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## Methods of Processing Meats

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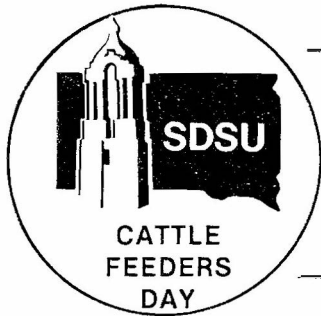
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## METHODS OF PROCESSING MEATS

S.C. Seideman and W.J. Costello  
Department of Animal Science Report  
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### Summary

Newer methods of processing meats along with the development of new meat products will become more and more apparent as the meat industry adapts to the changing life-styles of Americans. The fast-food service industry as well as the hotel, restaurant and institutional trade will become an ever more important market for meat products. Electrical stimulation, massaging/tumbling, restructured steaks, hot-boning and retort pouch packaging represent more recent changes in meat products and processing methods.

### Introduction

The ultimate objective of the meat industry is to provide the consumer with a product that has a high degree of eating satisfaction at a low cost. This objective must always be remembered in product development. The meat industry is presently experiencing a modernization phase. More new products and processes are being investigated than ever before. The purpose of this modernization phase is to adapt to the changing life-styles and attitudes of Americans. The family is more mobile than ever before. The income of the family is higher than ever before and the housewife is more often than not seeking employment. There are also more unmarried youth in their late twenties and thirties. Therefore, the trend is for more convenience foods and more individual serving packages. Developers of new meat products and processes must consider the changing market options. The traditional three markets are: (1) the retail store, (2) the hotel, restaurant and institutional trade, and (3) the fast-food service industry. Increased mobility, the increase in the number of working housewives and other social factors have reduced the proportion of meat sold in traditional retail stores and increased the sales of meat products to the hotel, restaurant and institutional trade and the fast-food service industry. By 1980, one out of every two meals will be eaten away from the home. Since more meals will be eaten away from home, meat and meat product development must be directed at the hotel, restaurant and institutional trade and at the fast-food service industry where the greatest number of meals will be eaten.

### Electrical Stimulation

In the meat industry, electrical stimulation can be defined as the application of electrical current to a carcass prior to chilling for increasing tenderness. Electrical stimulation is the most exciting development to hit the meat industry this decade. Various commercial units are presently available that vary voltage and impulses depending on the purpose. Voltages range from 100 to 600 volts at 10 to 30 impulses per minute.

Electrical stimulation was first noted to make meat more tender back in the 1740's when Ben Franklin found that the meat from turkeys that had been electrically shocked was "uncommonly tender." The New Zealanders, in the early 1970's, renewed the interest, but their attempts met with little commercial success. In 1975, Texas A & M University began doing extensive research on electrical stimulation. Some of the more recently discovered advantages of electrical stimulation include (1) extended retail case-life of meat by 1 additional day, (2) increased tenderness by 20 to 36%, (3) increased flavor desirability, (4) reduced energy consumption (less chilling and aging time required), (5) less shrinkage, (6) more accurate grading at an earlier stage, (7) catalytic release of enzymes which speeds the aging process (only one-half the time is required), (8) reduced cold-shortening of muscle fibers and (9) reduced occurrence of heat-ring. The process also adds a new dimension to marketing which increases consumer interest. Several commercial companies now market their product under the name of "Tender-shock." A carcass being electrically stimulated is shown in figure 1.

### Massaging and Tumbling

Massaging is defined as the mechanical agitation of meat by paddles that disrupts the internal protein structure of meats. Tumbling refers to the rubbing together of chunks of meat, resulting in a roughened outer protein layer. The meat is placed in the machine, tumbled/massaged for 4 to 8 hours and then pressed into some form (square or round). The process is used extensively in processed pork items and is now being applied to beef cuts. Cooked and New England ham are made in this manner. The purposes of massaging and tumbling include (1) increased water-holding capacity, (2) improved meat color and (3) improved meat bind. A commercial tumbler/massager is shown in figure 2.

### Restructured Steaks

Restructured steaks, also called flaked and formed steaks, are relatively new products to the meat industry. The purpose of this product is to simulate the eating qualities of an actual steak. The concept of restructured steaks is to use less desirable carcasses and carcass components to make a product that provides satisfactory eating qualities in order to increase the retail value of the meat.

The restructured steak is an excellent portion control item. The hotel, restaurant and institutional trade demand consistency in product appearance and quality. Portion control is the marketing aspect that requires meat cuts to be consistent in appearance, thickness and weight. Traditional steaks vary extensively because of animal variation. The restructured steaks can be manufactured to be uniform in most traits, thereby satisfying the hotel, restaurant and institutional trade's need for consistency.

The meat is frozen and passed through an Urschel Comitrol (figure 3) which has an impeller that throws the frozen meat against a series of blades mounted on a stationary head (figure 4). Figure 5 shows the action of the impeller. The frozen meat is, therefore, cut into wafer thin slices. The sliced meat is then formed into a log, frozen, tempered and pressed at 250 to 400 psi of pressure into a shape similar to a rib eye. The pressed log is then refrozen and subsequently cut into steaks.

At present, some companies are test marketing restructured steaks in the frozen state. Success of the restructured steak is excellent in the hotel, restaurant and institutional trade but only fair in the retail store. One retail disadvantage is the dull color due to the necessity to sell restructured steaks frozen to customers who are accustomed to buying fresh red beef steaks.

### Hot-Boning

The meat industry is the sixth largest user of energy in this country. Reduction in energy utilization in the meat industry may be achieved by the hot-boning of beef. Hot-boning can be defined as the fabrication of the carcass as early after slaughter as possible. Decreasing the cooling time and cooler space necessary to chill the boneless, trimmed meat may decrease energy usage by 33 to 65%. Cold-shortening of muscle which makes meat tough is a probable result of rapid chilling of hot-boned beef. Electrical stimulation of the carcass before boning may alleviate this problem.

