foods stored. Poultry constituted a larger proportion of the foods stored in Indiana than in the other states. In Ohio and Missouri, more than 10% of the products stored was fruits and vegetables, but in Minnesota it was 2% of the total. Of the products stored, fish and game were more important in plants in Michigan than in the other states.

Meat

Of the 164,914 pounds of meat and meat products stored on an average in the locker plants, 83% was fresh meat, 10% was cured meat, 6% was sausage and hamburger, and 1% was rendered lard (Appendix Table 42). This accounts for the meat and meat products stored throughout the year, but information was not obtained on the rate of turn-over of products at the locker plants. This varied among individual lockers in a plant.

Of the estimated total fresh meat stored 55.6% was beef and veal, 44.0% was pork, and 0.4% was lamb and mutton (Table 12). In Kansas and Ohio more than 70% of the meat stored was comprised of beef and veal, whereas in Iowa, Minnesota, and Wisconsin it was less than one-half of the total. On the other hand, more than 50% of the meat stored in plants in Iowa, Minnesota, and Wisconsin was pork, but in Kansas and Ohio it amounted to less than 30%.

In Kansas unusually small proportions of the meat and meat products stored were cured meats and rendered lard. On the other hand, cured meats were stored in relatively large proportions in plants in Illinois and Iowa, and a considerable amount of rendered lard was stored in plants in Iowa and Wisconsin.

As would be expected, the total amount of meat stored per plant varies with its size. In 1947, storage of meat in the plants having less than 400 lockers averaged 73,679 pounds per plant (Appendix Table 43). This compares with an average of 148,979 pounds for the plants having from 400 to 799 lockers, and an average of 291,945 pounds for the plants having 800 or more lockers.

TABLE 12—Estimated total pounds of meat and meat products stored in 1947 in the 4,376 frozen food locker plants in the nine states included in the study.

State	Plants used as basis for estimates	Beef and veal	Pork	Lamb and mutton	All fresh meat
	Number	Pounds	Pounds	Pounds	Pounds
Kansas.....	381	26,468,195	11,135,162	57,909	37,661,266
Missouri.....	317	20,927,439	12,721,221	139,359	33,788,019
Iowa.....	796	60,495,177	66,453,510	111,163	127,059,850
Minnesota.....	540	34,128,833	41,344,884	107,217	75,580,934
Wisconsin.....	659	37,647,945	38,341,468	108,071	76,097,484
Michigan.....	350	24,030,870	13,803,700	317,340	37,651,910
Illinois.....	576	66,764,624	48,649,768	1,136,448	116,550,840
Indiana.....	311	24,739,655	15,618,865	27,260	40,385,780
Ohio.....	446	37,811,228	15,577,790	298,037	53,687,055
Nine States.....	4,376	333,013,466	263,14,368	2,302,804	698,462,638
	Plants used as basis for estimates	Cured meat	Sausage and hamburger ground	Lard rendered	Total meat and meat products
	Number	Pounds	Pounds	Pounds	Pounds
Kansas.....	381	718,146	3,720,951	9,828	42,110,191
Missouri.....	317	4,795,371	2,895,330	1,390,500	42,869,220
Iowa.....	796	19,670,972	7,867,997	3,108,933	157,707,752
Minnesota.....	540	4,623,669	5,107,941	541,215	85,853,759
Wisconsin.....	659	6,151,028	5,233,928	1,993,134	89,525,574
Michigan.....	350	3,295,050	3,339,930	358,380	44,645,270
Illinois.....	576	22,857,984	11,717,568	1,165,824	152,292,216
Indiana.....	311	3,295,050	3,723,600	358,380	44,109,380
Ohio.....	446	5,611,572	2,176,926	1,078,874	62,554,427
Nine States.....	4,376	67,723,792	45,834,171	9,646,688	721,667,789

However, indications are that the small plants (less than 400 lockers) stored more meat per locker during the year than was stored in plants of medium and large size.⁵

According to this analysis, the small plants (less than 400 lockers) stored an average of 320 pounds per locker per year; medium size plants (400 to 799 lockers) an average of 271 pounds per locker; and the large plants (800 lockers and over) an average of 287 pounds per locker. The average amount of meat stored per locker for all plants that year was estimated to have been 304 pounds. The proportion of the meat stored in locker plants that was represented by beef and veal, pork, and lamb and mutton was not greatly different for the combined plants in the size groups.

Some reasons may be advanced for these differences in amounts stored per locker in plants of different sizes. Smaller plants have frequently been more selective in accepting locker renters. During the recent war period when plants were confronted with waiting lists of locker renters, many operators weeded out those renters who only stored small amounts of food and retained and accepted renters who stored large amounts. A plant operator with a small number of lockers can give more personal attention to each of his customers in directing the most effective use of the lockers. Some operators have been

⁵ This comparison is arrived at by assuming that plants with less than 400 lockers had an average of 230 lockers per plant; plants with 400 to 799 lockers an average of 500 lockers; and plants with 800 and more lockers an average of 1016 lockers.

able to increase the volume of storage by periodically observing the amount stored in lockers and calling the attention of those with small amounts to the possibilities of purchasing wholesale cuts of meat from the plant operator.

Also, as was indicated before, the largest plants were located generally in larger urban centers, had proportionately more urban renters with families of slightly smaller size than those of rural renters, and therefore had a larger portion of patronage whose family meat consumption was less than that of rural customers. There is the further possibility that in these nine states farmers tended to store more meat relative to other foods in their lockers than urban people did which may therefore account for some of the difference in the volume of meat stored in the large and smaller plants.

It is estimated that in 1947, 721,667,789 pounds of meat and meat products were stored in the 4,376 plants in operation in the 9 states included in the study (Table 12). Of this total, about 98% was cut and wrapped and otherwise prepared for storage at the plants where stored. The other 2% was cut and wrapped before delivery to the plants. The total meat and meat products stored in lockers is estimated by applying the average pounds of meat stored in the plants for which data were obtained in each state to the total number of plants operating in the state at that time.

Of the meat stored in all locker plants in the 9 states, 86% was estimated to have been produced from slaughter at the plants, slaughter on the farm, or as custom slaughter (Appendix Table 44). About 12% of the meat stored was bought as carcasses and wholesale cuts and about 2% was cut and wrapped before delivery to the plant.

