



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

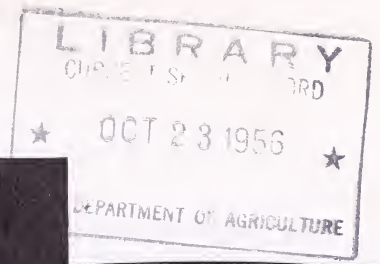
*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

9847m
of. 3



Survey of

DISTRIBUTION PRACTICES FOR PREPACKAGED FROZEN MEAT

Marketing Research Report No. 137

**U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
Marketing Research Division**

September 1956

PREFACE

The study on which this report is based is part of a larger research project designed to increase the efficiency of marketing meat. The report is based on information obtained from numerous firms that were engaged in packaging and distributing frozen red meat products at the time of the study. Many of the statements in the report are based on the cursory observations of the author. Observations were made of processing, wholesaling, and retailing operations located in the States of Illinois, Michigan, Missouri, New Jersey, New York, Pennsylvania, Ohio, Texas, Tennessee, and Washington.

Photographs in the publication were furnished by courtesy of the Lebo Press Company, General Machinery Corporation, Meat Magazine, and the Rath Packing Company. The research is being conducted under the general supervision of R. W. Hoecker, Head, Wholesaling and Retailing Section, Transportation and Facilities Branch, Marketing Research Division, Agricultural Marketing Service.

CONTENTS

	Page
Summary	iii
Introduction	1
Types of firms producing prepackaged frozen meats	2
Specialty frozen meat processors	2
Institutional meat wholesalers or jobbers	3
Packers	3
Central warehouse	3
Home freezer and locker storage processors	3
Processing methods and equipment	4
Specialty frozen meats	4
Portion-control meats	8
Fully trimmed waste-free cuts	9
Central prepackaging of roasts, steaks, and chops for retail sale	10
Equipment	10
Packaging materials and methods	12
Types of materials	13
Packaging labels	14
Institutional packaging	15
Distribution methods and costs for packaged frozen meat	15
Packer branch houses	16
Institutional frozen meat packs	17
Supermarkets	17
Wholesale margins	17
Retail margins	18
Comparative prices of frozen and fresh prepackaged meats	18
Physical facilities for expansion of frozen meat prepackaging	20
Packing plants	20
Transportation	20
Wholesaling facilities	21
Retail facilities	21
Transition from fresh to frozen	21
Conclusions	22

SUMMARY

Many firms are attempting to devise new methods of marketing fresh red meat that will overcome some of the inefficiencies and limitations of conventional practices. Widespread trade interest has been shown in the possibility of accomplishing desired improvements by removing fresh meat fabrication (such as, cutting into wholesale or retail cuts, boning, cubing, and grinding) and packaging work from retail stores to central processing plants.

Freezing is generally regarded as the most practical method currently available for centrally processing the meat and still preserving its fresh qualities. During the last 25 years, extensive industry experience has been acquired in freezing packaged fresh red meats for specialized purposes. This experience has shown that fresh meat can be processed at any desired location with no appreciable change in quality or texture of meats, providing proper packaging and handling methods are employed.

This report gives a general description of processing methods, equipment, packaging materials, and marketing channels that were being employed by various firms engaged in central prepackaging and freezing of fresh red meat products at the time of the study. Information was obtained from interviews with industry members and from observation of representative types of meat packaging and freezing operations.

Accurate statistical measures of the output and number of firms engaged in producing frozen packaged meats are not available. Trade observers estimate total production represented less than 2 percent of the approximately 16 billion pounds of packaged fresh red meat marketed in 1955.

A few leading institutional meat jobbers are said to have originated portion-control frozen meat packs (cuts of uniform size and weight) about 1948. A growing number of meat jobbers serving restaurants and institutions, as well as national and local meat-packers, are undertaking production of both portion-control and specialty frozen meat items.

Market demand for these items has rested primarily upon the convenience and cost control features they offer. Selling prices indicate marketing margins of most packaged frozen meat packs have been substantially higher than for comparable kinds of conventionally processed fresh meats.

Most specialty meat items are manufactured from lower grades of meat. Grinding, chipping, portion molding, cubing, and breading operations are performed to produce the forms in which specialties are now offered for sale. Much of the machinery employed has been adapted from other food processing operations. A slicing machine and hydraulic press, both especially designed for frozen meat processing, were recently introduced. Substantial savings in production costs are claimed for these devices.

The fabrication of portion-control steaks and chops is mostly a manual operation requiring precise cutting and trimming skill. After cutting, the pieces are segregated according to size, weight, and grade for packing in master cartons.

Processors and retailers generally agreed that nontransparent packaging is best suited for frozen meat. The use of cartons is considered desirable in order to maintain uniform package sizes and to permit complete labeling information. Frequently mentioned was the importance of including adequate descriptive information on labels to aid consumers in their selection and cooking of meats.

At the time this report was written, meat packaging research work was being done by industry on the development of improved wax or plastic-type coatings applied by dipping. A few firms were using a wax-dip coating on frozen meat cuts. The manufacturer of the wax stated that a greatly improved coating process would soon be offered. Marketing tests of at least 2 other types of coating materials were expected to be undertaken in 1956. One or more of the coating materials in process of development may also prove adaptable for packaging nonfrozen meats.

Much recent trade interest in adoption of central prepackaging was prompted by 2 significant new ventures in this field during 1955. A national meatpacker began a test marketing program for a line of frozen roasts, steaks, and chops packaged for sale to consumers. The innovations in this program included packaging in cartons with heat-sealed laminated foil overwrap, complete trimming of cuts, distribution through the packers' branch houses, and retail display adjacent to unfrozen self-service meat. Also in early 1955, the operator of a chain of small grocery stores began supplying frozen packaged meats to retail units from a newly constructed central processing plant. Early results of these frozen meat marketing programs were considered satisfactory. They are being closely watched and frequently reported in trade publications.

Estimations of the physical facilities required to handle frozen packaged meats indicate difficulties are likely to be encountered unless expansion is gradual. In order to market 20 percent of the 1955 fresh meat volume in frozen form, facilities capable of handling an annual pack of about 3.3 billion pounds of dressed carcass weight would be needed. This volume is equivalent to 75 percent of the estimated commercial pack of all frozen foods in 1955.

Proponents of central prepackaging and freezing believe the operation offers a substantial potential for increasing labor productivity in meat processing, lowering transportation costs, and reducing overhead charges for meat retailing. Industry people believe these features are becoming increasingly important in maintaining a favorable competitive position for fresh red meats. The elimination or reduction of shrink, downgrading, and spoilage losses, regularly incurred at the wholesale and retail levels in conventional meat handling practices, is expected to yield additional savings.

Some of the economic advantages of central prepackaging can be estimated with reasonable accuracy. Weight reduction, accomplished by fully trimming retail cuts at the point of slaughter, may save as much as \$120 to \$160 per car in freight costs between principal meat producing and consuming areas. At 1955 byproduct prices, packers could recover about \$7 more than retailers from the fat and bone trim of a 600-pound beef carcass.

Fully mechanized central fabrication and packaging facilities are yet to be installed and studied to measure possible gains in productivity. Similarly, possible reductions in wholesale and retail costs can be determined only after efficient methods for handling large volumes of packaged frozen meat are established and comparisons made with typical fresh meat handling costs. On the other hand, there are several costs encountered in frozen meat processing and marketing which may offset a considerable part of other savings. No accurate estimate of the marketing cost relationship between frozen central prepackaging and conventional fresh meat methods can be stated until the foregoing information is accumulated. The possibilities that both merchandising and economic gains can be realized appear sufficiently promising to justify continued promotional effort by the industry and research in central prepackaging development. Conclusive information would be of great benefit to everyone engaged in red meat production and marketing.

SURVEY OF DISTRIBUTION PRACTICES FOR PREPACKAGED FROZEN MEAT

By James S. Toothman, agricultural marketing specialist, Transportation and Facilities Branch, Marketing Research Division, Agricultural Marketing Service

INTRODUCTION

Merchandising meat in precut, weighed, priced, and packaged form in self-service refrigerated cases has become the accepted method of retailing in most supermarkets. Most of the prepackaging operations, including cutting, weighing, pricing, and packaging are being done in a processing room to the rear of the meat display cases. This method has definite shortcomings, and a number of firms are attempting to develop satisfactory arrangements for performing all meat preparation and packaging at central locations. It is believed that central prepackaging may offer economies and merchandising advantages over methods now used in the retail stores.

Substantial progress has been made in devising satisfactory central prepackaging methods and materials for smoked and luncheon-type meat products. As a partial step toward central prepackaging of fresh meat, several large chains and voluntary group wholesalers are developing methods for performing some of the preparatory work, such as carcass blocking, boning of rough cuts, and ground meat processing at the warehouse level. However, the greater perishability of fresh meat and the importance of appearance as a sales factor has restricted the adoption of central fabricating¹ and packaging methods for meat that is not preserved in some manner. Recently, the several favorable indications of consumer acceptance of frozen red meat and the rapid sales growth of other kinds of frozen meats and meat products have stimulated interest in accomplishing more central prepackaging of red meat in the frozen form.

Accurate statistical data are not available to show the number of firms engaged in the various types of frozen meat packaging and the volume of each type being produced. Trade observers estimated that less than 2 percent of the approximately 16 billion pounds of packaged red meat marketed in 1955 in fresh form was packaged and frozen in central facilities. The opinion was expressed that portion-control packs² going to restaurants and institutions have comprised a major part of the total frozen meat pack. A trade publication³ reports 179 firms produced an estimated total of 250 million pounds of packaged frozen meat in 1955. These estimates do not include the meat packaging and freezing activities of the many firms (locker plants, freezer provisioners, and some supermarkets) selling quantity lots of meat direct to consumers for storage in home and rented public freezer space. There are indications that the quantity of frozen meat moving through this latter channel may equal or exceed the quantity prepackaged in portion-control and specialty meat packs at central locations.

¹ Fabricating, as defined in "Federal Meat Grading Regulations. Notice of Proposed Rule Making." is the "cutting into wholesale or retail cuts, or dicing or grinding." (See Federal Register, 21(97): 3285. May 18, 1956.) For use in this report, boning and trimming of fat was included in the definition of fabricating.

² Portion-control packs contain cuts of meat of uniform size and weight.