### Packaging

Two purposes of meat packaging are to protect the meat against physical damage, chemical changes and bacterial contamination and to present it to the consumer in the most attractive manner possible. Historically, meat was sent from the packing house to the store in carcass form. Presently, 80% of the beef in this country is being distributed in vacuum packages. In the future, more and more meat is going to be shipped to stores in gaseous atmospheres (80% N<sub>2</sub> + 20% CO<sub>2</sub>). This gas atmosphere reduces trim loss and is cheaper than vacuum packaging. Another possible future method of meat distribution is the use of trailers that can be vacuumized. This is called hypobaric storage and is being developed by Grumann Industries.

The retort pouch has recently received considerable attention. Meat can be placed in a retort pouch which consists of three materials laminated together (figure 6). The meat product is then cooked in a retort machine. The cooked product can then be stored on the shelf without refrigeration for up to 5 years. The U.S. Army has recently disposed of their C rations and has ordered food products in over 40 million retort pouches. The convenience of the retort pouch to the consumer is most important. The consumer merely needs to place the unopened retort pouch in hot, boiling water for 3 to 5 minutes, remove the pouch from the water, open it and place the contents on a plate for serving (see figure 7).

In conclusion, the meat industry is a rapidly changing field requiring continued product development to keep pace with the changing life-styles and attitudes of the consumer. At present, research is being directed at convenience foods, improved meat quality and reduction in processing costs.

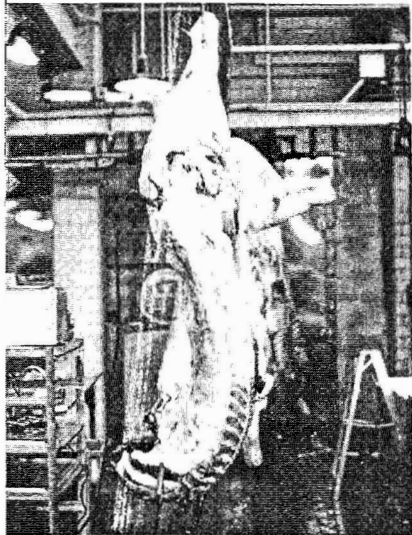


Figure 1.  
A carcass being electrically stimulated.

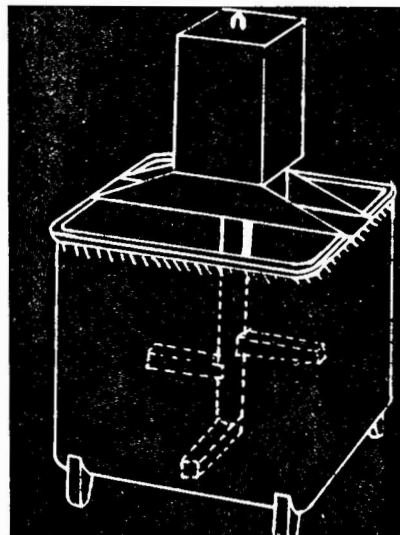


Figure 2.  
A tumbler/massager.

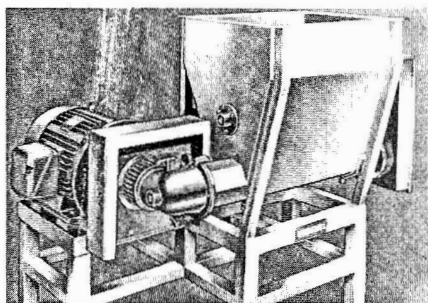


Figure 3.  
An Urschel Comitrol.

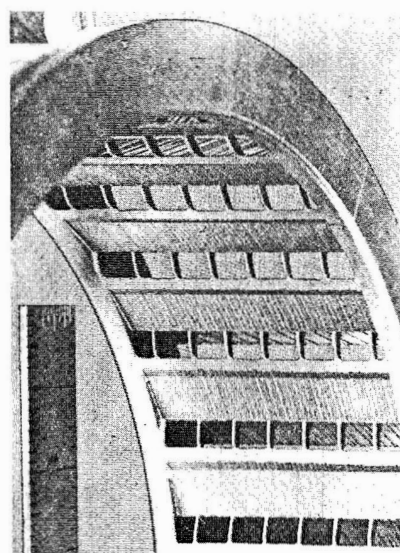


Figure 4.  
The stationary head of an Urschel Comitrol.

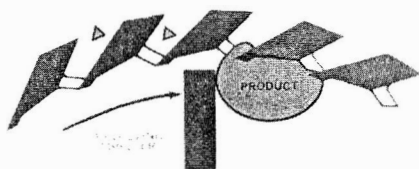


Figure 5.  
The action of the impeller of an Urschel Comitrol.



Figure 6.  
The materials in the retort pouch.

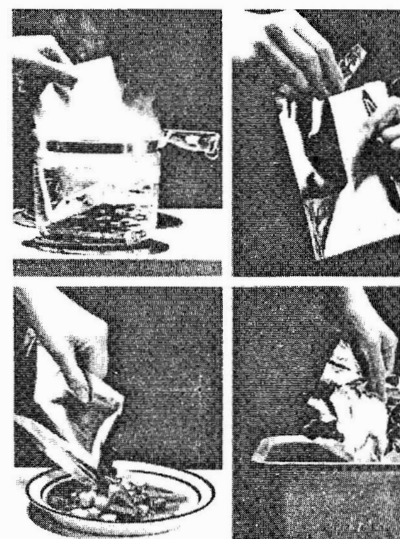


Figure 7.  
The preparation and serving of food in a retort pouch.