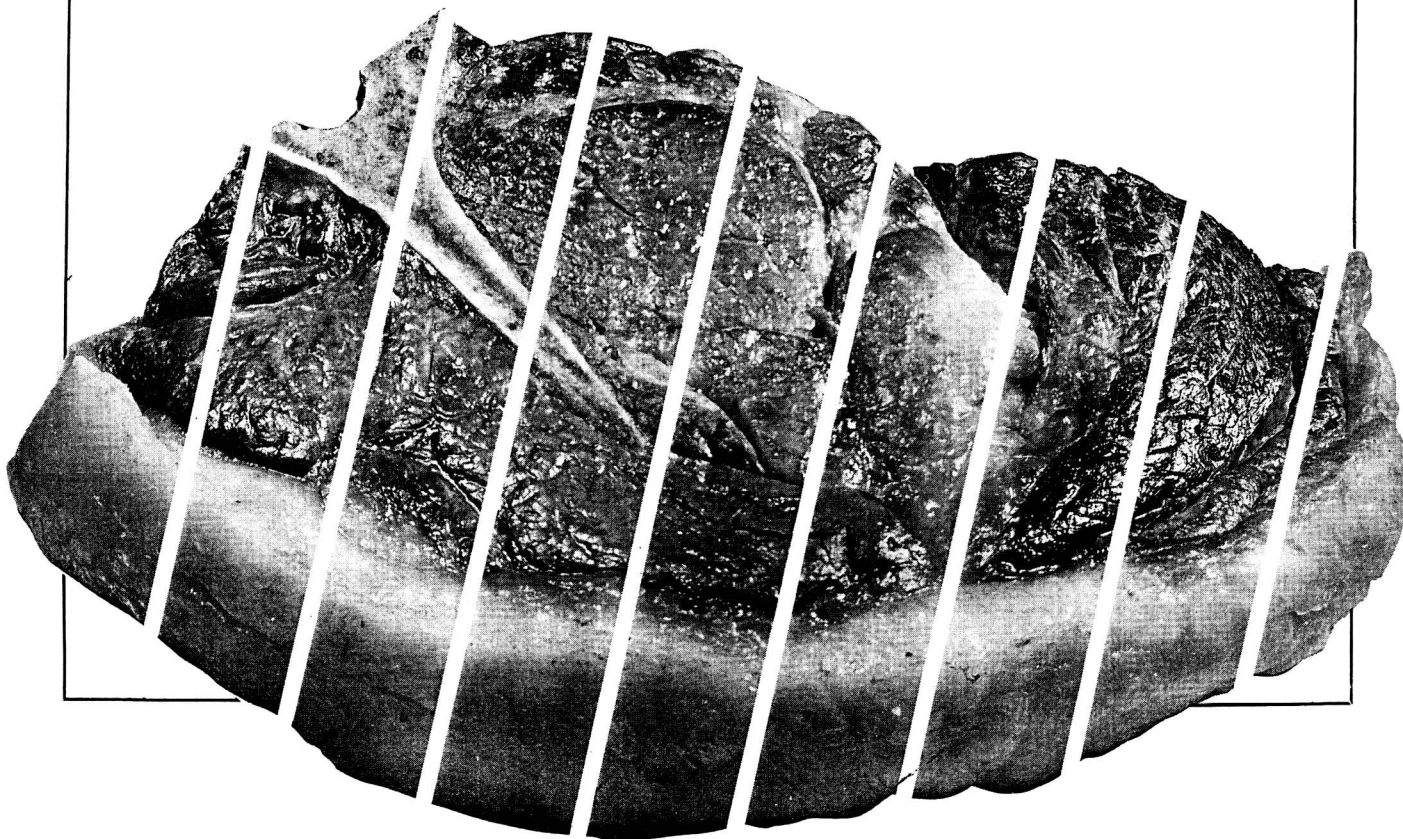


A Different Kind of Steak

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Restructured meats offer the opening of new doors to the industry. The impact could have far-reaching effects on merchandising and, ultimately, supply. N.G. Marriott, associate professor and extension food scientist at VPI & SU, Blacksburg, Va., shares information on the subject with ANGUS JOURNAL readers.



The trend toward more fast food and family restaurants has increased the need for portion controlled meat products (especially beef) with uniform size, shape and composition. Restructured muscle foods (flaked, formed and sectioned beef, pork, lamb, poultry and seafood) appear to provide a solution. This technology offers the beef industry an opportunity to merchandise more beef products in the institutional market and eventually the retail grocery stores.

The institutional market accounts for over 40 percent of the meals eaten away from home. In any given two-week period, 85 percent of all Americans will eat at least one meal outside the home. If beef is to receive a significant share of this market, it is necessary to develop more portion controlled products from beef and products that can be efficiently produced on a large volume scale. Development of portion controlled products that are derived from the less expensive portions of the carcass offers an opportunity for increased utilization of the beef carcass and added merchandising value. This processing system with improved engineering techniques also provides an opportunity to upgrade lower value cuts to a more acceptable product that is more uniform in shape, weight and texture.

Production of restructured meats offers the opportunity to produce a product with mechanically controlled weight and shape. Composition can be closer controlled through monitoring fat, lean and moisture of flaked products to be restructured. With this production method, lean, protein, vitamin and mineral fortification is possible during blending of flaked meats and non-meat ingredients such as salt and sodium tripolyphosphate. Texture control through alteration of flake size and other ingredients can be exercised to regulate mouth feel, tenderness, juiciness and bind. All of these factors can be regulated through product formulation and processing variables during manufacturing. Boneless meats may be restructured by joining together various sizes of muscles to produce an individual portion or a marked size product.