Meat produced from slaughter by locker plants, farmers, and other local slaughterers constituted over 90% of the total stored in Iowa and Minnesota, but less than 70% of the total in Michigan. The proportion of the meat stored in lockers bought as wholesale carcasses and cuts amounted to 26% of the total stored in Michigan and 19% in Wisconsin. In Minnesota, Iowa, and Missouri, it comprised less than 10% of the total stored. Plants in Michigan and Kansas received larger proportions of the meat already cut and wrapped than in other states, but even in these states it amounted to only 5% and 4% of the totals, respectively. Virtually no cut and wrapped meat was received at Illinois plants.

The different kinds of meat stored at plants were not obtained from the same source in equal proportions. Larger proportions of beef and veal than of pork were generally bought as carcasses or wholesale cuts. On the other hand, pork was obtained from slaughter at the plant in larger proportions than beef and veal. There was wide variation in the proportion of lamb and mutton obtained from different sources, but as the volume of this kind of meat stored in plants in a given state is very small, the reader is cautioned against placing too much reliance on the proportions shown.

Volume of meat handled wholesale

Meat purchased by locker renters

Locker renters obtain meat for storage from livestock which they own and have slaughtered and from meat that is purchased. This meat is purchased principally from farmers, the locker plant and retail meat dealers, and in lesser amounts from other sources. Farmers may purchase meat if they do not produce their own and if they wish to supplement their own farm-produced supply. City customers who do not obtain meat directly from farms which they own buy wholesale amounts to be processed and stored in lockers. In fact one of the reasons for renting lockers is to save money by buying wholesale cuts at wholesale prices rather than buying small amounts at retail prices. Many locker operators as part of their service for their patrons, either stock such wholesale cuts, buy them upon receiving orders from patrons, or act as agents in assisting farmers to dispose of surplus meat to locker renters.

Of the 3,947 locker renters who responded in this survey, 2,326 or 59% bought meat for locker storage. Three-fourths of all the red meat purchased was beef and veal, nearly one-fourth was pork, and a negligible amount was lamb and mutton (Appendix Table 45). Of the locker renters that indicated the source from which they bought meat, 48% purchased from farmers, 29% from locker plants, and 23% from retail meat dealers and others (Appendix Table 46).

Meat purchased by locker plants

Sixty percent of the locker plants included in this study secured meat as wholesale cuts and carcasses for resale to patrons. Of the meat bought wholesale 90% was for locker renters and 10% for non-renters. A considerable proportion of the meat bought wholesale for non-renters of lockers was processed for storage in home freezers.

The average amount of meat bought wholesale per plant for patrons was 23,515 pounds (Appendix Table 47). Of this total, 82% was beef and veal, 17% pork, and 1% lamb and mutton.

The total amount of meat bought wholesale by all locker plants in these States for storage in lockers is estimated to be 74,343,419 pounds. This is equal to 12.0% of the estimated 621,084,409 pounds processed for storage in all the locker plants in these states in 1947.

Of the meat bought wholesale by managers of locker plants, 84% was obtained from packing plants, 11% from farmers, 1% from meat markets, and 4% from other sources (Appendix Table 47). In Kansas, Missouri, Illinois, and Indiana more than 93% of the meat bought wholesale was obtained from packing plants. The locker plants in Minnesota, Wisconsin, Michigan, and Ohio bought from 74% to 85% of their wholesale purchases of meat from packers, but such plants in Iowa bought only 68% of the wholesale purchases of meat from this source. Wholesale purchases from packers represented 87% of the total beef and veal bought wholesale. Of the pork bought wholesale, 71% was obtained from packers, but of the lamb and

mutton bought wholesale, 95% came from this source. Farmers supplied considerably larger proportions of the pork than other kinds of meat bought wholesale by locker plant managers. Purchases from farmers represented 24% of all pork bought, 8% of all beef and veal bought, but less than 1% of the lamb and mutton bought. Purchases at meat markets represented slightly more than 1% of the beef and veal, but less than 1% of the pork, and lamb and mutton bought wholesale.

Volume of meat sold retail

Only 19% of the frozen food locker plants which were not added to retail meat markets included in the study reported meat sold retail. Of the total value of the meat sold in this form, 76% was fresh and 24% was processed. Only a small part of the meat was frozen. Processed meat consisted almost entirely of hams, bacon, and sausage.

Fifty-nine percent of the meat sold retail at locker plants was bought by non-renters of lockers and 41% by those renting lockers (Appendix Table 48). Iowa was the only state in which the plants reporting disposed of more than 50% of the meat sold retail to renters of lockers. In other states, locker renters bought from 39 to 44% of the meat sold retail.



MERCHANDISING OPERATIONS

Retail merchandising of meats, dairy products, canned foods, and miscellaneous items is a service numerous locker plants are now adding to their regular locker plant operations.

The mark-up of meat sold retail at frozen food locker plants varied greatly, ranging from less than 10% to more than 30% of the cost price. The most common rates of mark-up were from 20 to 24%, but rates from 25 to 29% were nearly as common. These rates applied to both fresh and processed meat. Only meager data were furnished on the mark-up of frozen meat but the limited information available indicated about the same rates were applied as for fresh and processed meat.

Some problems are frequently encountered in the retailing of meat by locker plants. Operators who retailed meat and responded to this survey suggested the following problems:

- (1) Additional investment is required for display and refrigeration equipment, and in some instances, expansion of building.
- (2) Competition with established retailers sometimes creates ill-will toward the locker plant.
- (3) It often increases difficulty of planning efficient use of personnel. The specialized personnel used for processing, etc. is frequently and irregularly interrupted by the retail trade.
- (4) In some communities, credit is demanded beyond the ability of the locker operator to supply it.
- (5) Meat retailing is highly competitive and complex. A rather large volume of business is necessary in order that all cuts can be disposed of profitably.
- (6) Sale of meat may at times lead the patron to suspect that some of the meat he stored is being sold. For this reason, some plants limit their retail sales to commercially packaged meats, such as hams, sliced bacon, and wieners; fish; and similar products not generally stored in lockers.

Home Freezers

Information on various phases of the use made of home freezers in the states included in the study were obtained on mail schedules completed by owners of home freezers. From these replies comparisons could be made between farm and town owners of freezers on such factors as: the location with respect to frozen food locker plants; the extent to which owners of home freezers rent lockers; years freezers have been used; types, sizes and cost of home freezers; size of families owning freezers; where meat stored in freezers was prepared; amounts and kinds of meat stored in freezers; and where obtained; how the development of home freezers has affected the use of frozen food lockers; and the advantages and disadvantages of using home freezers.

