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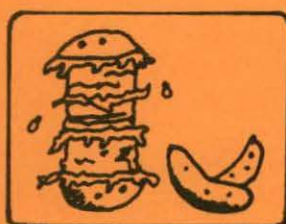
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LOSSES IN U.S. FOOD DISTRIBUTION SYSTEM



DELICATESSEN FOOD LOSSES

Thomas R. Pierson
John W. Allen
John M. Halloran

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East Lansing



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**DELICATESSEN FOOD LOSSES IN THE
U.S. FOOD DISTRIBUTION SYSTEM**

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Department of Agricultural Economics
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PREFACE

This is one of eight reports resulting from a study of losses and waste in food distribution. The National Science Foundation-Research Applied to National Needs (NSF-RANN) commissioned and provided primary funding for the analysis of the general magnitudes and locations of food losses occurring in the U.S. food distribution system. Additional resources were provided by Michigan State University's Agricultural Experiment Station and Cooperative Extension Service. Seven food product categories have been analyzed: fresh beef, produce, dairy products, dry grocery, frozen foods, bakery goods and foods sold through delicatessen departments. Foods within these categories constitute about 92 percent of supermarket dollar food sales. Dry grocery is the largest category, accounting for about 36 percent of supermarket food sales. It is followed by dairy products at about 15 percent, fresh beef at about 13 percent, and produce at about 9.8 percent of food sales. Frozen foods, "deli" department foods, and bakery goods accounted for 8.1, 5.2, and 4.7 percent respectively. It should be noted that with the exception of fresh beef, the categories are designated according to conventional food store departments. In the case of beef, it is the dominant product in the meat department.

This particular report contains: an introduction and orientation to delicatessen food distribution through supermarkets; a discussion of the general nature of delicatessen losses; and findings of the magnitudes, causes and suggested remedies for delicatessen losses. The following companion reports also derived from the NSF-RANN study complement this report.

- Losses in the U.S. Food Distribution System
- Produce Losses in the U.S. Food Distribution System
- Dairy Product Losses in the U.S. Food Distribution System
- Dry Grocery Losses in the U.S. Food Distribution System
- Fresh Beef Losses in the U.S. Food Distribution System
- Frozen Food Losses in the U.S. Food Distribution System
- Bakery Losses in the U.S. Food Distribution System.

**DELICATESSEN FOOD LOSSES IN THE
U.S. FOOD DISTRIBUTION SYSTEM**

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INTRODUCTION*

The reality of serious resource shortages coupled with stagnant productivity over the past decade has led to a renewed search for ways to improve efficiency in the U.S. economy. The productivity problem and resource shortages have been important factors in creating the nation's most serious economic problem -- inflation. Among the most visible symptoms of inflation are rising gasoline and heating fuel costs as well as food price increases. Rapid food price increases and the hardships they pose for society highlight the necessity to improve productivity and resource utilization in the food distribution system. Among the many resources used in the distribution foods -- labor, energy and capital, to name just a few -- food itself must be included as a vital resource. Thus, food firms need to develop and implement more "food efficient" distribution methods within an overall context of cost efficiency.

At the present time, however, the nature of food losses in the distribution system is often not well understood. Neither the magnitudes nor the locations of food losses have been adequately documented. Even definitions of the terms differ greatly. Nonetheless, until the magnitudes and locations of the losses are established, opportunities to take action to reduce them are severely limited. This report presents preliminary estimates of delicatessen food losses in the U.S. food distribution system.

The Nature of the Research

"Delicatessen food losses" is a term subject to many interpretations. The purposes and nature of this study dictated the use of a number of different "delicatessen losses" terms and concepts: (1) losses by weight, (2) economic

*In addition to the principal authors, major contributions to this report were made by Cynthia M. Seik, Graduate Assistant, Department of Marketing and Transportation Administration, Michigan State University.

value of physical losses, (3) total economic costs associated with losses, (4) shrinkage, and (5) losses resulting in reductions of either the quantity or quality of delicatessen products available for human consumption. Although different "delicatessen food loss" concepts with disparate data were used, the study tended toward a single focus: an effort to develop estimates or proxies for the quantities of delicatessen food lost for human consumption.