Restructured meats are manufactured by boning beef (or other species) with subsequent storage at a sub-freezing temperature until the product is manufactured. The frozen product is tempered and mechanically flaked into thin slices without a standard dimension. The flaked particles are blended with adjuncts such as salt and sodium tripolyphosphate to obtain the desired flavor and cohesiveness. The mixture is then stuffed into casings mechanically formed into the desired shape (i.e. a strip steak or round shaped), sliced to the designated thickness, packaged and stored in the frozen state until cooking.

Restructured muscle foods as developed during the past has involved two basic concepts. Fresh restructured products have been manufactured for a variety of final methods of preparation such as grilling, broiling, shish-ka-bob, swissing and deep-fat frying. The other concept involves cured and smoked products which are manufactured

by a similar process. These products include pressed ham, sliced ham, shaved ham, breakfast pork, bacon slices and shaped and cubed ham. Therefore, the restructured concept is versatile in nature.

Early research related to restructuring was conducted primarily by R.W. Mandigo and coworkers at the University of Nebraska and G.R. Schmidt and coworkers lately at the University of Illinois and currently at Colorado State University. Mandigo and coworkers at Nebraska, Cordray and Huffman at Auburn University, Marriott and coworkers at Virginia Polytechnic Institute and State University, field and coworkers at the University of Wyoming and Seideman and coworkers at South Dakota State University have studied accelerated processing of pork and flaking, forming, cutting and packaging of boneless pork and other meats as restructured products. Siegel and Theno at the University of Illinois have investigated reforming chunk meats after tumbling.

Dr. B.C. Breidenstein, director of research and nutrition information of the National Live Stock and Meat Board has previously referred to restructured beef as intermediate value products. He used this term to identify beef products having textural characteristics between those of ground beef and those of intact muscle cuts. A flaked product with more texture is perceived as being higher in value than ground meats that have lost their identity as intact muscle cuts. The most probable raw materials for restructured beef steaks are boneless chucks and plates as well as boneless cow beef for certain applications.

Mandigo and coworkers at Nebraska have studied the effect of grinding and flaking of meat products. They discovered the taste of flaked meats was preferred over ground products. The restructured flaked products were found to be more cohesive and acceptable in appearance. However, as particle size was reduced, amount of cooking loss was reduced.

Research conducted at Nebraska and in our laboratories at Virginia Polytechnic Institute and State University has revealed that the flavor of salted restructured meats is preferred over the unsalted formulations. Additions of salt and other adjuncts such as sodium tripolyphosphate are known to decrease cooking loss. Our research and that conducted at Nebraska has demonstrated that salt increases rancidity and discoloration. However, flavor and texture are improved by the addition of salt. Restructured products made without salt and sodium tripolyphosphate lack texture and flavor.

While at South Dakota State University, Dr. Nancy Quenzer and coworkers investigated various cooking/preparation methods of restructured beef steaks including broiling, oven roasting, grilling and deep-fat frying with and without breading. Deep-fat fried steaks were lower in moisture and higher in fat content than the other methods of cookery which were similar to each other. Mois-

ture content was essentially the same for oven-roasted and grilled steaks and both of these preparation methods were responsible for less moisture loss than for the other cookery methods. As expected, the deep-fat fried steaks were higher in fat content than any other cooking method and all other cooking methods were not responsible for differences in fat content. Breeding of the deep-fat fried steaks appeared to provide some protection against moisture loss. When flavor, texture and juiciness were evaluated by a trained taste panel, it was discovered that the unbreaded steaks that were grilled and oven roasted were superior to the other cookery methods. Overall acceptability of taste was lower for the unbreaded and deep-fat fried steaks than for those prepared by the other methods. Unbreaded steaks that were broiled and grilled were less tender than those cooked by other methods.

Dr. Breidenstein appropriately stated in his recent report on international value beef products that considerable scientific knowl-

edge and technology currently is available on the subject of restructured meats. I agree with Dr. Breidenstein when he stated that the appropriate and expeditious application of this technology could result in a **significant and relatively immediate impact on the value of a rather large segment of the beef supply**. Yet, one precaution seems appropriate. Any additional costs from processing, packaging, distribution and merchandising will reduce the residual portion of consumer expenditures to be allocated to raw material value.

Although technology related to restructured beef is available, additional expertise is needed. Consideration of the options for raw material by mechanical processing parameters, additives and end products should indicate the scope of the restructuring concept. Appropriate raw materials must be appropriately processed, preserved, distributed, marketed and prepared for the consumer in a satisfactory manner. Identification of a total systems approval must be accomplished in

the future to provide consumers a product to fulfill their expectations. Their traditional preference has been broiling steaks and oven roasts as evidenced by a consistent trend to pay a higher price for those items rather than less tender cuts, ground beef and variety meats.

Additional research is needed to identify the merits of hot processed beef for manufacture of restructured steaks and other products. Mechanically deboned beef is a viable raw material for restructured products and its potential and limitations for use in restructuring need to be further studied. Processing parameters such as particle size, particle size combinations, appropriate salt level, antioxidants, lean-fat ratios and connective tissue concentration should be further investigated. Our institution has previously conducted research related to accelerated processing of restructured meats and we and others will continue to search for added technology (especially related to the processing parameters) in the future. **AJ**