Location of home freezer owners

Of the 2,156 home freezer owners who filed schedules, 69% resided on farms and 31% in towns. It should not be inferred that this is the ratio of home freezers owned by farmers and by town residents as information on that question was not obtained in the study. Of the town residents reporting, 27% stated they owned farms from which they obtained meat for storage in their freezers, 18% obtained fruits, and 21% obtained vegetables.

Home freezer owners renting lockers

Families that install home freezers do not necessarily forego the use of frozen food lockers. Of the farmers owning home freezers who furnished information in 1948, 42% rented lockers. Thirty-five percent of the home freezer owners residing in town rented lockers. Fifty-five per cent of all owners of home freezers rented lockers before acquiring freezers. Only 36% of these respondents rented a locker at the time of this survey. Even though some purchasers of home freezers ceased to rent lockers others began renting them.

Of the owners of home freezers residing in town and renting lockers, 90% patronized the locker plants located in the same town in which they resided. The other 10% rented lockers in plants located in other towns. Of the freezer owners on farms and renting lockers, 83% resided less than 10 miles from the nearest locker plant. Sixteen percent were located from 10 miles to 20 miles from the nearest plant, and 1% was located 20 miles or more from such plants.

Replies were received from 705 home freezer owners who also rented lockers as to whether they planned to continue renting lockers in the future. Of these, 66% stated they would continue to rent lockers, and 34% stated they would discontinue renting. A slightly higher proportion of the home freezer owners living on farms than of those living in town planned to continue renting lockers. The main reasons given for continuing to rent lockers were: (1) To provide extra storage space for meat which would be cheaper than to buy larger freezers; (2) to provide convenient places for getting processing done; (3) to provide satisfactory places for having livestock slaughtered; and (4) to provide a dependable source of refrigeration in case local power failed.

The principal reason given by home freezer owners for planning to discontinue renting lockers were: (1) home freezers provided adequate space for storing perishable foods; (2) the inconvenience of taking food to locker plants, and of getting food from the plants; and (3) the suspicion that some meat disappeared from rented lockers. Other reasons given by a few freezer owners were dissatisfaction with locker plant service, locker rentals were too high, meat stored in lockers loses flavor, and services of the locker plant were no longer needed.

Advantages and disadvantages of owning home freezers

A number of advantages of having home freezers were given by those who owned them. The advantage given most frequently was the convenience of having a supply of perishable food available at all times (Table 13). Others stated that it was economical and that better quality foods were available.

TABLE 13—*Advantages of owning home freezers as reported by farm and town freezer owners, 1948.*

Advantage	Number of times given		
	Farm	Town	Total
1. Convenient.....	600	310	910
2. Economical.....	189	152	341
3. Supply of tasty foods are immediately available.....	242	69	311
4. Better quality foods are available.....	185	86	271
5. Home freezer is accessible at all times.....	178	52	225
6. Saves trips to locker and to market.....	153	35	188
7. Can take care of small amounts and save left-overs.....	139	41	180
8. Can store any amount and variety of food at any time.....	143	33	176
9. Saves labor.....	70	26	96
10. Saving of food because of less waste and spoilage.....	77	14	91
11. Storage that will provide fresh quality foods out of season.....	50	36	86
12. Saves time.....	50	27	77
13. No danger of food being misplaced or stolen.....	50	11	61
14. Can preserve perishable foods including pastries and baked foods.....	41	19	60
15. Greater variety of foods to choose from.....	31	13	44
16. Food preservation is easier and of better quality.....	28	8	36
17. Can make more use of home freezer than locker.....	27	7	34
18. Freezing done more promptly than at locker plant.....	13	7	20
19. More space than in a locker.....	15	1	16
20. Can prepare and package foods to suit yourself.....	6	3	9
21. No bad odors in food.....	4	3	7

Disadvantages of owning home freezers were listed by very few owners, the more common being the high initial cost, loss of food caused from electrical power failure, and the unsatisfactory size of the freezer. (Table 14).

TABLE 14—*Disadvantages of owning home freezers as reported by farm and town freezer owners, 1948.*

Disadvantage	Number of times given		
	Farm	Town	Total
1. Initial cost too high.....	36	20	56
2. Electrical power failures.....	42	9	51
3. Unsatisfactory size (usually too small).....	23	9	32
4. Inconvenience of defrosting.....	14	4	18
5. Operating costs too high.....	9	9	18
6. Mechanical difficulties.....	7	5	12
7. Work and trouble in preparing foods for freezing.....	9	1	10
8. Eat too much.....	6	3	9
9. Takes up too much floor space.....	1	6	7
10. Unsatisfactory for some foods.....	1	6	7
11. Hard to reach packages on the bottom.....	3	3	6
12. Too noisy when motor is running.....	2	4	6
13. Frozen food not as good as fresh meat.....	3	2	5
14. Capacity to sharp freeze unsatisfactory.....	3	2	5
15. Meat will not thaw as quickly as desired.....	3	1	4

Number of years home freezers have been used

Home freezers comprise a new industry. Replies from 1,783 owners of home freezers showed that 73% of them had used freezers one year or less, and 14% had used them 2 years. About 4% of the owners had used freezers 3 years. Only about 2% had owned freezers each of 4 years, 5 years, and 6 years, and 3% had owned them more than 6 years. Ownership of home freezers increased at about the same rate for farm owners and town owners. The difficulty of acquiring home freezers during World War II accounts for the short period of time that most freezers have been in use.

Types, sizes, and uses made of home freezers

The commercial type freezer was used by 96% of both the farm and town owners. Homemade freezers were unimportant in all states but were reported used in about the same proportions by owners residing on farms and in town, except they were used by relatively larger proportions of farmers in Wisconsin and Minnesota than in the other states.

Home freezers vary widely in size. Of the 1,722 owners from whom reports were received, the freezers ranged in size from less than 5 cubic feet to more than 30 cubic feet. Farmer owners had freezers of larger size on an



HOME FREEZER

Home freezers of different designs, sizes, and construction are increasing in popularity. Many owners of home freezers avail themselves of the processing services of locker plants—some also rent lockers.

average than those owning freezers in town. The average sizes reported were 13.0 cubic feet for farmer owners and 11.0 cubic feet for owners residing in towns. Among farmers, the largest number of freezers were reported in sizes ranging from 5.0 cubic feet to 20.0 cubic feet. Town residents had the largest number in sizes ranging from 5.0 cubic feet to 12.5 cubic feet.⁶

Some home freezers have a single compartment for freezing and storage and others are equipped with storage and freezing compartments. Of the farmer owners who reported, 49% had freezers with separate freezing compartments and 51% had freezers with a single freezer-storage compartment. Of the town owners, the ratios were 42% and 58% respectively.