The project covered delicatessen food distribution activities starting from the processor's or manufacturer's shipping dock and extending through transportation, wholesaling, and ending with supermarket retailing operations. Clearly, depending on the product, these operations vary sharply from one another. Prepared salads, for example, may need little in-store preparation. However, some deli foods, such as hot sandwiches and ready-to-eat entrees, require final preparation in the supermarket service delicatessens. In all cases, the distribution systems covered in the study were those ending with the supermarket and most often they began with transportation to distribution centers or warehouses which service supermarkets.

The specific objectives of the study were:

- To identify the general magnitudes and locations of major delicatessen food losses during distribution activities based upon a thorough inventory of available information.
- To determine the approaches currently used to control delicatessen food losses, and to assess the strengths and weaknesses of these approaches.
- To identify delicatessen loss issues which may need additional research in order to reduce losses.

Research procedures employed to achieve these objectives involved a four-step process:

- An initial, broad-based survey of published information was conducted. Sources of information included: (a) university, United States Department of Agriculture and private industry-sponsored symposia on food losses and related topics; and (c) trade publications.
- A select panel composed of representatives from industry, trade associations, and government met at Michigan State University to review and comment upon the preliminary findings. They also contributed to the identification of comprehensive resource materials.
- The analysis and synthesis of selected published data was conducted in order to develop a comprehensive picture of delicatessen food losses.
- A limited number of in-depth interviews were carried out with selected industry authorities to provide additional information, and to ascertain the reasonableness of findings.

The Delicatessen Department

All supermarkets carry at least some delicatessen (deli) foods, although some supermarkets do not operate formal deli departments. Tables 1 and 2 indicate pertinent sales information on deli foods in supermarket service and self-serve deli departments, respectively. In many instances, deli foods are merchandised through conventional supermarket departments. Luncheon meats, for example, may be merchandised through meat departments just as cheeses, ready-to-eat salads and gelatin may be offered to shopped in dairy departments. Increasingly, however, deli foods are being displayed and sold from formal deli departments which are independent of other departments within the supermarket. The final stages of preparation of some foods such as sandwiches and hot, ready-to-eat entrees may be carried out in supermarket service delis. A 1979 report estimated that up to 23 percent of service deli sales are from items with in-store preparation (4).

Table 1. Service Delis: Items, Sales and Best Sellers

Average No. of Items Within Category	Product Category	Average Sales	Leading Sales Item in Each Category
		(percent)	
44	Luncheon Meats	40	Ham
26	Baked Goods	7	Glazed Donuts
21	Imported Cheese	7	Swiss
20	Domestic Cheese	13	American
16	Salads	10	Potato
12	Hot Foods	12	Chicken
7	Sausage, Franks	6	Franks
4	Puddings, Gelatins	2	Rice Pudding
2	Others	3	---
152		100	

Source: See (4).

Table 2. Self-Serve Delis: Items, Sales and Best Sellers

Average No. of Items Within Category	Product Category	Average Sales	Leading Sales Item in Each Category
		(percent)	
154	Luncheon Meats	33	Bologna
129	Domestic Cheese	28	Mild Cheddar
52	Baked Goods	3	Biscuits
46	Imported Cheese	8	Swiss/Jarlsberg
40	Sausage, Franks	16	Franks
13	Salads	5	Potato
10	Puddings, Gelatins	1	Fruit Gelatins
3	Hot Foods	4	Chicken
4	Others	2	---
451		100	

Source: See (4).

In recent years there has been substantial growth in the number of supermarket deli departments, and a corresponding increase in the sales of deli type foods. With respect to deli food sales, trends in sales of "provisions" or "processed meats" (bacon, cured hams, picnic hams, frankfurters, sausage products, and cold cuts) provide one example of the kind of sales growth experienced by deli foods. From 1973 to 1975, food store sales of these products increased from \$8.5 billion to \$9.85 billion or nearly a 16 percent increase (6).

Recent growth in deli food sales can be attributed in major part to at least the following factors. Because of changing lifestyles, consumers are placing an increasing value on convenience foods -- the types of products sold through deli departments. Secondly, growth in the number of supermarket deli departments is providing consumers with ready access to deli foods and a broader assortment of these convenience foods and services. Moreover, it may be that the fresh taste image and attractiveness of displays that characterize deli departments have stimulated purchases of this kind of food.