³ Quick Frozen Foods, 1956 Almanac of the Frozen Foods Industry. Quick Frozen Foods 18: 221-52. Feb. 1956.

During 1955 a large packer introduced a line of frozen packaged retail cuts of beef, veal, lamb, and pork. By the end of the year the packer's test marketing of these products had been extended, with the cooperation of several well-known chain and independent supermarket operators, to 4 large cities. This program and other expanding uses of freezing in central fresh meat prepackaging have received wide publicity and brought increased trade interest concerning the extent that present methods of fresh red meat fabrication and marketing may be changed by these new developments.

This study presents a summary description of some of the processing methods, equipment, packaging materials, and marketing channels being used in 1955 by firms engaged in central prepackaging of frozen red meat. In view of the increasing trade interest in frozen meat prepackaging, it is believed that a general resume of practices and trends may be of some assistance to firms planning to engage in red meat packaging using the freezing process.

As a further objective, the study seeks to identify some of the major problems involved in this new development. An awareness and understanding of these problems and the timely direction of research as an aid in finding solutions may save the industry much expensive experimentation and time.

This report is based on information obtained through interviews and observations made of representative firms of different types engaged in processing, freezing, and packaging red meat for distribution through various channels. Included in the group of firms surveyed were (1) national meatpackers, (2) processors of consumer-packaged specialty meats,⁴ (3) firms producing specialty and retail meat cuts at a central warehouse, (4) jobber-processors who pack portion-control frozen meat for institutional use, (5) freezer provisioners, (6) locker plants, and (7) a supermarket packing frozen meat for retail and quantity home freezer sales.

TYPES OF FIRMS PRODUCING PREPACKAGED FROZEN MEATS

The initial experiments in central prepackaging and retailing of frozen red meat were made separately by a large meatpacker and the marketing firm of a well-known brand of frozen food in 1929 and 1930, respectively. The sponsoring firms considered the results of these attempts to market prepackaged frozen meat unsatisfactory and withdrew their products from retail distribution. Between about 1935 and 1948, most work in frozen meat packaging was done by frozen food locker plants and several small firms that went into business mainly to process frozen red meat specialty items. Most packers and institutional meat wholesalers engaged in prepackaging frozen red meat have entered the field in the last 5 to 8 years.

The following categories used for classifying firms prepackaging frozen red meat are only generally descriptive. They primarily indicate the original line of product or type of business of the firms that are producing one or more types of packaged frozen meat. Firms in each group have tended to expand their output and diversify the product line as conditions permit. A substantial quantity of cooked specialty meat items are frozen, but they have not been considered in this study.

Specialty Frozen Meat Processors

The largest number of firms engaged in the packaging of frozen red meats at central plants are the producers of frozen specialties, such as chip steaks, cutlets, chopettes, and various ground meat products. It is estimated that as of January 1, 1956, there were close to 100 firms whose principal business was the manufacture of frozen uncooked meat specialties. These firms are well scattered throughout the country, usually located in or near large cities. Most specialty processors are comparatively small with distribution of their output confined to a local or regional market area.

⁴ Consumer packaged meats or consumer-size packs, as used in this study, refer to meats packed in packages for sale to consumers.

The development of processing methods and markets for specialty frozen meats is said to have started in the late 1930's with the invention of a process for manufacturing chip steaks.

Institutional Meat Wholesalers or Jobbers

A number of hotel and restaurant meat purveyors (institutional meat jobbers or wholesalers) have installed facilities for fabricating and freezing steaks, chops, and specialty items of uniform weight and size. These products are packaged with protective wrapping materials and packed in large cartons with a net weight of from 6 to 25 pounds. This style of pack was developed by a few meat wholesalers shortly after World War II to supply restaurants and institutions which wanted to avoid fabricating their own meat on the premises and wished to assure uniform size and cost of meat portions for each meal served.

Packers

Three national packers and many local packers have undertaken prepackaging of various types of frozen red meat. Most packers have used the experience gained in processing and freezing meat for institutional use to expand their operation to the prepackaging of frozen meats for other types of outlets. One large packer is now producing a wide variety of specialties and retail cuts in both institutional and consumer-size packs. Another packer with national distribution now offers a total of 26 consumer-packaged specialty and variety meats and 20 kinds of institutional portion-control cuts. The more popular portion-control items are offered in four different grades of meat. During 1955, a third national packer began a large consumer advertising program to introduce a limited line of frozen beef, veal, lamb, and pork specialty meats.

Numerous local and regional packers have been equally active in entering the field of frozen meat prepackaging. Most of these firms have tended to concentrate on producing specialties for the institutional and retail trade. A few local packers, in large metropolitan areas, are now competing with institutional purveyors and national packers in producing and distributing portion-control packs.

Central Warehouse

In 1955, central warehouse operators comprised the smallest group of frozen meat prepackaging firms and, thus far, operations at this level have been limited to meeting special situations. Three firms were prepackaging meat at central warehouses observed in this study. Two of these firms were supplying a nearly complete assortment of frozen retail cuts (roasts, steaks, and chops) and many specialty items to their own or affiliated small grocery outlets, most of which did not have complete fresh meat departments. Low-cost cutting methods and packaging materials were employed. According to the owners, both of these operations have proved profitable, with a rapid growth in sales to stores outside the group they were originally planned to serve. The operators were questioned concerning the effect of offering a full line of frozen meats on overall store sales. In response, they said that their experience showed that the competitive position of small convenience grocery stores is improved by offering a variety of reasonably priced frozen meats. One of the firms cited operating figures showing no loss in sales and an increase in net profit in several small stores where frozen meat had replaced a conventional service fresh meat operation. Managers of stores handling meats supplied by the central warehouse stated that it was the policy to maintain selling prices on most of their frozen meat items at a level comparable to fresh meat prices in the area.

Home Freezer and Locker Storage Processors

In 1955 there were about 8 million home freezers in private homes.⁵ In addition to the families using home freezers and freezer refrigerator compartments, a large number of consumers rent freezer storage space in the more than 10,000 locker plants located

⁵ McGraw Hill Publishing Co., Inc. Index of Saturation. Electrical Merchandising 88(1): 85. January 1956.

throughout the United States. Trade opinion and a survey indicate that consumers store more meat in their freezer storage space than any other kind of food.⁶

Prior to 1950, locker plant operators processed practically all meat purchased by individuals for freezer and locker storage. Since the introduction of the food-plan type of freezer provisioning, many institutional meat wholesalers, retail butcher shops, and some supermarkets have begun cutting and packaging red meats for freezer storage. A trade journal⁶ survey of food plan operations and freezer sales in 1955 estimated that there were about 150 firms, other than locker plants, engaged exclusively in packaging frozen meat for and supplying quantity lots of all kinds of frozen food to individuals owning home freezers. One of these freezer provisioning firms claimed that it had a customer list of 30,000 freezer owners. Another leading operator stated that his firm served over 12,000 customers in 1955 and that each order averaged about \$165.

Freezer and locker provisioning firms differ in their frozen meat operations from those described in preceding categories in that both the packaging work and retail selling are usually done from the same location, and consumers often have the opportunity to see the meat before it is frozen. The quantity of meat packaged by freezer provisioning firms is not usually included in estimates of centrally prepackaged frozen meat production. However, it appears that the total sales of frozen red meat by locker plants and freezer provisioning firms represent a very substantial proportion of all fresh meat being packaged and preserved by freezing. Consequently, the frozen meat prepackaging activities of the freezer provisioning firms working directly with consumers have been of considerable importance in promoting the acceptance and use of prepackaged frozen meat.

PROCESSING METHODS AND EQUIPMENT

Any gains in productivity that have been achieved by prepackaging at a central location rather than in the store can be mostly attributed to greater labor specialization and the steady workload. The limited experience of the industry in central meat operations has made it necessary for pioneering firms to improvise their production facilities. They have adapted the equipment originally designed for other meat processing operations and the packaging materials and machinery of the frozen food industry. Meat processing equipment manufacturers have recently developed radical improvements in machinery for processing and packaging smoked and luncheon-type meats. Comparatively little work has been done in designing machinery specifically for central fabrication and packaging of frozen or fresh meat. Firms planning a central meat processing plant have found that standards are lacking for judging the relative efficiency of various equipment and work methods for different production volumes.

In the central frozen meat prepackaging operations visited, one important limitation noted was the lack of space to use equipment efficiently. Small processing rooms of square or irregular shape prevent the arrangement of production operations in a straight or continuous line. In these operations much manual rehandling of the meat in process is required. The development of continuous flow processing lines to replace the present batch methods used by most operators should improve productivity in central prepackaging.

Specialty Frozen Meats

The processes for producing specialty items are designed to create, from the lower grades and less desirable cuts of meat, a fresh meat product that is appetizing and easily cooked and that will return a relatively high price (fig. 1). The raw material is upgraded substantially by the processing performed, in much the same way as parts of the carcass that have little or no market value without processing are upgraded in the manufacture of cold cuts.

⁶ Frozen Food Center. A Look Into the Freezer. A Nation-Wide Survey by Frozen Food Center Magazine, September 1955. Frozen Food Center 9(10): 19-26. October 1955.

The source of the meat used in producing specialties and the form in which it is received depend upon the situation of the processor. Slaughtering firms engaged in producing specialties usually supply their own raw material. Independent processors and the institutional meat wholesalers manufacturing these items purchase from many sources bulk packs of boneless processing meat in fresh or frozen form.

The chip steak, labeled by some firms as a wafer or minute steak, has been one of the most popular specialty meat items. The original method of producing chip steaks is still used by many firms. This method requires packing boneless chunks of meat into cylindrical metal molds. Molds are then placed in a blast or plate freezer and the meat is frozen in the shape of the mold. After removal from the molds, the cylinders of frozen meat are placed in a tempering room where the temperature of the meat is raised to around 28° F. As the next step in processing, thin uniform slices are cut from the tempered meat rolls with heavy duty slicing machines. The slices are laminated in 3 or 4 thicknesses to form the chip or wafer steak.

