Advances in Meat Research

Volume 3
Restructured Meat and Poultry Products

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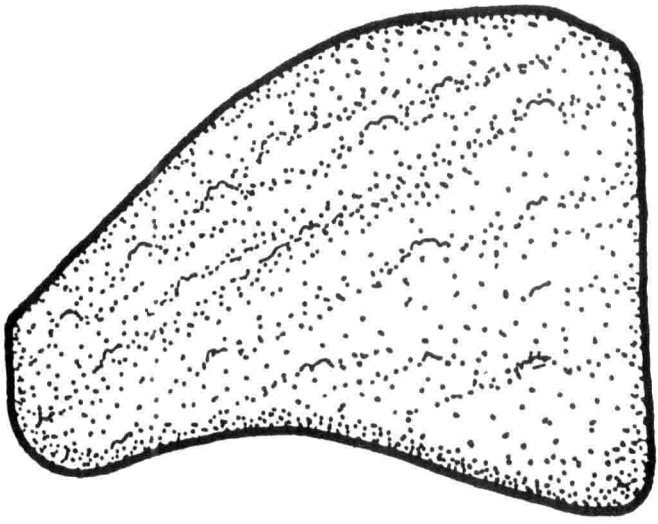

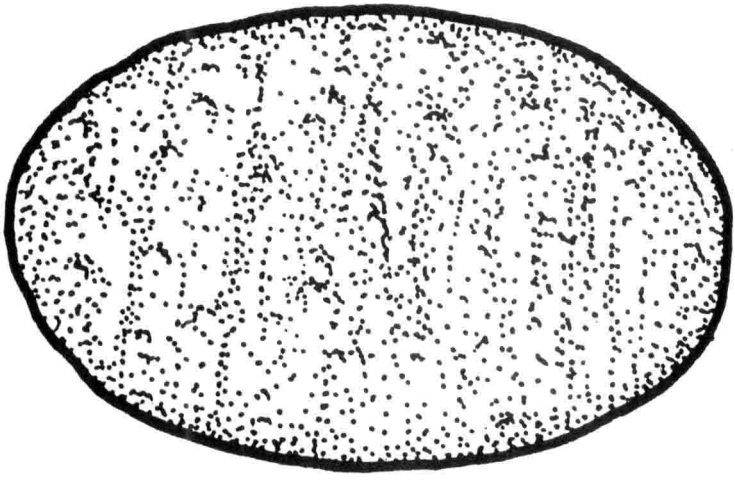

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Preface

The central theme of this volume deals with the technology of producing restructured meat products, a relatively new process that permits upgrading of lower-priced meat cuts into higher-valued products. Although meat packers and processors have long been interested in producing steaks, chops, and oven roasts from the entire carcass, the anatomical structure and physical properties of the carcass and its component parts have proven to be a formidable obstacle to the upgrading process. Production of boneless cuts or grinding of the muscles to form a homogeneous mass represented the first attempts to upgrade the cheaper cuts, but these processes either were not adapted to all parts of the carcass or else failed to duplicate the characteristic structure of steaks and oven roasts that make them desirable to consumers.

With the development of a whole new generation of high-speed processing equipment, it is now possible to disassemble lower-priced meat cuts and to add to their value by production of restructured steaks, chops, and roasts. Although development of restructured meat products has led to new opportunities, it has also resulted in some challenges that must be surmounted if this fast-developing segment of the meat industry is to have a sound basis. Thus, this volume will concentrate on the opportunities and challenges for manufacturers of restructured meat products.

Discussions herein focus on the history and present status of restructured meats, the role of muscle proteins, the influence of fatty and connective tissues, color and appearance, rancidity and warmed-over flavor, and the microbiology of these products. Other topics covered include discussions on texture and its measurement, nonprotein meat additives, nonmeat protein additives, production principles and equipment, formulations for restructured red meat and poultry products, packaging, the technology involved in producing a new fresh

meat product without using salt or phosphate, and the prospects for the future of restructured meat products.

It is anticipated that this volume should prove helpful not only to those presently engaged in manufacturing restructured meat products, but also to those who may become involved in this promising area in the future. The discussions should answer questions of importance for all who are interested in the production and marketing of restructured meats.

A. M. Pearson

T. R. Dutson

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Restructured Meats—The Past and Present

John L. Secrist[1]

This publication consists of 15 chapters devoted to a single subject, namely restructured meats. One might question why so much attention is given to a subject that is relatively obscure to the consumer. The answer lies in the motivation of those scientists who can visualize and project the constant and progressive changes taking place in the animal and associated industries. Animals are being grown today more for edible yield than for the eating satisfaction associated with marbling fat and interstitial fat deposits, which have been desired by consumers in the past.