In cases where the home freezers now used were not considered of proper size, they generally were reported to be too small. This was reported by 22% of the farmer owners and 18% of the owners residing in towns. Practically all other owners considered their present home freezers of proper size as only an insignificant number considered their freezers too large in size.

Prices paid for home freezers

Prices paid for home freezers ranged from less than \$100 to more than \$1,000. Farmers reported higher average investments in freezers than did residents of towns. The average price paid for home freezers by farm owners was \$402 compared with \$364 paid by owners residing in towns. Fifty per cent of the farm owners had paid less than \$400 for their freezers, but 69% of the town owners had paid less than this amount. Freezers costing \$500 and over were bought by 20% of the farmers and by only 11% of the owners residing in towns.

Size of families of home freezer owners

Replies were received from 1,298 farmer owners of home freezers and from 569 owners residing in towns regarding the number of persons that ate one or more meals per day regularly at their tables. The individual families ranged in size from 1 to more than 10 persons, both on farms and in towns.⁷ The average size of farm family was 4.4 persons and the average size of family in towns was 3.9 persons. These averages are larger than for those families renting lockers at locker plants for whom the averages were 4.0 (rural) and 3.4 (urban). This agrees with data on population which shows that farm families average larger than do families residing in towns. Forty-six per cent of the home freezer owners on farms cut, wrapped, and froze their meat at home, 44% had it done at locker plants, and 10% had it done elsewhere. The figures for city freezer owners are 36%, 54% and 8% respectively.

⁶ The Bureau of Human Nutrition and Home Economics, in United States Department of Agriculture Miscellaneous Publication No. 687, regards five to six cubic feet of frozen storage space per family member as adequate for most families.

⁷ Farm families as used here refers to farm households and includes non-family farm laborers eating meals with the farm family. Urban families would also include all who eat their meals regularly with the family.

Relative amounts of meat and related products stored by farm and town owners of home freezers

Farm owners of home freezers stored in their freezers and in frozen food lockers an average of 804 pounds of meat, poultry, fish and game in 1947. This compared with 555 pounds stored by owners of freezers residing in towns (Appendix Table 49). These amounts as reported are greatly in excess of the amounts which locker operators reported stored in lockers.⁸ The amounts stored by farm and town owners varied considerably by kinds of products. Storage of meat (beef, veal, pork, and lamb and mutton) was 60% greater for farm than for town owners of freezers. The storage of poultry, on the other hand, was 10% less by farm than by town owners, and the storage of fish and game was 24% less. The average amounts stored by the two groups were determined from reports furnished by 1,000 owners of home freezers residing on farms and 420 owners residing in towns.

One reason farm owners of freezers stored larger amounts of meat than town owners apparently is that they slaughtered their own animals whereas town owners must purchase meat to fill their freezers. Meat storage and apparently consumption also tends to be greater by farm than by town families. This may be accounted for in part by the fact that farm families are on an average larger than town families. The larger amounts of poultry stored by town owners are apparently accounted for by their purchase of chickens at any one time in larger numbers than were consumed fresh, the balance being placed in storage. Such purchases were probably made when poultry prices were low. On farms, it is more common to kill chickens as they are needed. The relatively larger amounts of fish and game stored by town owners of freezers indicates that they did more fishing and hunting than did freezer owners residing on farms. Townsmen rely more heavily upon fresh meat bought at meat markets to supplement that frozen and stored whereas farmers depend more regularly on their home produced meat supply which they have stored. This may account for much of the difference in the volume stored.

Of the amounts of meat, poultry, and fish and game bought by freezer owners for storage in home freezers and in locker plants in 1947, the farm owner bought an average of 77 pounds whereas the town owner bought an average of 217 pounds (Appendix Table 50). This indicated that town owners rely more heavily upon purchases of meat for storage than farm owners and that farm owners tend to supply more of their own meats for storage than town owners. However, this does not necessarily mean that the total volume of meat bought for storage by town owners is greater than that bought by farm owners if the ratio of farm owners to town owners is relatively high.

The meat purchased by freezer owners for storage was obtained from farmers, locker plants and retail meat dealers and others. Of the freezer owners that indicated the source from which they bought meat 49% purchased from farmers, 31% from retail meat dealers and others, and 20% from locker plants (Appendix Table 51). There did not appear to be any difference in the sources from which farm owners and town owners obtained meat for storage.

⁸ Locker operators reported an average of 304 pounds stored per locker in all plants. See page 39.

The Place of Frozen Food Lockers and Home Freezers in Meat Distribution

Basis for estimating the importance of frozen food lockers in the United States

The preceding analysis of the use made of frozen food lockers and home freezers will serve as a basis for appraisal of the effect of frozen food locker plants and home freezers on meat distribution. This will involve the volume of slaughter at locker plants relative to total commercial slaughter, relationship between meat stored in lockers and home freezers compared with total meat production, the extent to which locker patrons and home freezer owners bought meat produced in commercial packing plants, and the shifts that have taken place in both slaughter and meat consumption.

In order to compare livestock slaughter at locker plants with total commercial slaughter, and meat production at locker plants with total production of meat it is necessary to develop the data so they will cover the same geographical area. It is not possible to make the comparison by regions as neither commercial slaughter nor production of livestock by regions bears any relationship to the amount of meat consumed in such regions. Consequently, in order to develop slaughter and meat consumption data on a comparable basis it is necessary to estimate the volume of slaughter and meat production in all of the frozen food locker plants in the United States and compare this with the total slaughter and total meat production in the commercial plants of the country.

Locker plants and locker patrons in the United States

Approximately 10,500 locker plants were operating in the United States in 1947 according to estimates (Table 15). The number of plants in the North Central States were based on complete records in some of the states and on nearly complete records in others. In the states in the other regions the numbers are those reported by a national survey made as of July 1, 1948.⁹ As there is evidence that there were more plants than were reported by the national survey, the number reported as of July 1, 1948 probably represents fairly closely the number that operated in 1947. In the nine states included in this study, where special efforts were made to get the accurate number of plants, there were 4,869 locker plants in operation by the spring of 1948. This compared with 4,565 shown by the national survey as of July 1, 1948.