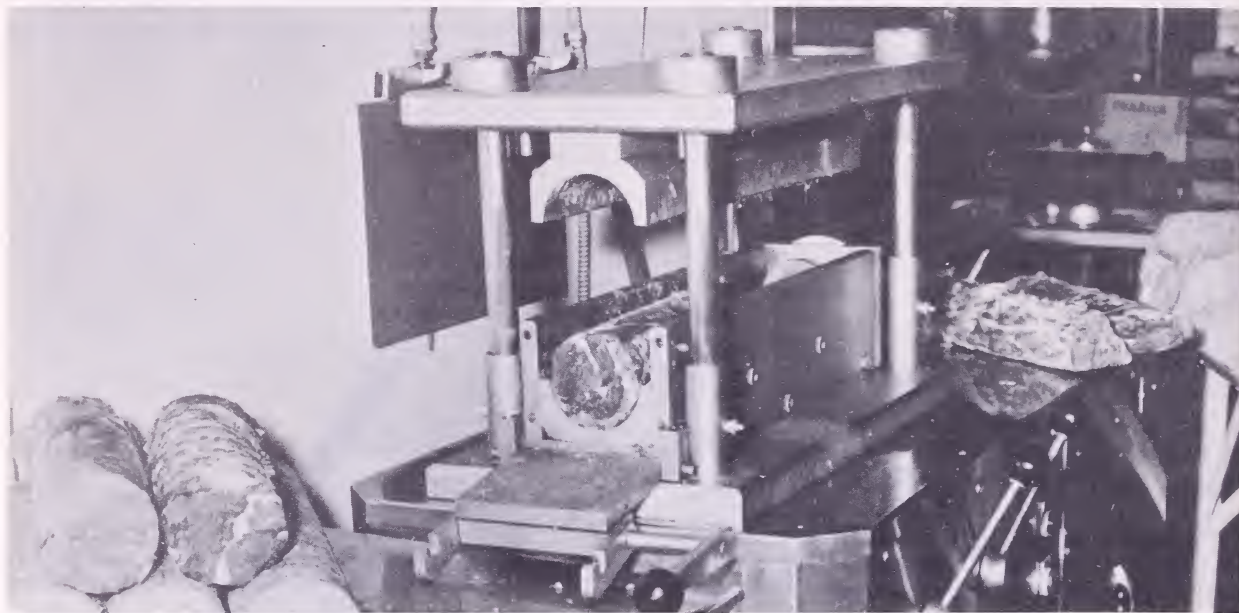


Neg. BN-2569

Figure 1. --Institutional pack frozen specialty item prepared from lamb breast and chopped lamb.

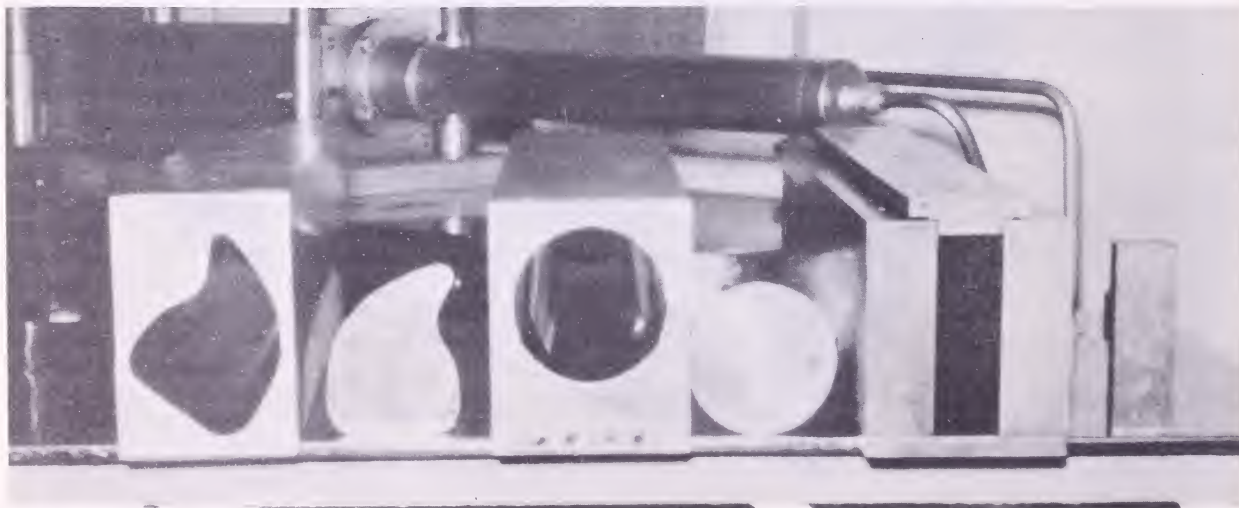
Most other specialty items are formed from meat that has been ground or chipped as the first step in processing. All specialties are packaged in portions of uniform size and shape. Until recently, the preferred method for producing round or square patties, rectangular sticks, and shapes resembling pork and lamb chops was through the use of machines that molded the ground meat prior to freezing.

Several processors are now using a hydraulic press with interchangeable dies to shape frozen tempered meat (figs. 2 and 3). It is claimed that a press of this type eliminates



Neg. BN-2566

Figure 2. --Hydraulic press designed to shape tempered frozen solid meat cuts or loaves of ground meat preparatory to portion slicing.

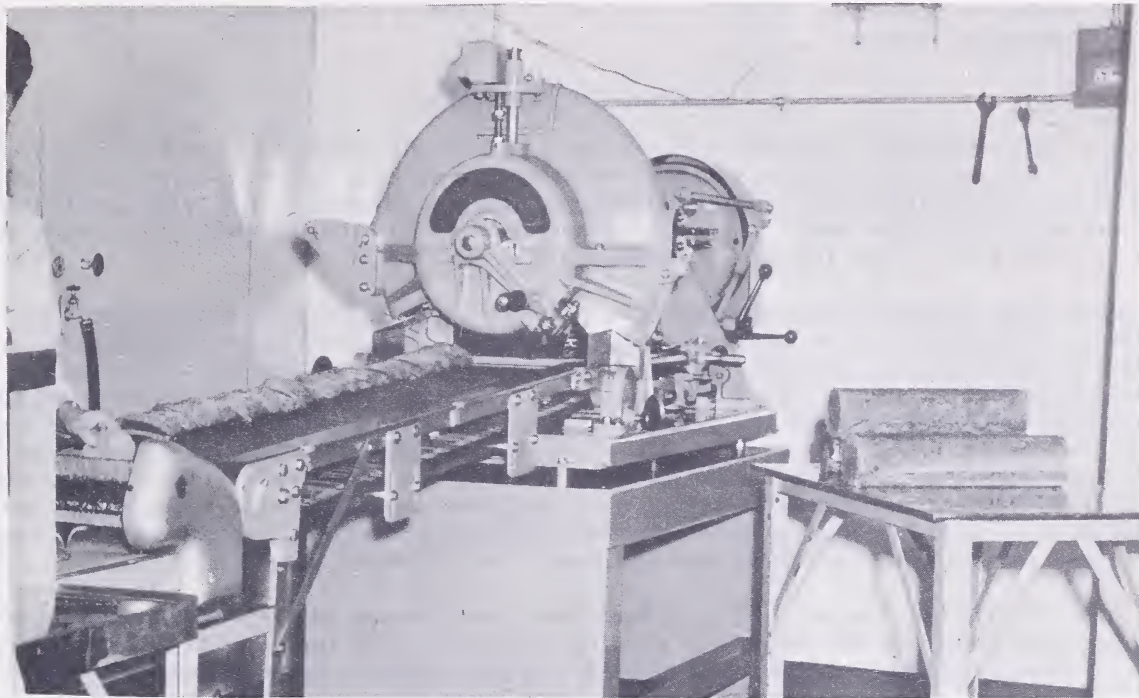


Neg. BN-2564

Figure 3. --Interchangeable dies used in press to create various portion shapes.

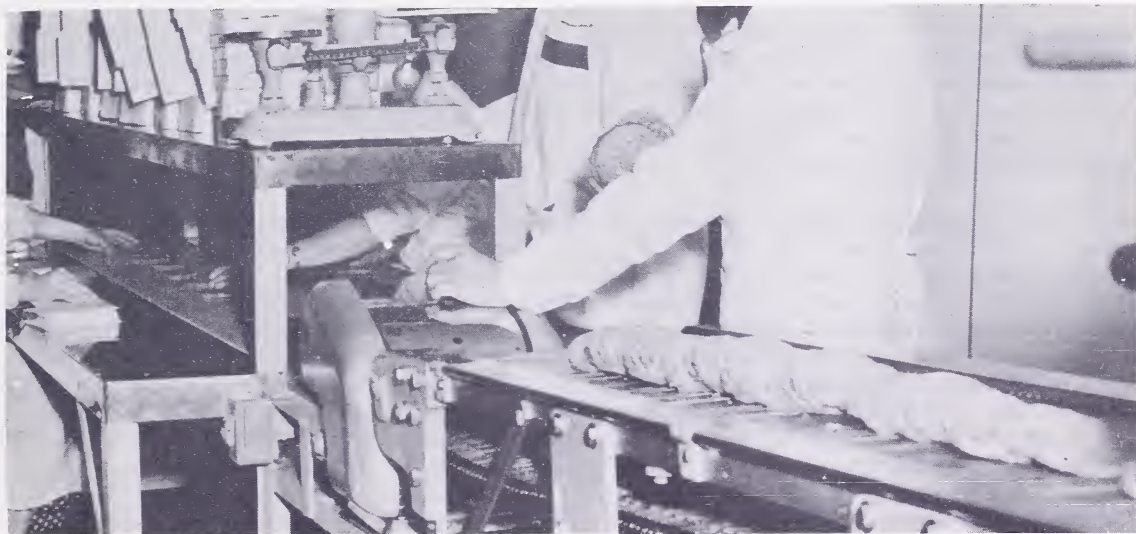
the need for placing meat in molds or forming portions before freezing and thereby reduces the amount of hand labor and number of operations required to process most specialty items.

Tempered frozen sections of solid meat or loaves of ground meat are placed in the press and formed into elongated blocks having the shape of the die being used. After the pressing operation, the shaped blocks are placed in a heavy duty slicing machine and portions of the desired thickness and weight are cut at high speed (figs. 4 and 5).



Neg. BN-2565

Figure 4. --Meat portions being cut from compressed frozen logs by a heavy-duty slicing machine. Setting of machine can be varied to produce uniform slices of desired weight. Slices are fed manually to cubing machine (extreme left).



Neg. BN-2567

Figure 5. --After cutting and cubing, portions are packed in plain cartons. These are mechanically overwrapped with a printed wax label. Laminated foil and printed or plain transparent film are also used in overwrapping cartons.