Wholesale and retail meat price increases have occurred over the years, due in part to the increased cost of grain and of manufacture. In days gone by, animals were slaughtered, dressed, and divided into sides and quarters, which were shipped directly to the neighborhood butcher for customized breakdown to satisfy individual buyer preferences. Today, the pathway from pasture to plate consists of slaughterers, primal and subprimal breakers, renderers, further processers and packagers, precookers, commercial freezers, warehousers and shippers, etc. Thus, assets and debits are shared among the various participants responsible for delivering the end products to consumers, and the costs have risen accordingly.

Supporting the evolution in animal selection and growth to provide a

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greater percentage of lean and lesser percentage of fat has been the growing awareness of consumers that saturated fat intake may be associated with health problems and decreased life expectancy. Responding to the challenge of national and private health authorities, the red meat industry has been forced into changing the standards for commercial meat grading. Beef quality factors, such as marbling and cover fat, have been revised repeatedly during the past 20 years so that today the U.S. Choice Beef Grade, commonly associated with retail sales, includes animals with lesser amounts of fat than in past years.

In addition to these trends, consumers have demonstrated a decreased demand for roasts and an undiminished desire for the middle cuts, from which grilling and broiling steaks and chops are fabricated. This puts an added burden on the meat manufacturer since only 15–25% of a carcass yields these desired products. A large part of the carcass is processed into comminuted products such as ground meat and sausage products. As extensive as the markets are for these products, they do not satisfy current consumer demand for products with the eating characteristics of the solid muscle steaks and chops. Nor do they provide a profit margin to the various segments of the meat industry adequate to stabilize the price of the middle portion meats.

What is needed is a way to transform the secondary carcass parts into products of high value that have eating characteristics similar to those of the middle meat steaks and chops and are reasonable in price. Such a transformation is inherent in the various processes of meat restructuring as we recognize them today.

DEVELOPMENT OF THE RESTRUCTURING CONCEPT

Role of Military Food Procurement

World War II placed an immediate huge demand on the meat industry to provide meats for the rapidly increasing numbers of military personnel overseas. Innovations in carcass breakdown by slaughterers began in earnest. Carcasses were divided into primals and subprimals, which were further fabricated into boneless steaks, roasts, stew meat, ground meat, etc., and frozen for shipment. For many years following World War II, the marketing of animal carcasses remained essentially a total carcass utilization concept; that is, institutional buyers had to procure the secondary carcass parts to obtain the steaks, chops, and roasts desired. This meant that the various cuts had to be merchandised to their most economic advantage.

In the case of the military establishment, with over two million personnel to feed three meals daily, this became an unpleasant task for foodser-

vice management. To meet the constant demand for steaks and oven roasts, conversion of some of the better-quality secondary parts into those components was required. The lesser-quality secondary parts were the source of pot roasts, Swiss steaks, and stew meat. The remaining trimmings were converted into the ground meat component.

It was not until the late 1960s that major meat buyers, such as the military, were offered the opportunity to procure single carcass components solely on the basis of price. The introduction of hamburger outlets by McDonalds came about in the late 1950s with subsequent proliferation of that giant fast-food chain. Increasing numbers of ground beef competitors, as well as pizza, Mexican, roast beef sandwich, and other fast food outlets, followed. This provided the opportunity for major meat companies to fill orders for single meat items as well as multiple carcass parts. Grill steaks could be purchased in the amount preferred and affordable by the customer.

Although this might seem to be the answer that institutional foodservice officials had wished for, there also came some problems. The grill steaks under the military "six-way" concept were subsidized by the other components in the total carcass utilization approach. However, as the military demand for grill steaks increased beyond the percentage derived from the carcass, the cost of the single-commodity grill steaks offered by the meat industry was more than the military, limited by the daily basic food allowance established by Congress, could afford.

An answer to the military's demand for affordable steaklike products was provided by a piece of machinery manufactured by Bettcher Industries. Bettcher had recently purchased the rights to an existing mechanical meat press utilized until that time for pressing beef livers into liverlogs from which portionized liver slices could be obtained by mechanical slicers, bandsaws, etc. Bettcher's improvements in the design of the meat press and the introduction of the precision meat slicer enabled the military to purchase perfectly portioned beef grill steaks at a price equivalent to that previously paid for handcut steaks under the subsidized "six-way" breakdown system.

The gradual replacement of the manual fabrication of meats with sophisticated mechanically operated equipment came about during these years as the result of the buyer demand for reasonably priced portionized steaks and chops. Mechanization of formed and portion-controlled meats came of age during the late 1960s.

Development of Restructured Veal Products

As the 1960s became the 1970s, the veal industry, as the beef industry had previously done, offered to market single carcass parts to fill the requests of foodservice buyers. Users no longer had to contend with an inordinate percentage of the secondary carcass cuts. The demand, natu-