The average number of lockers per plant in the United States as a whole was estimated to have been 471 in 1947. For the North Central States the average number of 426 was developed principally from data assembled in this study.¹⁰ In the other regions, the numbers are the average lockers per plant by states in 1945 as reported in an earlier study.¹¹

⁹ Warner, K. F. Extension Service, U. S. Dept. of Agri., Aug. 19, 1948.

¹⁰ See Table 1.

¹¹ Mann, L. B. and Wilkins, Paul C.. "Frozen Food Locker Plants, Location, Capacity, Rates and Uses," Jan. 1, 1946, Miscellaneous Report No. 105, Farm Credit Administration, Washington, D. C.

TABLE 15—Number of locker plants and number of lockers, by regions and in the United States, 1947.

Region	Locker plants ¹	Average lockers per plant ²	Total lockers
	Number	Number	Number
North Central.....	5,465	426 ³	2,328,090
Western.....	2,440	548	1,336,223
South Central.....	1,387	443	614,970
North Atlantic.....	679	600	407,421
South Atlantic.....	493	490	241,689
United States.....	10,464	471	4,928,398

¹From survey by Warner, K. F., Extension Service, U. S. Dept. of Agri., Aug. 19, 1948.

²Mann, L. B., and Wilkins, Paul C., "Frozen Food Locker Plants, Location Capacity, Rates and Uses," Jan. 1, 1946.

³Average based on records from 9 States included in this study and for 3 States reported by Mann and Wilkins, see table 1.

A total of 4,928,393 frozen food lockers were in use in 1947 according to the above estimates. However, the number of families served by lockers was smaller than the number of lockers in use as the study shows that about one-third of the patrons rented more than one locker. On an average, 139 lockers were rented per 100 patrons. (See Appendix Table 27). If this relationship applies in the country as a whole, then about 3,569,196 families rented frozen food lockers in 1947. If the average size per family was 3.8 persons, approximately 13,600,000 persons were served.

Slaughter plants serving locker plants¹²

Over the last 20 years there has been a tendency toward decentralization of the meat industry. At the outset of this study there was some suspicion that relatively small slaughtering plants organized by, or for, a number of locker plants might be contributing to this move. To discover the status of such slaughter plants a portion of the study was designed to survey them. Because the largest number of such plants was believed to be in Illinois, this portion of the study was concentrated within the state of Illinois.

In a survey of slaughter plants operated by locker plants in Illinois it was found that the usual practice is to have the slaughter plant owned and operated by a single locker plant. However, 12 slaughter plants did the slaughtering for 32 locker plants with each slaughter plant serving two, three, or four locker plants. These central slaughter plants were owned by 12 different companies, each of which operated small chains of locker plants within the same or adjacent counties. Nearly all of these companies were cooperatives. In no case was a central slaughter plant built by and operated for several independently owned locker plants.

¹²Based on special study made by Illinois Agricultural Experiment Station of slaughter plants operated by locker plants in Illinois.

The anticipated advantages of central slaughter plants were believed to result from (1) the larger volume of slaughter at a given plant thus permitting fuller use of slaughter facilities and labor, and from (2) the reduction in investment in processing facilities.

In comparing these 12 concerns with 13 locker plants that did only their own slaughtering, the former group slaughtered 55% of the animals killed for locker storage, while the latter group killed 90%.

The 12 plants slaughtering for 32 locker plants killed an average of 684 hogs and 351 cattle per slaughter plant per year. The investment averaged \$82,786 per plant. The income obtained from slaughtering charges averaged \$2,332 per plant and the income from the sale of hides, bones, and offal, \$3,034 in 1947.

The 13 plants slaughtered 712 hogs and 272 cattle per plant per year. The investment averaged \$28,469 per plant. The slaughter income was \$2,166 per plant per year. The income from hides, bones, and offal, \$2,603.

This study indicates, as summarized above, that some problems have developed in the operation of central slaughter plants which, to date, nullify many of the anticipated advantages. The most pressing problem is an investment that is high in relation to the volume of livestock slaughtered.

In the multiple plants having centralized slaughter, patrons stored less food per locker than in plants where the slaughter plant was operated by the individual locker plant. There was the additional difficulty of the patrons in the outlying plants bringing their livestock to the central slaughter plants. The central slaughter plant was killing most of the livestock for the locker plant nearest to it, but only a small portion for the outlying locker plants. Two methods were being followed to overcome this difficulty: (1) The patron delivered the livestock to holding pens at his local locker plant. The central plant then hauled the livestock from these holding pens. (2) The central plant sent a truck into specified parts of the area served on designated days of the week to pick up the livestock at the farm.

These central slaughter plants have made substantial investments in equipment and facilities and at the time of this survey had not developed sufficient volume to use them efficiently. Until they are able to use available equipment more fully the overhead costs will more than offset any economies they may bring about.

In most of the plants included in this study the carcasses were cooled, then hauled to the respective locker plants for cutting, packaging, freezing, and placing in the locker. Frequently only one plant in the firm did the curing and smoking for all the plants in the firm.

The extent to which local slaughter plants will enter into the future meat distribution will depend upon: (1) ability to buy livestock on a competitive basis (2) ability to operate the plant efficiently so that per unit operating costs can be on a competitive basis; (3) capacity of the plants as determined by

size of killing floor, efficiency of labor and equipment, and cooler capacity; and (4) ability to efficiently dispose of the product and by-product.

Thus far the experiences of central slaughter plants in Illinois indicate that these plants are primarily serving the patrons of the several locker plants which own them. Only to a limited extent are they furnishing fresh meat to their communities. Essentially all of the livestock which is killed is that provided by patrons renting lockers or by those who have home freezers. Little livestock is purchased outright with the intention of selling the carcasses or parts of carcasses to the local meat trade in competition with regular meat distributors.

Meat produced from slaughter in locker plants for locker storage compared with total commercial slaughter

Meat (beef, veal, pork, lamb and mutton) produced from slaughter for storage in frozen food locker plants of the country was estimated to have been about 1,366 million pounds in 1947 (Table 16). This was equivalent to slightly more than 6% of all the meat produced by commercial slaughter—6% of the commercial slaughter of beef and veal, nearly 7% of pork, and less than 1% of the commercial slaughter of lamb and mutton. The meat estimated to have been slaughtered for storage in locker plants does not include

TABLE 16—Amount of meat produced for storage in locker plants in the United States compared with the amount produced in packing plants, 1947.