Specialty meat items prepared from ground veal, lamb, and pork are usually given a bread coating, which is applied by conveying the portions through an automatic bread-coating machine.

Most specialty processors include one or more items in their product line that simulates a solid meat cube or tenderized steak. These items are created by passing beef patties through machines with counter rotating circular blades that impart a striated (cubed) pattern to the meat. These operations are usually performed between the slicing and packaging operations.

Portion-Control Meats

Specialty meats are also portion-control meats in that they are of uniform size and weight. These features, together with convenience in storing and ease of preparation, have made specialties popular with institutional outlets. However, the term portion-control, as now used in the meat trade, usually denotes solid meat portions of uniform size, such as steaks and chops fabricated from primal cuts.

Basically, portion-control meats fabricated in central facilities give the same advantages for preparing meals in institutional facilities that fresh meat prepackaged in central facilities gives retail stores. That is, fabrication of portion-control meats in central facilities eliminates the labor, equipment, space, and supervisory responsibility required to fabricate meat on the premises. The market for portion-control meats has been created in part by the scarcity of chefs with acceptable meat-cutting skill. Also, increasing wage rates, competition, and improved cost accounting practices have caused institutional managers to seek better control over food portion costs. With the conventional procedure of fabricating meat servings from primal cuts in institutional kitchens, yields are variable and shrinkage and spoilage losses often occur.

Some institutional purveyors have fabricated and offered to the trade frozen portion-control meat priced by the pound and varying considerably in the weights of both the individual cuts and the quantity packed in each carton. Other firms have maintained a uniform net weight in each carton but have permitted variations, reported to be as great as 4 ounces, between portions packed in the same carton. A leading producer of portion-control frozen meat states that true portion control requires that each cut be of the same size and weight and that prices be quoted by the piece rather than by the pound.

A few firms have experienced a rapid growth in portion-control sales volume while others have had only indifferent success. One of the principal reasons for this, from a production standpoint, appears to hinge on the firm's ability to maintain uniformity in the quality and physical characteristics of its pack. Institutional buyers, it was reported, expect the same constancy in the contents of a portion-control pack of meat as they receive in canned and frozen foods.

With methods of portion-control meat processing in use at the time of the study, the portions are formed from trimmed, unfrozen primal cuts. Because of the irregular shape of primal sections, it is impossible to cut all portions of identical size and weight regardless of the skill of the men performing the cutting. Firms that pack portion cuts with an average weight variation within the carton of a quarter of an ounce accomplish this by scaling each cut and segregating them by weight to the nearest ounce. Cuts of similar weight are then packed together in cartons. A reasonably uniform net weight for cartons containing cuts of different weights is maintained by varying the number of portions packed in them. Table 1 shows how the finished pack of portion-control cuts is offered to the institutional buyer.

A similar range of sizes is usually offered in several grades of meat. One packer offers portion-control packs in 8 different grades, 4 are U. S. grades, and 4 are packer grades.

Table 1.--Example of methods of offering boneless sirloin strip steaks in several portion-control sizes (U. S. Choice Grade Beef)

Size of piece (ounces)	Pieces per box	Price per piece	Price per box
	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>
8.....	24	1.25	30.00
9.....	20	1.41	28.20
10.....	18	1.57	28.26
11.....	15	1.73	25.95
12.....	15	1.89	28.35
14.....	12	2.21	26.52

Fully Trimmed Waste-Free Cuts

One of the first decisions confronting firms intending to undertake central prepackaging of retail meat cuts is determining whether conventional retail cuts or fully trimmed waste-free cuts will be produced. Much of the economic gain promised by central prepackaging is expected to be derived from the reduction of the meat carcass to permit shipment of only edible portions to the retailer. Listed below are some of the reasons advanced by industry people as favoring the fabrication of fully trimmed cuts.

1. Smaller space required for storage and display
2. Lower cost of freight
3. Lower cost of storage
4. Greater adaptability to molding and packaging in uniform carton sizes
5. Greater convenience to the purchaser in cooking and serving
6. Higher byproduct recovery from carcass trim

Effecting the change from conventional to fully trimmed retail cuts probably represents a bigger selling task than gaining consumer acceptance for the change in the meat from fresh to frozen form. The consumer advertising of a line of fully trimmed cuts produced by one large packer has emphasized the convenience of this style of pack.

The three central warehouse operations observed were fabricating retail cuts comparable in size, shape, and trim to those generally found in self-service fresh meat cases. Also, the several freezer provisioning firms visited were following conventional cutting and trimming procedures.

The principal reasons mentioned by central warehouse and freezer provisioning operators for not packaging a fully trimmed product were:

1. Because of their higher price, the task of obtaining consumer acceptance of fully trimmed retail cuts is too large for a small firm to undertake alone.
2. Much of the saving in freight cost that is gained when full-trim cuts are packaged at the point of slaughter cannot be realized by the warehouse prepackager. Freight costs on the whole carcass must be paid for transporting it to the warehouse location.
3. At the time of the study, the volume of packaged frozen meats in these operations was not large enough to justify the more expensive and complex processing that would be needed to produce efficiently fully trimmed cuts.

4. The equipment, managerial "know-how," and skilled labor for producing conventional retail cuts are immediately available.

5. The pricing of conventionally trimmed frozen meat cuts can be held more nearly competitive with retail fresh meats. This is believed to be especially important to small stores handling only prepackaged frozen meats. One operator found that substituting competitively priced frozen meats for fresh meat departments in small retail units enabled him to maintain and, in some instances, improve meat and overall store sales.

Central Prepackaging of Roasts, Steaks, and Chops for Retail Sale

Very little experience has been accumulated in marketing centrally prepackaged frozen roasts, steaks, and chops in competition with retail fresh meats.

Processors of frozen specialty meats in some localities have prepared frozen retail cuts (roasts, steaks, and chops). These cuts, usually trimmed and packaged in the same manner as self-service fresh meats, have been sold through small grocery stores that had no other means of offering fresh meat.

Judging by trade reaction, the most significant recent development in frozen meat marketing has been the offering to retailers in several cities of a line of about 30 full-trim frozen meat cuts packaged by a national packer. This represented the first large-scale effort in recent years to place a packer-processed line of ready-to-cook cuts of solid meat into retail distribution.

The marketing tests for these products have been of particular interest to all large retailers because they were initially conducted in the meat departments of several chain-operated supermarkets. Early test results, reported as representing sales of 4 to 9 percent of total fresh meat sales in the test stores, were regarded favorably by the store operators. The tests have been in progress less than a year. During the same period one of the central warehouse prepackagers began offering frozen meat in a few large independent grocery stores. This experience has provided much useful information for the guidance of further work in packaging and merchandising frozen meat in retail distribution.

Combining the production of a wide variety of specialty items with the processing of retail cuts is essential because of the upgrading of rough cuts that can be accomplished by converting them into specialties. Approximately 24 percent of the dressed carcass weight of beef processed in stores is represented by trimmings that go into ground meat, stew meat, and miscellaneous cuts. The marketing experience in specialties has shown that a substantially higher retail price can be obtained for ground meat when additional processing is performed. The ability to do such processing at a central facility may be an important factor in offsetting some of the higher packaging and handling costs for frozen meat products. Also, the firms now producing frozen retail cuts are not packaging the less desirable cuts, such as short ribs of beef, breast of lamb, and shank meat. They feel that the limited demand and low price of these items does not justify the extra packaging, handling, and display expense required for frozen packs. The elimination of these items as retail cuts results in a larger amount of trim that must be marketed in the form of specialty items.

Equipment

All of the firms visited in this study were using "blast-type" freezing equipment. However, it was reported that several firms producing packaged frozen meat specialty items were using "plate-type" freezers. Most manufacturers of commercial freezing equipment can offer valuable engineering assistance in selecting freezing equipment and planning its installation.

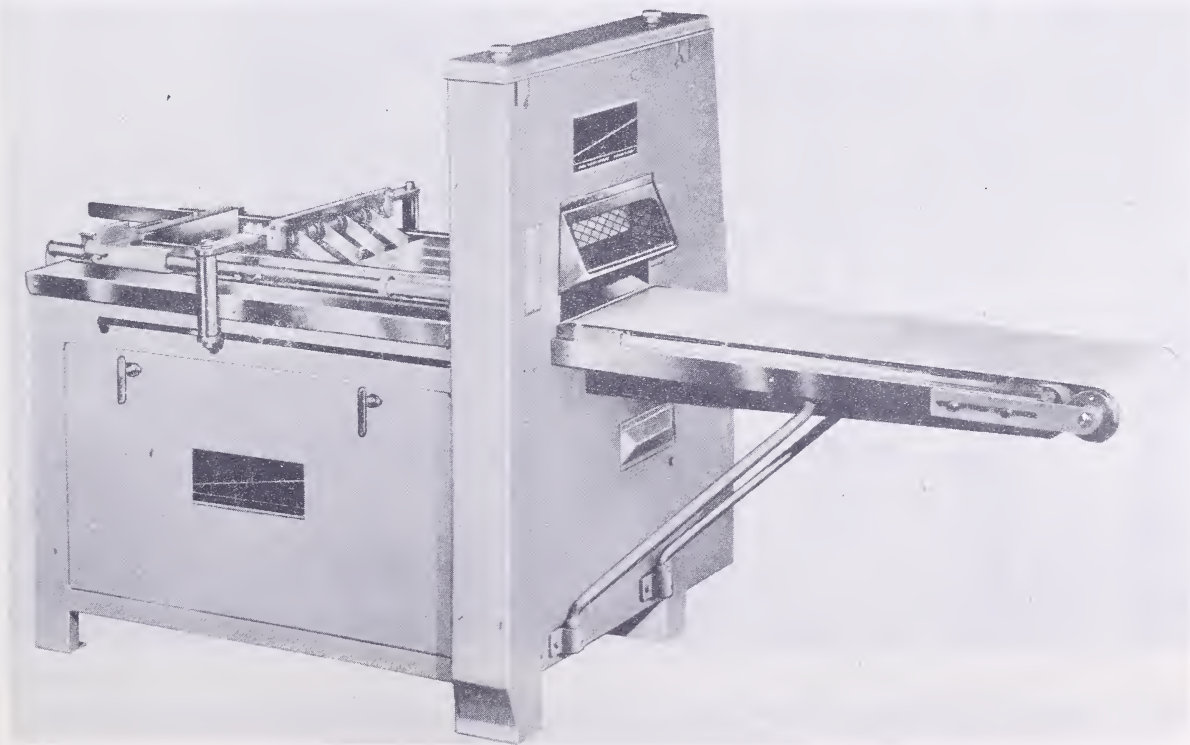
One of the central prepackaging meat operations visited in this study was producing between 8,000 and 10,000 pounds of conventionally fabricated meat cuts in an

8-hour shift with a crew of 14 people (7 men and 7 women) and the following mechanical processing packaging equipment:

- 2 band-type power meat saws
- 1 meat grinder--15 hp.
- 1 meat grinder--5 hp.
- 1 food mixer for blending ground meat
- 1 heavy-duty (bacon-type) slicing machine
- 1 patty molding machine for ground meat
- 1 twin slicing and stacking machine for luncheon meats
- 1 striating (cubing) machine for tenderizing meat cuts
- 2 weight and price printing scales
- 1 wax dipping machine

All processing operations observed were using a "batch" method requiring that meat in process be transported from one operation to another in tubs or on trays in dolly racks. Most operators indicated that a continuous method of processing could probably be devised; they agreed that it should prove much more efficient if volume were large enough to justify the space and equipment investment that continuous-flow manufacturing requires.