The recent rapid growth of supermarket deli departments is documented by the following reference. In a 1972 Progressive Grocer study, it was reported that 22 percent of the "independent" (non-chain organization) supermarkets operated separate service deli departments. In 1979, Progressive Grocer reported that 40 percent of the surveyed supermarkets had service delis and that an additional 27 percent operated self-serve delis (4). Currently, then, in excess of 67 percent of all supermarkets operate formal deli departments. This growth in the prevalence of supermarket deli departments is significant since losses of deli foods, as with other food products, can have as much to do with the merchandising methods employed in their distribution to shoppers as with the nature of the foods themselves.

This report emphasizes losses of those types of foods which typically are sold through service deli departments. Service delis perhaps are best defined by the kind of food and services included for sale as shown in Table 3.

Table 3. Products and Services Offered in Service Delis

Products and services	Stores with Offering
	(percent)
Party Platters	97
Made-to-Order Sandwiches	90
Hot Chicken	81
Pre-Packaged Sandwiches	73
Other Take-Out Foods	55
Catering Service	40
Space for Customers to Eat	26

Source: See (4).

A general approximation of 1977 supermarket deli food sales through deli departments is \$5 billion, or about 5.2 percent of supermarket food sales. This estimate is based upon average supermarket deli department sales which ranged from 3 to 12 percent and averaged about 4.1 percent of total store sales (5). It should be pointed out that because deli-type foods frequently are sold via supermarket departments other than deli departments, deli food sales are much larger than this figure for deli department sales. For example, provisions, a single category of deli foods, had 1975 sales of \$9.85 billion, compared with 1977 deli department sales of perhaps \$5 billion. Thus, it is likely that deli food sales are several times as large as deli department sales.

THE GENERAL NATURE AND CAUSES OF DELI FOOD LOSSES

In terms of their loss characteristics, deli foods are similar to a broad range of other food product categories. For instance, some forms of canned sausage and hams are handled in much the same way as dry grocery items. That is, no refrigeration is required and they can be stored for several weeks at room temperature without incurring spoilage losses. Other deli meat items, however, are handled in a manner similar to fresh meats. Such products must be refrigerated and

are subject to the same kinds of losses as suffered by fresh beef, such as shrink and cutting losses. Fresh, bulk deli salads, on the other hand, have similarities to both produce and dairy items. These foods require careful handling and controlled refrigeration to keep bacterial spoilage at minimum levels. Of course, cheeses sold in the deli department must be treated the same as cheeses sold through the dairy department. A possible exception to this is the merchandising of bulk cheeses through the deli department which are individually cut to consumers' orders. In this case, the absence of protective packaging and the additional handling -- cutting, weighing and so forth -- is likely to result in additional losses. Bakery products which are sometimes sold through deli departments can be expected to incur the same kinds of losses as bakery products sold through conventional bakery departments. It is clear, then, that the causes for losses in the deli department are highly varied due to the broad range of products sold. The following list of basic causal factors are related to deli department losses.

- | | |
|--------------------------------------|--|
| ● Handling | ● Slow Demand |
| ● Temperature and Humidity | ● Spoilage |
| ● Packaging Materials and Processes | ● Out-of-Date |
| ● Moisture Evaporation and Shrinkage | ● Sanitation |
| ● Government Regulations | ● Inventory Management |
| ● Limited Product Life | ● Quality of Product Entering Distribution |

The most important loss factors in this list relate to the inherent perishability of many deli products and the unpredictability of consumer shopping demand. The inability to predict shopping demand arises from such factors as the substantial seasonality of product sales, and the effect of day-to-day weather patterns. Holiday and weekend sales of deli products are especially susceptible to adverse weather conditions.

Loss problems for deli products of course vary substantially from product to product. Fresh salads, for instance, are highly perishable. If not adequately refrigerated, bacteria counts will increase rapidly. Salad items are also highly seasonal in nature with many salads selling best during the summer months. Their sales can change dramatically from day to day. Warm summer weekends normally stimulate sales, and cold snaps during the summer can result in precipitous sales declines. These factors combine to require either daily in-store salad preparation; or, if they are prepared off-premise, then delivery generally must be made on a daily basis. Under these circumstances, inventory management becomes a critically important management requisite for minimizing losses.