Kind of meat	Produced from slaughter for storage in locker plants ¹	Produced in all commercial packing plants ²	Slaughter for storage in locker plants as a percent of commercial slaughter
	Thousand Pounds	Thousand Pounds	Percent
Beef and veal.....	705,929	11,589,000	6.1
Pork.....	657,845	8,811,000	7.5
Lamb and mutton.....	2,685	779,000	0.3
Total.....	1,366,459	21,179,000	6.5

¹ Does not include meat stored in lockers that was bought wholesale as carcasses and cuts, and meat that was cut and wrapped upon delivery. The totals by kinds of meat were estimated by applying the average number of pounds produced for storage by slaughter per plant included in the study in the nine North Central States (see table 44) to the 4,928,393 lockers estimated to have been in use in the United States in 1947.

² Comprises meat produced in federally inspected plants, other wholesale plants, and retail establishments as estimated by U. S. Bureau of Agricultural Economics. Meat produced from farm slaughter was not included.

that bought wholesale as carcasses and cuts as this is assumed to have been produced in packing plants or at retail establishments. Nor does it include meat that was cut and wrapped prior to delivery to the plant as this is assumed to have been largely obtained from farm slaughter. Commercial slaughter includes meat produced in federally inspected plants, in other wholesale plants and in retail establishments.

The total meat produced from slaughter for storage in all locker plants in the country was estimated for each kind of meat by determining the aver-

age number of pounds per locker in the nine North Central States (Appendix Table 44) and applying this average to the 4,928,393 lockers estimated to have been in use in 1947 (Table 15).

To the extent that the kinds and amounts of meat stored in the North Central States do not represent conditions in the other regions these estimates are in error. The purpose of making this estimate, however, was to determine approximately the relative importance of frozen food locker plants in producing meat.

How slaughter by locker plants has affected commercial and farm slaughter

Meat produced from slaughter by locker plants was represented by animals that otherwise would have been slaughtered by commercial packing plants and by farmers (including custom slaughter). From the limited data available it is estimated that the shift in slaughter from commercial packing plants to locker plants in 1947 represented approximately 2% of the total commercial slaughter of the country. The rest represented shifts from farm slaughter.

The reduction in farm slaughter, as estimated by the U. S. Department of Agriculture, also gives supporting evidence that slaughter at locker plants has been drawn from farm slaughter. Meat produced from farm slaughter was estimated at 2,437 million pounds in 1946 and 2,252 million pounds in 1947. Meat from total commercial slaughter on the other hand, increased from 20,519 million pounds in 1946 to 21,179 million pounds in 1947.

Locker plants and the meat packing industry

It is fairly apparent from the data assembled that locker plants are not replacing packing plants in the livestock and meat industry, nor are they substituting local slaughter and processing to any appreciable extent for that done in commercial packing plants. Locker plants are primarily and basically storage plants. Processing and meat merchandising are functions that have been added as related services. The processing operations are likewise of the simplest type, designed primarily to prepare products for storage in the manner desired by customers. Very few plants are equipped to prepare meats and meat products for commercial distribution in their communities.

As was pointed out previously, the "backbone" of the industry is the rural patronage (64% of patrons resided on farms—Appendix Table 25). To a large extent, therefore, the locker plant is making it possible for rural people to substitute frozen meat for home cured and canned meat, and to shift the slaughter from the farm by the farmer himself to the locker plant. This transition in the type of meat now available for consumption and the place of slaughter has had little effect on the volume of movement of livestock to market, on commercial slaughtering operations, and on the volume and movement of meat through regular commercial channels. It is highly probable, therefore, that locker plants will serve as supplementary agencies to established packing plants and commercial distributors of meats and will confine their activities to a relatively local sphere.

Meat bought from packers for storage in lockers

The amount of meat bought from packers for storage in lockers in the United States is very small relative to total commercial slaughter. It is estimated that in 1947 this comprised about 177 million pounds of beef and veal, 31 million pounds of pork, and 2 million pounds of lamb and mutton, a combined total of 210 million pounds of meat. This total amount equals only about 1% of the commercial slaughter of meat in the United States that year. The amounts purchased in relation to commercial slaughter were somewhat greater for beef and veal than for pork, lamb and mutton. These estimates were derived by determining the average number of pounds per locker of each kind of meat bought from packers in 1947 for storage in the plants included in the study and applying this average to the estimated number of lockers in use in the U. S. that year.

Locker plants provide an outlet for some locally produced meat

Besides acquiring packer-dressed meat at wholesale for resale to locker renters, carcasses or parts of carcasses were also obtained by locker plants from farmers and other sources for resale to their patrons. To a small extent the locker plant has become a market outlet for locally produced meat. In 1947, 11% (Appendix Table 47) of all meat bought wholesale for resale to patrons was obtained from local farmers and a little over 5% from local sources other than packing plants. Before the advent of locker plants some meat was exchanged between farmers and some sold to townsmen, but with the locker plant equipped to act as intermediary between the farmer with a surplus and the patron desiring meat for his locker, the amount of purchase of locally produced meat has increased. Such local outlets for meat make it unnecessary to haul some livestock to distant slaughtering points and to return dressed carcasses to the local communities. There is the possibility of an increase in such sales as the number of home freezer owners and locker renters, especially urban renters, increases.

Locker plants, home freezers, and retail meat distribution

Nearly one-fifth of the frozen food locker plants which were not added to existing retail markets reported selling meat at retail. Sales to non-locker renters exceeded those to locker renters. Average sales of meat at retail by plants reporting in this survey amounted to \$28,820 in 1947. Three-fourths of the meat sold consisted of fresh meat, nearly one-fourth of cured meats, and only a small portion of frozen meat. Through their storage operations, sausage making, and lard rendering, locker plants have also undoubtedly affected sales which local meat markets would normally have made to locker renters. How much decrease in retail sales is experienced by meat markets as a result of locker plants with or without retail meat counters springing up in their communities was not ascertainable. On the other hand, some meat markets are supplying locker renters and home freezer owners with wholesale

cuts of meat for locker and freezer storage and a small amount is sold to locker operators for resale to their patrons.