Illustrated on this page is a relatively new machine for slicing ground or solid meat that has been frozen and tempered. It was not observed in operation but performance data (72 to 288 slices or patties per minute, depending upon size of cuts) indicates that a machine of this type can be profitably employed for high speed fabrication of most kinds of frozen meat portions (fig. 6).



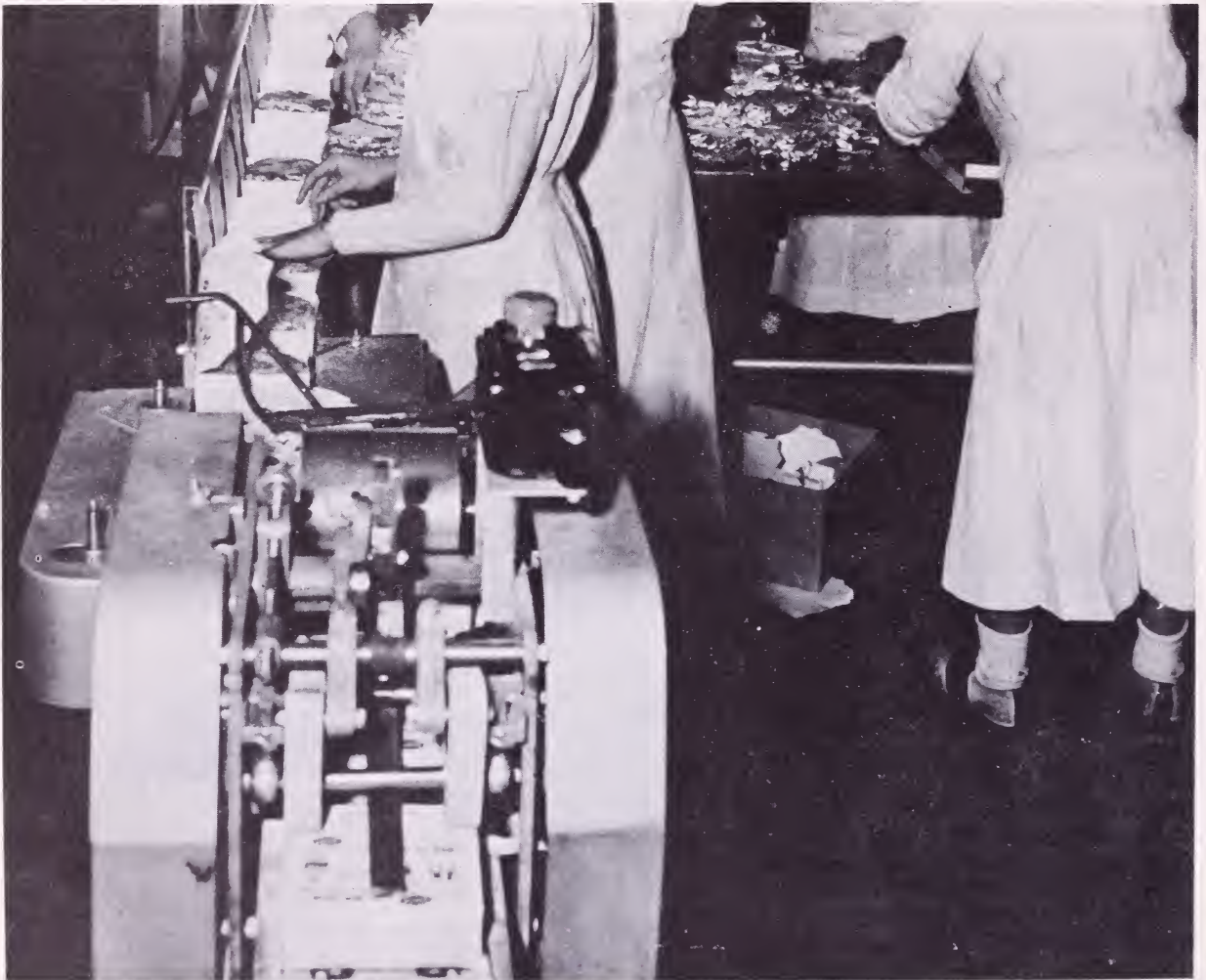
Neg. BN-2571

Figure 6. --High speed automatic frozen meat slicer specially designed to slice compressed blocks, logs, or loaves of tempered frozen boneless meat.

PACKAGING MATERIALS AND METHODS

Most early experiments in prepackaging frozen red meats employed a transparent overwrap or window carton. This type of packaging was believed essential because of the emphasis consumers place on the appearance of meat when they buy it. Some industry people expressed the opinion that appearance has been overstressed as a criterion of quality in fresh meat marketing. They believe that variations in meat color caused by oxidation after cutting or to types of feed at different seasons of the year have little or no effect on eating quality and arbitrarily force downgrading of a considerable quantity of meat.

The leading firms prepackaging frozen fish and cut-up poultry began using nontransparent packaging materials for retail packs about 10 years ago. The rapid increase in sales of these and other foods in "blind" packages has shown that consumer acceptance can be gained without providing for visual inspection when the processor maintains a uniform standard of quality (fig. 7).



Neg. BN-2568

Figure 7. -- Patties are hand wrapped in foil after freezing and placed in cartons. Machine in foreground closes and locks the printed cartons. No overwrap is used.

Trade opinions obtained in this study showed general agreement among processors and retailers that, with the present transparent films and methods of packaging, non-transparent packaging is best suited to meet both the processing and merchandising requirements of centrally prepackaged frozen meat. A wide variety of opaque materials are being used by processors. Most of these are adaptations of materials already being used in packaging other types of frozen foods. Opinions differ as to which material or combination of materials is best suited to give adequate freezer protection and to meet manufacturing, shipping, and retail self-service display requirements at lowest cost. Controlled study of these factors for the several types of materials now in use, or soon to be available, would assist industry members in making packaging decisions.

Types of Materials

The following types of materials were observed being used without any apparent consistency according to type of meat item or volume being packaged: (1) Printed transparent film bags, heat sealed; (2) printed wax or lacquer-coated cartons with inner film wrap; (3) plain cartons with printed insert label overwrapped with transparent film; (4) plain cartons with printed wax or printed film overwrap; (5) semitransparent bags with vacuum seal; (6) transparent sheet film applied and heat sealed manually; (7) plain cardboard cartons with laminated printed foil overwrap; and (8) wax-type dip coating materials. The latter two packaging materials were first used in central meat prepackaging in 1955 and aroused widespread trade interest.

Retailers stocking the foil-wrapped meats were especially enthusiastic about the appearance of this type of wrap. But some processors expressed doubt that the higher cost of laminated foil wrapping should be incurred if frozen prepackaged meat is to be merchandised as a staple commodity moving in large volume, rather than as a premium-priced specialty food.

One of the two central warehouse operators pioneering in the use of a wax coating for frozen conventionally trimmed meats reported an average cost of 2 cents per pound for both the labor and the material required to wax coat meat. This cost is said to include weighing, pricing, mechanical dipping, and packing the coated meat in master shipping containers.