Sliced meats, such as ham, corned beef, and roast beef, possess loss characteristics that are very different from salads. Initial product quality factors such as fat and water content play an important part in overall shrink losses. But sliced meat operations also require the continuous "refacing" of meat loaves for maintenance of appetizing appearance and high quality. In a well managed sliced meats program, fresh "facing" surfaces may be used as samples and as sandwich ingredients. Another important source for losses of sliced meats are the loaf ends. Customers generally do not want the small or misshapen slices typical of ends. Thus, they are generally regarded as sources of gross margin shrinkage in the deli department.

Bulk cheeses possess loss problems similar to those of sliced meats. Slicing faces need to be refaced on a periodic basis and the ends of blocks also pose problems. Once again, however, refacing slices and block ends can be used for samples, in sandwiches, and for a variety of cheese spread preparations.

Store sales volume is still another factor associated with deli product losses. The perishable nature of deli foods coupled with highly variable daily demand tend to make losses proportionally larger in relatively lower volume stores.

Slower customer traffic and lower sales make it more difficult to incorporate the ends and refacing slices from meats and cheeses into customer sampling programs or into other products such as sandwiches. Also, moisture evaporation from salads is a proportionally larger problem when sales volumes are low. In essence, losses due to out-of-date and otherwise unsaleable products, as well as moisture evaporation, are frequently larger proportions of overall sales in lower volume stores.

DELI LOSSES DURING TRANSPORTATION,
WHOLESALING AND SUPERMARKETING OPERATIONS

Field interviews with a limited number of Midwestern retailers indicated that losses in transportation and wholesaling activities for deli products were relatively small. During these phases of distribution, losses for a cross section of deli foods were reported to be less than .25 percent. Several factors may help to explain the relatively low level of losses. First of all, many products are delivered directly to the supermarket from nearby, specialized manufacturers and vendors; or from central retailer-owned commissaries. Also, final in-store preparation of certain deli items contributes to low transportation and wholesaling losses. Finally, perhaps it is recognized that many deli items are comparatively perishable and high in value, thus, the economic impacts of losses are appreciated and special care is exercised to avoid losses during transportation and wholesaling activities.

A prime example of a highly effective distribution system which minimizes losses is provided by a specialty salad manufacturer located in the Midwest. This firm conducts nationwide distribution of ready-made, fresh salads from a single plant located in Chicago. In order to accomplish the far ranging distribution of such highly perishable products, the company has developed specialized production and distribution methods. Manufacturing and distribution practices such as those used by this particular firm, tend to be specialized for various categories of deli

products in order to provide the care necessary to ensure high quality products and minimal losses.

Detailed information pertaining to the extent and causes of losses of delicatessen products during transportation and wholesaling activities was not available in the literature. However, limited information was revealed by the Freight Loss and Damage Reports of the Association of American Railroads. Insurance claims (1975) for SIC-2013 products which include prepared meats, totaled \$681,188 (2). This information is of limited value to this study, however, since most deli products are transported by truck rather than rail. It should also be noted that deli foods include many products not listed in the SIC-2013 classification.

Unlike transportation and wholesaling operations, deli losses during supermarket activities are substantial. High perishability, variability of shopping demand, required re-working and trimming, and necessary sanitation standards combine to make loss reduction of deli items a significant management challenge. Based upon a limited number of interviews with Midwestern retailers, estimates of service deli retail dollar shrink loss ranged from 5.16 to 7.75 percent. In this case shrink loss is defined as the difference between expected and actual sales dollars. It should be noted that factors such as theft, mark-downs, accounting errors and misrings, as well as losses that reduce the available quantity of food for human consumption are all included in this shrinkage figure. Related estimates of tonnage losses -- that portion of losses that reduce the quantities of food for human consumption -- ranged from 3.23 to 4.75 percent.

Of course, shrinkage figures can differ greatly from one deli item to another. Retail shrinkage figures for several selected items of one Mid-western retailer are presented in Table 4.

A number of techniques are used in efforts to reduce or minimize losses during supermarket operations. Several retail industry executives believe that reducing

deli losses is essentially a "people" task. Many commonly heard suggestions for reducing losses support this basic notion. First, proper ordering procedures coupled with adequate inventory control practices seem to be key factors for reducing losses. Secondly, it was noted that proper sanitation is extremely important, and that inadequate sanitation and product losses are directly correlated in the deli department. Appropriate sanitation practices include proper organization and housekeeping of refrigerated display cases and other equipment in the deli department.