Locker plants which do slaughtering have also been to a small extent suppliers of wholesale cuts and carcasses to local meat markets. To what extent home freezer owners have meat cut and wrapped by meat market operators for freezer storage was not found out. That some such service is provided by meat markets is suggested by the reports of home freezer owners who stated that they had processing done elsewhere than at home or the locker plant. Certainly, the total volume of meat stored or processed by locker plants does not represent a loss of retail meat market business. Only a fraction of it can be considered as such. Part of the meat bought by locker operators as wholesale cuts directly from packers for resale to their patrons by-passes the retailers and represents business which might normally have been handled by retail meat dealers for their communities. The competitive position of locker plants with local retail markets depends to a great extent upon the volume of purchased meat which locker renters buy from locker operators for storage to augment their own home-produced supply, upon the relative number of locker renters compared with the total population served by retailers, and upon the auxiliary services (curing, grinding meat, making sausage, and rendering lard) provided by locker plants.

Consumption of meat influenced by lockers and home freezers

The possibility that meat consumption might be increased as a result of using lockers and home freezers is based upon (1) the economy of buying wholesale cuts at less than retail prices, thus stretching the family meat dollar, (2) the greater use of meat as a result of getting better quality meat for storage than might be normally obtained at meat markets, and (3) the greater variety of meat in the menu, especially for farmers who previous to locker rental were largely restricted to using meat preserved by one or two methods. Upon a little reflection it is apparent that these factors do not apply with equal force to all locker renters and that also the cost of rental and processing service must be considered in measuring the possible savings.

According to the judgment of locker renters and home freezer owners the amount of meat consumption increased since storage facilities became available. (Table 17 and 18)

Whether the increase as reported is directly traceable to the availability of storage or whether it merely reflects the greater per capita consumption of meat made possible by a larger meat supply for the country as a whole is not too clear. Millions of families who did not use any frozen storage also ate more meat in 1947 than in immediately preceding years.²⁸ For the United States

²⁸ The annual per capita consumption of red meat in the U. S. since 1940 has been:

1940	-----	141.7 lbs.	1945	-----	144.4 lbs.
1941	-----	142.8 "	1946	-----	153.4 "
1942	-----	139.5 "	1947	-----	155.0 "
1943	-----	146.0 "	1948	-----	146.4 "
1944	-----	153.5 "			

The consumption fluctuates some from year to year depending upon annual production. Since small amounts of meat are exported domestic consumption is based almost entirely on annual production.

TABLE 17—*Reported change in the consumption of meat by farm and town locker renters as affected by locker storage, 1948.*

Kind of meat	Farm patrons		Town patrons		All patrons	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
	percent	percent	percent	percent	percent	percent
Beef.....	15.2	-----	8.7	-----	11.7	-----
Veal.....	1.9	-----		0.5	1.0	-----
Pork.....	3.5	-----	1.1	-----	2.6	-----
Lamb and mutton.....	1.6	-----		0.3	0.9	-----
Poultry.....	5.8	-----	6.1	-----	5.9	-----

as a whole, per capita beef consumption in 1947 was 17% greater than in 1945 and 31% above 1943; pork consumption in 1947 was 5% above 1945 but 11% under 1943.

TABLE 18—*Reported change in the consumption of meat by farm and town owners of home freezers as affected by storage of meat in home freezer (and locker if one was rented), 1948.*

Kind of meat	Farm owners		Town owners		All owners	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
	percent	percent	percent	percent	percent	percent
Beef.....	15.8	-----	8.7	-----	13.5	-----
Veal.....		0.1		0.6		0.3
Pork.....	3.0	-----	1.5	-----	2.7	-----
Lamb and mutton.....	0.8	-----	0.4	-----	0.4	-----
Poultry.....	9.4	-----	7.3	-----	8.0	-----

The increase in beef consumption as reported by farmers is perhaps explainable by the fact that prior to locker plant services of slaughtering, processing, and storing, many farmers found it difficult to butcher cattle on the farm, utilize a whole carcass, and preserve the meat over long periods of time. Today, the locker operator often buys a portion of the carcass of beef from a farmer if the whole carcass is too large for the farmer's needs. The greater palatability of frozen meat to that of cured, canned and smoked meat, and the additional variety in the family's meat consumption made possible by frozen meat may also have been responsible for the reported increase in consumption. This latter factor has been of less significance to townspeople who conventionally relied on the variety of fresh meat offerings in the retail meat market. Increased meat consumption, however, by both rural and urban people, reflects the larger national supply of meat and the increased purchasing power of the population. It is not possible to conclude on the basis of the data obtained in this survey just what effect storage of meat by freezing has had upon per capita consumption.

The experiences of locker patrons and home freezer owners with frozen meat may have an important effect upon consumer acceptance of commercially

frozen retail cuts of meat when and if these are introduced more widely in the markets. Frozen meat constitutes at the present time but a small fraction of total meat sales in commercial channels. The fact that one-fourth of the locker patrons and nearly one-third of the home freezer owners (Table 4) indicated a preference for frozen meat and slightly over one-half of both groups reported no preference for either fresh or frozen meat would suggest that consumer acceptance of frozen meat may not be so difficult to establish.

Some factors that will affect the future of frozen food lockers

The extremely rapid growth of the locker plant industry in most of the states took place during the war and immediate postwar period. No doubt, the problems incident to meat rationing and a constantly rising price level enhanced the popularity of the locker plant and its services to prospective patrons. These conditions can no longer be depended upon to attract and hold locker plant patrons.

The reactions of locker users and former locker renters as given in Tables 5, 6, and 8 are indicative of the possible factors that may have a bearing on the future significance of frozen food lockers. The factors that may therefore influence the use of lockers in the future may be listed as:

- 1) Cost of locker plant service and rental charges.
- 2) Increase in the number of plants and expansion of services.
- 3) Use of home freezers.
- 4) Marketing margins on meat.
- 5) Trend in prices of meat.
- 6) Management of plants.

For many patrons the decision as to whether to rent a locker, or to buy a home freezer or to forego such storage space is hinged upon the cost of renting a locker and the charge for the processing service. With an average rental charge in 1947 of \$12.75 per year, and with 414 pounds of meat and other perishable foods stored in the locker, the storage cost per pound came to 3.1 cents. If a processing charge of 3¢ per pound is added to this and if the shrinkage in weight during storage is considered, then a cost of 6½ cents to 7 cents per pound is experienced. Should rental and processing charges increase, it is apparent that economy-minded renters may quit renting lockers and others remain unattracted to the service. How high rental and processing charges can go and still attract locker renters is not known. If urban and rural incomes should decline, there is considerable possibility that the interest in locker rental will decline despite the convenience and other satisfactions which a plant has to offer.