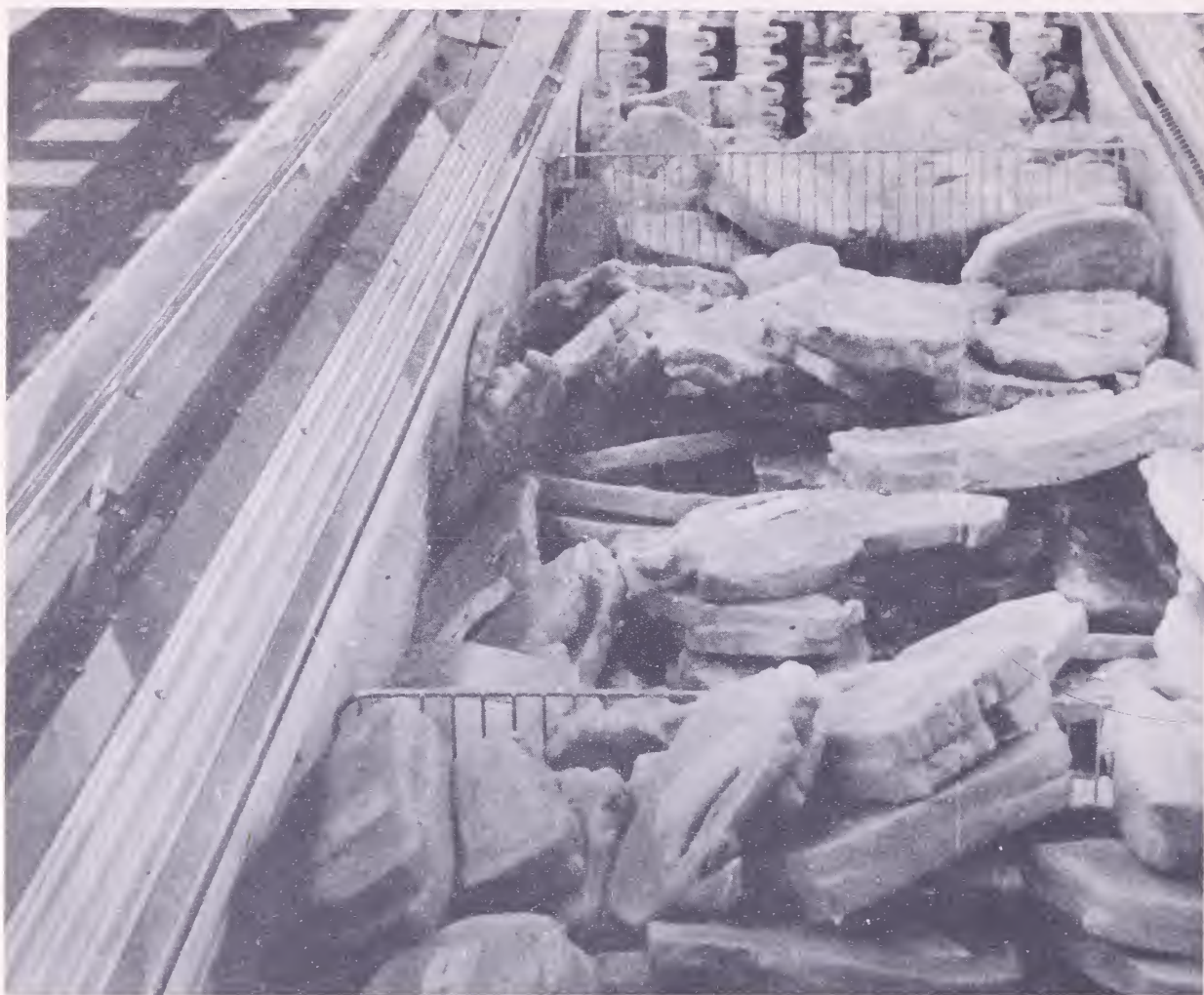
Food technologists studying the various methods of providing protective packaging for frozen meat appear to agree that it is desirable to exclude as much air as possible from contact with the meat. The principal advantages of wax-type coating are that it excludes all air, is comparatively low in cost, and requires no hand labor to apply it (fig. 8). Processors and retailers mentioned several disadvantages of wax coating as a complete consumer packaging material. The wax does not offer an attractive appearance in retail display, and information about the product cannot be incorporated with the packaging, as it is on printed cartons and overwrap materials. Wax packages are of irregular shape and size, causing space to be wasted and displays to look disorderly if not continually rearranged. The wax coating now being used tends to chip off during shipping and handling in the display case. Removal of the wax is also somewhat more difficult and time consuming than most other kinds of packaging material.

To overcome the labeling and retail display shortcomings of wax coating, one operator is planning to place the coated cut in a printed carton. The manufacturer of one type of wax being used advised that his product and the machine for applying it are being improved. The new machine will automatically set up two types of film coatings in a liquid state and apply them to any type of frozen retail cut. According to the manufacturer, the first film applied will be a very flexible primer and the second a tough, flexible, lustrous coating.

The invention of an entirely new type of dip coating was recently announced. It is transparent, can be applied at room temperature, and is recommended for packaging both frozen and fresh meats. The maker of this coating has arranged for a market test of the material by a national meatpacker.

In addition to these recently announced plans for improving dip-type coatings, a large chemical manufacturer is known to have research work in progress on still another material similarly designed as a coating for meat packaging. This coating can be stripped from the meat.

There are indications that some of these new coatings are being designed for testing the practicality of using this type of packaging for fresh red meat, luncheon meats, and other delicatessen products generally hand or machine wrapped with transparent films.



Neg. BN-2563

Figure 8. --Retail display of frozen cuts of beefsteak packaged with a wax-dip coating. A price and weight label is placed on each cut before dipping and is held in place by the wax.

Packaging Labels

The smaller specialty meat processing firms contacted in this study were using wax- or lacquer-coated cartons and printed film bags for retail packaging. The cartons are imprinted with labeling information in 2 or 3 colors but do not carry a picture of the product. These operators producing a small volume expressed varying degrees of dissatisfaction with their present packaging. The main criticism was the lack of a label vignette (picture) of the product. They felt that a picture label would increase the impulse

appeal and sale of their specialty meat items. Some stated that they could not afford a picture label. Others said they hesitated to risk a large investment in printing plates and the purchase of several months' or years' supply of labels, usually required to bring the unit cost down to an acceptable level. Possibly, as the industry grows, the need of the small processor for a more attractive label will be met by label- and carton-printing firms with stock vignette labels for the more popular meat items, similar to the stock labels for frozen fruits and vegetables, and most canned foods.

In addition to the importance attached to the use of a picture on the label, experienced trade people feel that labels for packaged meat should incorporate the following features:

1. The label should include the same type of information about the meat that the customer has been accustomed to getting from the butcher or from visual inspection.
2. Cooking instructions should be concisely and clearly stated. Many feel it would be desirable for the industry to use standardized cooking instructions based on sound research.
3. The design of the label should attract attention and be of pleasing appearance.
4. The picture on the package should accurately depict the form in which the contents are packaged, i. e., fresh, cooked, breaded, stuffed, rolled, or tied.
5. The terminology used to name or describe various cuts should be standardized to avoid confusing the purchaser.

Institutional Packaging

Most institutional packs of frozen solid meat cuts and specialty meats are now being packaged in rectangular suitcase-type fiber cartons. Usually, each portion is individually wrapped in transparent film. Heavy waxed paper is used to separate each of the 3 or 4 layers packed in a carton. Cartons carry a net weight of 6 to 25 pounds (fig. 9).

Individual wrapping of portion-control cuts with moisture-vapor proof material is considered preferable to placing the protective wrap over the carton, as in retail carton packaging. This permits the cuts to be removed from the institutional pack as needed without the remaining contents becoming dehydrated in low-temperature storage.

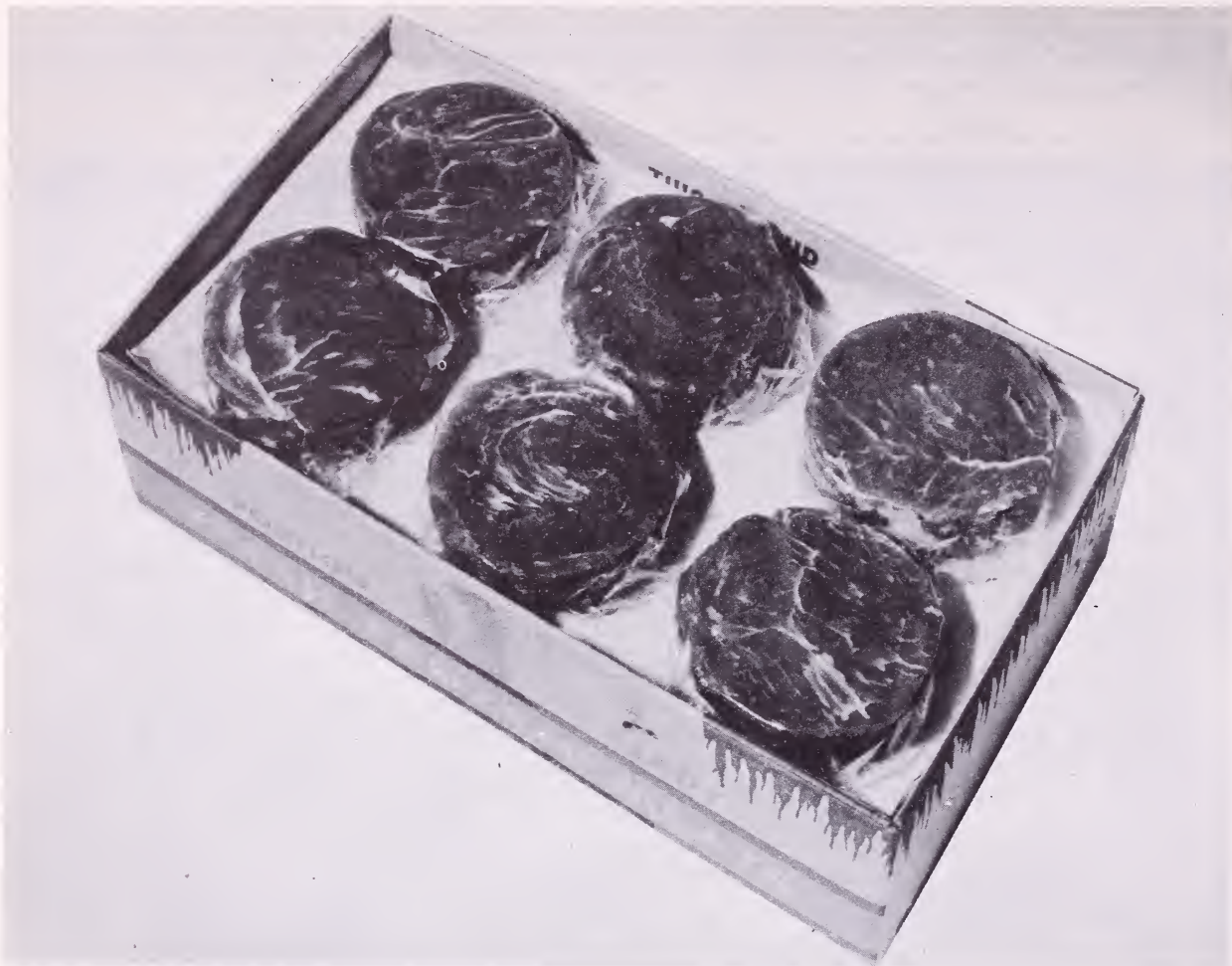
At the time of this study none of the processors, so far as could be determined, had attempted to use a dip-type protective coating for institutional meat packaging. The main disadvantage of using present coating materials was thought to be the time required for stripping the coating from the meat. New types of material and methods of removal show promise of overcoming this difficulty

DISTRIBUTION METHODS AND COSTS FOR PACKAGED FROZEN MEAT

The distribution of consumer packaged frozen meats has utilized the wholesale and retail facilities developed for the marketing of other frozen foods. Most independent frozen meat processors having distribution in several markets are represented by a food broker in each sales territory. Brokers perform the same administrative and sales services that they customarily provide for packers of canned and frozen foods. Trade members stated that brokerage commissions in 1955, ranged from 3 to 5 percent of the processor's selling price. Packer branch house personnel usually perform services similar to the broker for the large meatpackers whose frozen meat products are being distributed through independent jobbers and direct buyers.