Table 4. Shrinkage of Service Deli Foods as a Percentage of Product Category Sales

Product	Shrinkage
	(percent)
Fresh, Bulk Salads	6
Roast Beef, Corned Beef	8
Ethnic Meats	4
Sausage Meats, Cheese	7
Branded, Luncheon Meat Loafs	6
Baked Ham	6
Barbequed and Fried Chicken	7
Fresh and Frozen Fish	4

Another method for reducing losses is to frequently re-merchandise the deli counter to match retail movement with allotted sales space. It was noted above that demand for deli products changes with the seasons; thus, to maintain appropriate inventories and to minimize losses, it is necessary to modify product selection and space allocation with each change in the seasons. Another apparent reason for the need to frequently re-merchandise is that many deli foods are considered to be less essential impulse foods, or "fun" foods, by many consumers. Conceivably, preferences for these less essential kinds of foods change more rapidly than other more traditional "commodity" products. Maintaining a shrinkage

log in the deli department is another approach for reducing losses. With the log as a base of management information, it is possible for deli department managers to monitor the precise nature of losses, and have a better opportunity to gain control over the problem areas identified. It seems clear that with each of the above suggestions it is necessary to develop adequately trained personnel and to establish capable deli department managers to coordinate activities and oversee operations. In this regard, a 1979 report noted that in stores with service delis, 56 percent had formal training programs for their deli personnel (4).

In addition to the previous suggestions for reducing losses in deli department operations, several unusual innovations and practices are being employed in the industry. In terms of product improvements designed to reduce losses, one processed meat manufacturer markets a "single-ended" loaf of luncheon meat. In essence, the loaf is initially formed to be twice the normal length and is subsequently cut in half either before or after delivery to the retailer. In this case, losses and waste from ends are reduced by 50 percent. Another innovation involves a team of transportation specialists to distribute deli products from store to store to help balance inventories. Finally, in order to reduce losses and to gain other efficiencies associated with reducing the number of direct store deliveries (DSD), at least two Midwestern retailers are working with DSD vendors to combine store deliveries either at retailers' distribution centers or at large vendors' facilities. The result is fewer small deliveries to supermarkets and more uniform handling of products.

SUMMARY AND CONCLUSIONS

Table 5 presents a summary of losses of delicatessen foods in the distribution system. These figures are based on a combination of secondary data and industry sources.

Table 5. Estimated Ranges of 1977 Deli Food Losses
in the Distribution System¹

Distribution Activity	Losses ²	Value of Losses ³
	(percent)	(millions of dollars)
Transportation and Wholesaling	.10 - .24	3.15 - 7.88
Retailing	4.81 - 7.16	156.50 - 237.50
Systems Losses	4.91 - 7.40	159.65 - 245.38

¹Losses cited are estimated values of physical quantities of food lost for human consumption. Costs of recoup, salvage operations, and numerous indirect costs associated with losses and damage are not included.

²Percentage losses are based upon dollar values of losses in each phase of distribution as a percentage of the wholesale value of products entering the distribution system. Wholesale values of products entering the system are estimated to have ranged from \$3255.14 million to \$3315.79 million. This range accommodates the given loss rates and estimated supermarket deli department sales of \$5 billion.

³Losses in transportation and wholesaling activities are valued at wholesale prices and losses at retail are valued at retail prices. The estimated gross margin of deli products is 37 percent (7).

It is important to understand the nature of these loss estimates. First, the ranges of losses are extremely large. They reflect substantial variations in practices and performance currently achieved by firms in the deli foods distribution system. Also, substantive information pertaining to losses of deli department foods is extremely limited and fragmented. Substantial uncertainty exists concerning a "normal" range of losses occurring in the industry. Thus, average losses cannot be assumed to exist at the midpoint of each range. Moreover, the ranges reported may not be representative of the entire industry.