It is not likely that new plants will increase as rapidly in number in the nine states in the immediate future as they have in the past ten years. High construction costs and the fact that most of the good locations have been taken up preclude further rapid expansion in the North Central Region. Additions to existing plants, tying in locker plant service with other busi-

nesses, and erection of plants in areas which now are not served or are served by plants at considerable distance may be the extent of plant increases in these states. It definitely appears that a "saturation" point has been reached in some areas. For example, in Brown county, Wisconsin, there are 37 locker plants, most of which are small plants (less than 150 lockers), to be sure, but which provide service to thousands of farmers and city folks, none of whom have to go more than just a few miles to a plant. In this same state, 9 of the 71 counties have more than 15 plants per county, 14 have from 10 to 14 plants each, 16 have from 6 to 9 plants each, and 32 have 5 or less plants. No doubt a comparable situation exists in such states as Minnesota with 644 plants, Iowa with 866 plants, and Illinois with 576 plants.

Although many users of home freezers also rent lockers and utilize the processing services of locker plants, many others have discontinued renting lockers after acquiring freezers. Since the purchases of such home units is so relatively recent, the supplementary as well as the competitive aspect is not clearly defined as yet. However, many locker plants have lost locker renters as a result of home freezers becoming popular but the volume of processing has been generally less adversely affected. In some plants processing for non-renters has more than offset the loss from losing renters.

The marketing margins on meat may also have a bearing on the interest that will be shown in locker rental, especially by urban renters. If the spread between wholesale and retail prices is wider than the charges for locker plant services, then economy-minded persons may buy wholesale cuts and store them in locker plants. If the potential savings are low, less interest would be shown in locker plants. To be sure, for many renters it is not a question of locker costs compared with retailing margins but rather the desire of having choice meat—steaks, roasts, chops—available when wanted rather than being limited to the kind and grade of meat the retailer may carry. Yet, the fact that one of the principal complaints against locker plants is high service charges indicates that these charges are by no means an ignored item.

The impressions regarding the trend which prices of meat may take can either increase or diminish interest in locker rental. If meat prices are low and people anticipate marked advances, then purchase of meat and locker rental may follow. If the reverse is true or if expectations of steady meat prices exist then the price of meat as such would have no influence on encouraging people to rent lockers. Price of meat in itself, i. e. low prices or high prices, does not appear to stimulate or decrease interest in locker rental, but rather the expected trend and the amount of change in prices does. The first wave of interest in locker plants was during the latter thirties when meat prices were very low and the second wave during the War years when meat was scarce and prices high.

The management aspects of a locker plant may also have significant bearing upon the probable future of the industry. In the complaints registered by former locker renters as well as by current renters, faults with the sanitary

conditions at some plants were found, others complained that the plant was not open Sundays and evenings when farmers had time to go to the plants; still others suspected that meat was missing from the locker and the wrong meat put in their locker; while others felt that such services as curing, smoking, lard rendering, and slaughtering should be offered. Satisfied customers are necessary for continued business operations. It is not to be inferred that the number of critics outnumbered the satisfied patrons, but the old adage about one bad apple in the barrel has application. Management practices that will satisfy patrons at a cost considered reasonable will do much to keep old customers and attract new ones. The locker plant is a highly personalized service institution and is judged by how well its service is rendered.

Appendix A—Methodology

An executive committee of three members and a representative of the Bureau of Agricultural Economics had direct responsibility for outlining and planning the details for the project, developing suggestions for conducting the study, outlining the regional report, and reviewing the manuscript for the report. Each of the various stages of the study was reviewed and approved by the technical committee.

Each state member has been responsible for planning the details of the study in his state in accordance with the plans approved by the technical committee. This comprised determining the number of locker plants, the number of locker patrons, former locker patrons, and home freezer owners to be included in the sample, how the sample should be drawn, collecting the information, and summarizing the data according to uniform procedures approved by the committee. In addition to developing data for the regional report most members will use the same information in reports to be issued in their own States.

The representative of the Bureau of Agricultural Economics combined the data summarized in the states into summaries for the region and prepared the first draft of the regional report. After the report was reviewed by the executive committee the suggested revisions were made, and the revised report was then reviewed by the technical committee at its next meeting and recommended that it be published.

How Information Was Obtained on Schedules

The frozen food locker plants included in the study were visited and the information assembled was obtained from plant managers or from someone acting in their stead. Information furnished by locker patrons, former locker patrons, and owners of home freezers were obtained on mail schedules.

Of the locker plants in operation in the nine states, information was obtained on schedules from 576, or 13.2% (Table 19). The sampling ratio

in the various states ranged from 9.8% in Iowa to 19.6% in Indiana. As information was not available on the number of locker patrons, former locker patrons, and home freezer owners residing on farms and in towns in each state, sampling ratios for these groups could not be determined.

TABLE 19—Schedules obtained from frozen food locker plant operators, locker renters, former locker renters, and home freezer owners for use as basis for the study.

State	Locker plants ¹			Locker renters			Former locker renters			Home freezer owners		
	Total in operation	Schedules obtained	Sampling ratio	On farms	In towns	Total	On farms	In towns	Total	On farms	In towns	Total
	Number	Number	Percent	Number	Number	Number	Number	Number	Number	Number	Number	Number
Illinois.....	576	112	19.4	225	108	328	70	86	156	89	81	120
Indiana.....	311	61	19.6	141	100	241	5	4	9	180	41	221
Iowa.....	796	78	9.8	119	112	231	99	86	185	158	67	225
Kansas.....	381	51	13.4	463	399	862	24	56	80	147	74	221
Michigan.....	350	41	11.7	152	96	248	37	93	130	127	82	209
Minnesota.....	540	60	11.1	341	157	498	31	28	59	224	42	266
Missouri.....	317	41	12.9	322	140	462	49	70	119	195	159	354
Ohio.....	446	75	16.8	358	203	561	47	99	146	96	70	166
Wisconsin.....	659	57	8.6	394	122	516	88	80	178	277	97	374
Total.....	4,376	576	13.2	2,515	1,432	3,947	510	602	1,112	1,493	863	2,156

¹In operation during 1947.

NOTICE

Appendix Tables 20 to 51 appear in Appendix B which is published separately. These tables may be had by writing to any of the 13 Agricultural Experiment Stations in the North Central Region listed on the cover of this bulletin and asking for "Appendix B—Tables 20 to 51—for Wis. Agr. Exp. Station Bul. No. 490 (Regional Publication No. 21) entitled "Frozen Food Lockers and Home Freezers in Meat Distribution."

Appendix B—Appendix Tables 20 to 51 may be obtained by requesting them from your Agricultural Experiment Station.

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