Most large-volume processors of frozen specialty meats maintain consigned reserve stock in a public warehouse in each sales territory. Wholesalers and direct buyers make withdrawals periodically from the processor's warehouse stock. This practice

assures that an ample supply of merchandise is continuously available and facilitates making minimum rail car or trucklot shipments. Shipping and storage costs on consigned stocks are usually paid by the processor.



Neg. BN-2570

Figure 9. --Institutional pack frozen portion-control steak cuts.

Chains and voluntary group wholesalers performing their own distribution of frozen foods to stores, purchase prepackaged frozen meat direct from processors. Other chain and independent retailers use the services of frozen food wholesalers.

Packer Branch Houses

In 1955 one large packer, inaugurating distribution to retail stores of a full line of prepackaged frozen meats, arranged for the performance of all wholesaling functions by branch houses. This policy appears to have been designed to assure close control over the handling of the products between the point of processing and the retailer's cabinet. It also facilitates control over margins and merchandising practices important to the accurate evaluation of test marketing programs.

Previously, most distribution work for packer-produced specialty and portion-control frozen meats had been performed by independent frozen food wholesalers. The principal function of the branch house in frozen meat distribution has been to perform administrative and promotional work, with the independent wholesalers distributing the packer's products to institutional users and retailers.

In the new operation mentioned above, frozen meat orders are solicited by the packer's salesmen and assembled from branch-house stock. Delivery is made direct to stores several times each week in the packer's own refrigerated trucks.

The ability of the branch-house organization to promote effectively the retail sale of prepackaged frozen meats is considered to be improved when these products are purchased and handled by meat department personnel at the store level. This arrangement makes it possible for the branch house to concentrate sales and promotional work for all of its refrigerated meat products with the same buyers in each retail firm.

One packer stated that he was having some difficulty in retraining branch-house salesmen to perform the missionary selling work required to introduce frozen meats to retailers. The traditional emphasis on large tonnage in selling fresh meat and sausage has accustomed salesmen to seek large orders and to have their performance measured accordingly. They are inclined, according to the spokesman, to resist spending time to develop accounts for comparatively small orders of frozen meats.

Some large retailers expressed the belief that the movement of prepackaged frozen meat through traditional fresh meat wholesaling channels will increase substantially as the volume in prepackaged retail cuts grows. These retailers say that they expect to buy most of their frozen meat from the same firms that now supply them with fresh meats.

Institutional Frozen Meat Packs

Institutional meat jobbers and local packers producing portion-control and specialty items generally provide their own personnel and equipment for distributing these products within their local trading area. When distribution is extended to other markets, processors usually have selected institutional meat or frozen food jobbers serving the area to stock and distribute their portion-control packs.

The large packers have used their hotel supply subsidiaries to distribute institutional frozen meat packs in the few markets where this type of outlet is available. In other areas they have used branch-house institutional distribution facilities and independent wholesalers that are equipped to handle frozen products.

Supermarkets

Traditionally, all frozen food items have been handled in large retail stores by either the grocery or produce departments. Personnel of one of these departments has usually performed buying, pricing, and display work for frozen foods of all kinds. A radical change in this policy occurred during 1955, according to the findings of a trade survey late in the year.⁷ Of several hundred supermarket operators responding, 62 percent said that frozen foods were handled, according to products, by two store departments--37 percent had split frozen foods between the grocery and meat departments and 25 percent between the produce and meat departments. A similar survey in 1954 reported that more than 75 percent of retail grocery departments and just under 25 percent of produce departments had sole responsibility for frozen foods.

The sudden shift in 1955 in the administrative policy for retailing frozen foods seems to reflect the operators' recognition of the increase in sales volume of frozen meat items. The shift also seems to reflect the desirability of combining the responsibility for purchasing and merchandising frozen foods with the responsibility for fresh foods of the same kind.

Wholesale Margins

Wholesale margins for frozen consumer-packaged red meat recently have ranged about the same as the wholesaling margin for most other frozen foods, according to information furnished by wholesalers, supermarket operators, and the processors of these meat

⁷ Quick Frozen Foods. Frozen Foods Now Account for 6% of Sales, Super Markets Report, Quick Frozen Foods 18: 261-62, Feb. 1956.

products. The wholesaling margin may vary from 5 to 18 percent of wholesale selling price, depending upon the type of operation and the services performed by the wholesaler. Recently, the gross margin of the independent frozen food wholesalers, who provide a full service-type of operation for the retailer, has ranged between 15 and 17 percent. When only limited services are performed, the wholesaling margin is reduced to 10 to 12 percent of the wholesale selling price. For most chain operators and voluntary group wholesalers purchasing frozen foods direct from processors, the cost of wholesaling these foods has been estimated at 8 percent. Exceptions to these indicated industry averages for various methods of wholesaling frozen food are found in two firms that are doing their own central meat prepackaging and were distributing most of the output to owned or controlled stores. These firms reported wholesaling cost estimates of around 5 percent, including the cost of warehouse storage, order assembly, and delivery to stores. A small chain operating its own distribution center and delivering large palletized frozen food orders to stores reported that its cost of performing wholesaling functions for these items averaged about 6 percent of the billing price to the store.

Fluctuating market prices for livestock and perishability of the product frequently causes wide fluctuations of wholesale and retail meat prices. Industry members anticipate a greater stability in year-round meat pricing if a substantial part of the total fresh meat tonnage is prepackaged and frozen. This would enable the industry to exercise closer control over the quantity of fresh meat moving into retail channels and, to some extent, to cushion the depressing influence of heavy livestock runs.

Retail Margins

Retail margins on centrally prepackaged frozen meat products for all large retailers contacted ranged from 18 to 25 percent of their selling prices. A trade survey of over 2,500 supermarkets in late 1955--previously quoted--showed an average gross margin of 21.9 percent for frozen meat products being sold in these stores.⁸

When prepackaged frozen meats are handled and displayed with other frozen foods, usually it has been the practice to group red meat products with frozen food specialties in setting retail margins. In the stores where frozen meats were being handled by the meat department, the markup applied to frozen meat was found to be about the same as the gross margin established for this department. In all stores other than those being supplied by central warehouse processors, retail pricing policy did not appear to take into account the actual differences in costs between prepackaging in the store and having this work done by the supplier. The cost of processing labor, packaging material, and shrinkage loss is not incurred by the retailer in handling prepackaged frozen meats. However, the pricing policy used for prepackaged frozen meat is consistent with prevailing retailing practice in determining markups for centrally prepackaged wieners, cold cuts, and other "sausage-type" products. Operators said that margins on these products ranged from 20 to 25 percent and sometimes higher, depending upon the retailer's competitive situation. Retailers indicated that margins on prepackaged frozen meat products could be reduced only as the sales turnover of these items increased. Retailers said that any reduction in margin would have to be compensated by a sufficient increase in sales volume to maintain the present gross income from the display space devoted to frozen meats.

Comparative Prices of Frozen and Fresh Prepackaged Meats

Price comparisons between meats fabricated at the store level and centrally prepackaged frozen cuts can only be approximated because of differences in the grades and types of meat used, the ratio of lean meat to fat in ground meat products, the amount of trimming performed, and the value added to specialty items by additional processing. Representative prices for various types of frozen and nonfrozen meat packs collected from corporate chainstore operators in Detroit, Mich., in October 1955 are shown in

⁸ Quick Frozen Foods. Frozen Foods Now Account for 6% of Sales Super Markets Report. Quick Frozen Foods 18: 260. Feb. 1956

tables 2 and 3. The prices listed in table 2 were considered by the retailers to represent a reasonably accurate comparison at the time between the cost of packer processed frozen retail cuts and similar items prepackaged at the store level. Representative prices for institutional portion-control packs were obtained from processors in Philadelphia, Pa., in November 1955 (table 4).

Table 2.--Retail prices of centrally prepackaged, fully trimmed frozen meat cuts and similar nonfrozen meats packaged at the store level, Detroit, Mich., 1955

Kind of meat and cut	Frozen prepack, fully trimmed, boneless	Nonfrozen store pack, boneless ¹	Nonfrozen store pack, bone-in
Beef:	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Strip sirloin steak.....	2.59	1.69	----
Top sirloin steak.....	1.89	.99	----
Round steak.....	1.29	.95	----
Tenderloin.....	3.59	2.29	----
Beef stew.....	.89	.69	----
Hamburger patties.....	.71	(bulk) .39	----
Pot roast99	----	0.59
Rib roast.....	1.25	----	.73
Sirloin roast.....	1.19	1.15	----
Veal:			
Leg roast.....	.89	----	.59
Cutlets.....	1.29	1.09	----
Pork:			
Chops.....	1.59	----	.94
Roast.....	1.19	----	.48
Tenderloin.....	2.19	1.09	----
Lamb:			
Chops.....	1.89	1.29	----
Leg roast.....	1.19	----	.79

¹ Store operators considered the nonfrozen cuts shown in this column to be about the same in quality and degree of trim as the frozen prepack listed opposite.

Table 3.--Retail prices of various centrally prepackaged frozen specialty meat items in Detroit, Mich., 1955¹

Meat item	Package size	Package price	Price per pound
	<i>Ounces</i>	<i>Cents</i>	<i>Dollars</i>
"X" brand flaked beef patties.....	11	0.45	0.80
"Y" brand flaked beef patties.....	16	.59	.59
Breaded beef sticks.....	10	.63	1.01
Buttered beef steaks.....	8	.35	.70
Breaded veal patties.....	8	.49	.98
Breaded pork patties.....	8	.49	.98

¹ At the time these prices were recorded, bulk packaged ground beef (hamburger) was selling in the same stores at \$0.39 per pound.

Table 4.--Comparative selling prices of frozen institutional portion-control packs and pre-packaged retail fresh meat, Philadelphia, Pa., Nov. 1955, U. S. Choice Grade Meats

Meat item	Price per pound for -	
	Institutional portion-control frozen pack	Prepackaged retail fresh meat
	<i>Dollars</i>	<i>Dollars</i>
Swiss steak.....	1.16	0.93
Sirloin strip steaks.....	2.56	1.69
Beef stew.....	.78	.69
Ground beef, bulk pack.....	.55	.39
Loin lamb chops.....	1.92	1.39
Veal chops.....	1.16	.89
Pork chops.....	1.12	.89

PHYSICAL FACILITIES FOR EXPANSION OF FROZEN MEAT PREPACKAGING

In the last 2 years the total quantity of red meat marketed in fresh form has been between 16 and 17 billion pounds. It is pertinent to attempt to analyze the factors that would enter into meat marketing, if, within the span of 5 years, 20 percent of this fresh meat, or about 3.3 billion pounds, were to be packaged in frozen form at central facilities. (This percentage is lower than estimates made by some industry people.) Present production is estimated at less than 2 percent. It is apparent that large investments in processing, storage, transportation, and retail handling equipment would have to begin in the immediate future to accommodate such a rapid increase in central prepackaging. It would entail the building of processing capacity up to a total of about 275 million pounds of dressed carcass weight each month, or the equivalent of about 458,000 beef carcasses averaging 600 pounds each. The monthly total would break down for each of 20 working days to nearly 23,000 carcasses of 600 pounds dressed weight of beef, or the equivalent in other kinds of meat. If fully trimmed cuts were being packaged and if dressed carcasses yielded 60 percent net packaged weight, this volume of prepackaging would net a daily pack of about 8,250,000 pounds.