Second, although the aggregate dollar losses reported are substantial, it should be noted that by comparison, individual incidents resulting in losses are relatively small. The majority of individual losses would probably be measured in cents, rather than dollars. In part, because individual losses tend to be small,

and also because they occur in hundreds of thousands of trucks, thousands of distribution centers and 33 thousand supermarkets across the nation, it is highly unlikely that losses can be significantly reduced by single or simplistic actions. Solutions to reduce deli losses will probably involve improved management practices at the store level and better coordination among manufacturing, wholesaling and retailing functions.

At the beginning of this report it was indicated that deli foods have loss characteristics similar to a wide variety of foods which are merchandised through more conventional supermarket departments such as dry grocery, fresh meat, produce, dairy and bakery. To include in this summary every cause for losses and every remedy for loss reduction would entail a compilation of the summaries from each of the six companion reports. Thus, three summary lists focusing on the unique aspects of deli losses are presented.

The first summary lists major causal factors for deli losses occurring during distribution. This list identifies and generalizes the causes for losses at a basic level. The letters in parentheses to the right of each factor in the summary provide a coding system. The codes are used along with the specific causes for losses which are listed next.

The second summary identifies specific causes for losses in the contexts of the phases and functions of the distribution system. The major causal factor codes indicate the related, underlying causes.

The third summary provides a preliminary list of potential remedies for product loss reductions. It is not intended to indicate that such remedies are either technologically or economically feasible, but only that there are numerous opportunities which warrant careful consideration and analysis, and indeed, this is the initial requisite step in reducing losses and improving the effectiveness of the food distribution system.

Major Causal Factors for Deli Food Losses¹

- Spoilage (Sp)
- Slow Demand (D)
- Limited Product Life (L)
- Inventory Management (I)
- Sanitation (S)

Specific Causes for Deli Food Losses¹

- During Supermarket Operations
 - * Slow moving items (D)
 - * Inadequate sanitation procedures (S)
 - * Display and storage equipment does not maintain proper temperatures (Sp)
 - * Lack of training for store level personnel and management (S-I-SP)
 - * Unforeseen demand conditions (D-L)
 - * Inadequate ordering policies and procedures (I)

Remedies for Deli Food Losses¹

- Reducing Trim and Spoilage Losses, and Improving Sanitation
 - * Improve training for store level personnel and management
 - * Improve merchandising policies and procedures
 - * Develop improved products
 - * Develop equipment analysis and maintenance procedures
- Coping with Slow Demand, Limited Product Life and Improving Inventory Management
 - * Improve ordering policies and procedures
 - * Re-merchandise the department periodically
 - * Develop inter-store inventory adjustment procedures

¹More complete summaries can be found in the reports on fresh beef, produce, dry grocery, dairy and bakery.

Appendix I
 Association of American Railroads Comparison of Claims: Meat Products--SIC 2013¹
 (dollars)

Year	Total	Loss Entire Package	Loss Other Than Entire Package	Improper Handling	Defective Equipment	Temperature Failure	Delay	Theft	Concealed Damage	Train Accident	Fire	Error of Employee
1975	681,188	15,936	1,857	320,966	68,349	5,276	29,963	127,735	693	82,997	27,975	441
1974	597,084	20,241	6,525	334,000	1,813	11,520	6,002	101,273	9	86,555	11,417	17,729
1973	584,389	22,988	6,896	343,984	3,325	27,375	--	79,785	457	91,350	--	8,229
1972	817,982	53,176	10,051	517,609	2,275	39,734	1,020	94,729	3	91,821	1,159	6,405
1971	1,093,256	74,228	20,610	682,817	6,582	73,533	16,804	96,364	362	41,739	55,350	24,867
1970	1,029,488	78,031	22,094	670,015	276	64,252	6,476	42,743	590	128,139	6,515	10,357
1969	919,935	52,366	23,303	643,728	5,390	43,463	8,989	21,796	3,723	53,521	9,878	53,778
1968	862,100	63,432	21,280	567,513	19,047	24,603	3,838	17,110	7,545	129,046	--	8,686
1967	972,391	69,393	26,083	724,328	9,666	37,593	11,683	6,362	24,477	57,869	817	4,120
1966	1,027,321	63,426	7,491	811,170	12,714	32,629	21,781	4,287	6,005	57,854	3,703	6,261

Source: See (2).

¹SIC 2013 - sausages and other prepared meat products, manufacturing of smoked, cured, canned processed and frozen meats.

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