Packing Plants

In respect to equipment investment cost, one firm engaged in meat freezing states a rule-of-thumb measure for meat freezing equipment as \$2 per pound of daily capacity, providing the capacity is 10,000 pounds or greater. Equipment investment costs per pound are reported as being substantially higher for installations with less than 10,000 pounds capacity. Should the \$2 per pound figure continue to be reasonably representative of the initial meat freezing investment for prepackaging, then the total outlay over the 5-year period for the acquisition of freezing equipment would approximate 16-1/2 million dollars. Added to this at the packer level would be the installation of sufficient cooler capacity to effect minimum aging (curing) of the carcass before cutting, and the construction of public or private freezer storage space sufficient to accommodate several days or perhaps weeks of output.

Transportation

On January 1, 1956, there were 1,037 mechanically refrigerated rail cars in operation in the United States and 1,219 cars on order. The present cost of this type of car is said to range from \$18,000 to \$24,000. On the same date there were 7,590 refrigerated motortruck trailers in service which were suitable for hauling frozen foods. These trailers were refrigerated with either mechanical units or dry-ice units. The cost of this type of truck-trailer equipment is approximately \$10,000 for an insulated trailer, \$3,000 for a refrigeration unit, and from \$8,000 to \$10,000 for a tractor. At the time of the study

all low-temperature equipment was very much in demand for long-haul shipments of frozen food because of its ability to maintain zero temperature in transit.

On the assumption that the frozen pack from 3.3 billion pounds of dressed carcass meat is moved from the point of packaging to market in zero-temperature refrigerated cars, about 2,750 cars (more than twice the number in service) would be required if each car carried a net weight of 60,000 pounds and made one round trip per month. On the assumption that all the production moved by truck, it would require 1,650 trucks, each carrying 25,000 pounds net weight and each making four round trips per month. Irrespective of whether the output is hauled entirely by rail, truck, or as is most likely, a combination of both, a very substantial equipment building program would have to be completed in order to provide adequate transportation facilities.

Wholesaling Facilities

At the wholesale or branch-house level, freezer storage would have to be provided for a fifth of the volume handled in fresh form by either building new freezer space or rebuilding existing coolers and converting them to low-temperature storage. Similar changes would be required in delivery equipment used by these facilities.

Retail Facilities

Continuing the assumption, for the purpose of illustration, that 20 percent of fresh meat volume might be in frozen form by 1960, at the retail level this would imply that a supermarket with \$10,000 weekly sales volume in the meat department would handle \$2,000 or more worth of frozen packaged meat, depending upon the relationship in price between fresh and frozen packs. Based on present percentage sales ratios of various food products in gross sales of supermarkets, \$2,000 worth of frozen retail meat cuts would be roughly equivalent to the current weekly sales of all other frozen foods. Additional back-room freezer storage space in stores may not be required immediately. Perhaps several smaller deliveries of frozen meat could be made, instead of one large delivery, by combining them with fresh meat deliveries. Display space for frozen meat can be obtained by reducing the fresh meat display. Retailers who have heavy insulated display cases can adapt them for frozen meat by increasing the capacity of the mechanical refrigeration units. But most stores would find it necessary to purchase a substantial quantity of new freezer display equipment in order to handle any appreciable increase in frozen meat sales.

Transition From Fresh to Frozen

Trade observers and advocates of central prepackaging seem to agree that the shift from store level to central operation will be a gradual, evolutionary change. During the transition period from all fresh to all frozen meat, if it so develops, possibly there will be more rather than fewer meat merchandising and administrative problems for retailers. There would appear to be little possibility of economic advantage at the retail level from such a dual operation, except perhaps a larger net profit if present retail gross margins on frozen meat products are continued--a condition that would be likely to retard the growth of the frozen meat business.

Continuance of practically all store-level meat fabrication equipment and some personnel with appropriate skills will be required as long as a complete line of fresh meat is offered. Until such time as a complete central prepackaging system of fresh meat supply for retailers is made practical, new stores will have to be equipped to handle conventional store-level prepackaging along with whatever storage and display capacity is considered necessary for accommodating frozen meat. Since both short- and long-term store planning is greatly affected by central prepackaging and a dual operation is not likely to reduce meat retailing costs appreciably, it is desirable to determine as quickly as possible to what extent frozen meat can be substituted for fresh meat and what methods and length of time will be required to accomplish optimum sales of the frozen.

CONCLUSIONS

The meatpacking industry is generally credited with having pioneered the use of continuous flow (assembly line) processing by introducing it in slaughtering operations. The systems and methods in use in large slaughtering plants were devised and adopted by leading firms around the turn of the century. Since that time only minor improvements have occurred in slaughter operations. These have involved the use of improved power equipment for materials-handling and carcass breakdown. Similarly, during the last 30 to 40 years no fundamental changes have been made in the methods used for transporting and wholesaling fresh meats. But increased use of mechanical refrigeration at all stages of fresh meat handling has reduced spoilage hazards and broadened the market for the product by making it available throughout the year to consumers in almost every locality. At the retail level, prepackaging for customer self-service has been the only significant change in meat retailing methods since the introduction many years ago of power saws and grinders.

The relatively small gains in the efficiency of fresh meat marketing occurring in recent years has meant that wage increases in the packinghouse industry and at the wholesale and retail level have, for the most part, added to the cost of meat marketing. This is in contrast to the experience in most other manufacturing industries that, to a greater extent, have been able to offset and justify higher wage rates out of gains in labor productivity.

In the opinion of many people in the industry, the pattern of fresh meat marketing at the time of this study was not susceptible to any further appreciable improvement in costs or in giving consumers fresh meat more conveniently prepared for their use. The strict limitations imposed by the highly perishable properties of fresh meat are primarily responsible for the static condition prevailing in the methods used for handling it. Recognition of these limitations and a belief that the administrative problems concerned with fresh meat preparation should be shifted from the retail to the manufacturing level of the meat industry have been stated as the main reasons for retailer interest in the adoption of central meat prepackaging and freezing.

Thus far the experience acquired with specialty and portion-control frozen meats has established the ability of central processors to add merchandising advantages to fresh meats, such as the maintenance of uniform quality, new items, and convenience features. This work, combined with the results achieved by locker plants, freezer provisioners, and manufacturers of frozen prepared meat dishes, has demonstrated a fairly broad consumer acceptance of meat preserved by freezing. Still lacking, however, is any encouraging evidence of the ability of central operation to effect an improvement in the cost of meat marketing. On the contrary, the pricing structure of most types of centrally prepackaged frozen meat would indicate that this method of operation incurs a much higher cost than conventional channels of fresh meat marketing. It is, of course, apparent that a good part of the unfavorable price relationship of frozen meat with conventionally processed fresh meat is due to the large promotional expense incident to the introduction of a new product and the treatment of frozen meats by wholesalers and retailers as a specialty item rather than as a part of the high-volume fresh meat operation.

If frozen meat processing and marketing practices are continued unchanged, it is unlikely that the few merchandising advantages they offer will justify the expansion of production and industry capital investment in this field to the extent discussed in the preceding section. The retailing and meatpacking people who believe that such an expansion will occur base their reasoning on the possibility of eventually realizing economic gains in these ways:

1. Increasing labor productivity in fresh meat preparation through greater mechanization of fabricating and packaging work.

2. Retaining at the point of slaughter and converting to byproducts the excess of fat and bone (about 40 percent by weight) of the dressed carcass that now goes to retail stores and homes.
3. Realizing the transportation economies resulting from the reduction of shipping weight and bulk.
4. Eliminating the cost of providing meat processing equipment and space at the retail level.
5. Eliminating the losses sustained from fresh meat shrinkage, downgrading, and spoilage.
6. Lowering meat handling costs in distribution activities.

Also to be considered in studying the economic aspects of central prepackaging is the possibility that some costs in this method of operation, such as packaging material and refrigeration, may always remain higher than similar costs in fresh meat marketing. Further, the performance of additional preparation work, such as breasting, portion forming, and precooking, represent new costs.

The saving in transportation costs between packing plants and market areas can be anticipated with reasonable exactness as an immediate gain in packer production of full-trim cuts. When fully trimmed boneless retail cuts are fabricated and frozen at the point of slaughter, the equivalent of about four carlots of dressed carcass beef can be loaded in one large mechanically refrigerated car. This is possible because of the removal of excess fat and bone and the greater loading density of packaged meat compared with carcass meat.

Based on present rail freight rates, a saving of about \$650 can be made in shipping a gross weight of 70,000 pounds of fully trimmed frozen meat from Omaha, Nebr., to the east coast. This is equivalent to a reduction in freight costs of about \$160 on each car of fresh carcass meat shipped between the same points and about \$120 per car between Chicago and the east coast.

Among the other economic advantages of a central plant is that packers can recover 5 to 6 cents a pound, at 1955 price levels, from fat and bone going into byproducts, compared with 1 or 2 cents a pound received by retailers. If an average differential of 3 cents per pound is assumed, the packer would receive about \$7 more from the trim of a 600-pound beef carcass than the retail store receives when cutting is done there.

The interest of large retailers in packer-processed frozen meats will not be likely to develop into aggressive promotion of these products at the retail level until it is shown that they can offer positive merchandising and economic advantages over conventional meat marketing methods.

It is of interest to all concerned with fresh meat marketing to obtain a conclusive answer as to the actual potentialities and limitations of central prepackaging and freezing. An affirmative finding based on sound research would provide a reliable basis for industry planning. A negative indication could save time and money for many firms that perhaps might be better spent in other meat research and development work.



