Batters and Breading for Restructured Poultry

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James Farr

I would like to briefly state a few statistics that may be of interest to you. The broiler industry in Louisiana ranks about 11th in the nation, based on farm cash receipts. We are larger than the dairy industry and the largest of the meat industries in the state. Only two firms operate broiler plants in Louisiana, ConAgra and Sanderson Farms; however, these two firms do operate four plants. One operation is processing in excess of a million head a week. We are now in a transition phase and are moving rapidly into further processing. *Meat Processing Magazine* indicated in the May '85 issue that in 1975, 10.1% of poultry was further processed. In 1980 it was 13%; in 1983, 19.1% and by 1993 it is projected that 25% of poultry products will be further processed. My personal feeling is that this may be low because we have some major moves in companies in our area (I am referring to Texas, the southern part of Mississippi and Louisiana) that are rapidly moving into further processing.

I would like to set some guidelines as to what I consider to be batter and breadings. A batter is a liquid mixture comprised of water, flour, starch and seasonings into which food products are dipped prior to cooking. Breadings are dry mixtures of flour, starch and seasonings which are coarse in nature and are applied to moist or battered product prior to cooking. A pre-dust is a dry base mix, such as a batter mix, which is applied to the moist surface of meat to improve adhesion. A coating is a combination of either batter and/or breading. We are dealing with five major categories of ingredients when we talk about batter and breadings, the carbohydrate form, polysaccharides, being the largest. This reflects wheat flours, corn flours, starches and modified starches. Their primary function is usually to interact with proteins and lipids to improve the viscosity, suspendability and emulsifying action of the batter.

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Proteins are probably the second major component. Sources of protein are the flour as well as added proteins such as milk proteins, egg albumins, cereal flours and seed proteins. The primary purpose of proteins is to improve the water absorption capacity of flour, which in turn increases viscosity to improve the baking qualities of the wheat flours. They also strengthen the structure and texture and retard moisture loss.

Fats are added for flavor and to enhance crust color. Water is the fourth primary ingredient. It is a carrier for suspensions and is important because it affects viscosity and adhesion. The last ingredient, seasonings, may include sugar, salt, peppers and other spices which help to flavor the product and sometimes assist in browning.

In poultry, we have numerous combinations of how the product is handled. My first exposure was in the latter 1960's. At that time we used a form of restructured product. It was deboned, either raw or cooked, mixed with salt and seasonings and then stuffed into casings and cooked for gel formation. These casings were then sliced and the slices battered and breaded. Today, almost all products are processed on a forming machine. Since the early 1970's, poultry plants have tended to leave the muscles intact as much as possible as this type of product tends to be perceived as higher in quality. You no longer see chipping or small fragmentation of the poultry muscle before it goes into the blender. One of the larger plants that I was in recently had roughly 200 recipes for both white meat and dark meat.

There are five primary categories of batter and breaded chicken. There is raw chicken that is cut up or formed in some fashion. It is battered, breaded, frozen and shipped. Some poultry is also cooked prior to battering and breading. Raw product is also battered, breaded and then prefried or blanched. There is a fourth category consisting of products that are cooked, battered, breaded and pre-fried. Then there are also the fully-cooked products which are battered, breaded, pre-fried and cooked.

Several plants I have been exposed to are having problems with their restructured poultry products. Generally, processors seem to have more problems with their dark meat products than with their white meat products.

Estes Reynolds

I'm Estes Reynolds from the University of Georgia. I'm a native Georgian. I spent five years as extension meat specialist at Michigan State and the last six at the University of Georgia working as an extension meat specialist. My exper-

ience has been working with the poultry and red meat industry, mostly in the processing area. Recently we've done a good bit of work with poultry plants which restructure items and we have been involved in the development of some new products relative to the use of mechanically deboned poultry.

I'd like to first emphasize one major criterion. I made the statement a while ago that today we are in the food processing business. We are food processors, we're not necessarily meats firms. We're going to have to cross the threshold of being a little more versatile in looking at combinations of meat and poultry; meat, poultry and vegetables; meat, poultry and seafood; and some other types of products that have been developed. Most of the literature that I reviewed in preparing for this session dealt with whole muscle and the adherence of batter to the skin. Today we're looking at restructured products.

I think the biggest problems that I've seen from my experience deal with forming the product. You have to be careful as to the temperature of the product as it goes into the batter and breading operation. If we are using fresh product and it's moist, we have to look at the use of a pre-dust or something to absorb the moisture so we get good adherence of the batter, of protein-protein interaction, as we would refer to it in the meat industry.

Jim didn't refer to the specifics of how we formulate in the machining of a product. In most cases, after the product has been formed, regardless of whether it is a frozen product or whether it is coming off a forming machine, we usually go through a pre-dust. We come out of the pre-dust and then go into a batter. These batters may vary from very thin, depending upon amount of pickup that we desire, to very thick. Obviously, the consistency of the batter is a critical control point. It deals with the amount of pickup and the amount of yield that we would expect from that product. From there, we go through a blow-off process to remove any excess batter to keep from contaminating our breading. Each of these steps has some highly technical transfer apparatus to make sure that we get uniform coating of batter and breading on the product and a total encapsulation of the product. Total encapsulation is very important from a cook yield standpoint.

Lastly, we go through the breading. In this step, we are looking at some very recent innovations of equipment that are able to handle something of a very fine texture all the way to a Japanese bread crumb. After we come out of the breading, we go into the deep-fat fry for blanching or setting.

Jim has just outlined the different types of combinations. I think that one of the things that we need to consider today in the meat industry and food industry is the utilization of horizontal ovens in frying, whether we are presetting or fully cooking. In one of the plants that I have been working, fully cooked product is being produced with a 96% to 97% yield out of the oven. I think that's phenomenal.

Discussion

J. Farr: Before I open up the floor for discussion, I would like to mention that the poultry industry is in a rapid transition and that the market is controlling what is being innovated.

J. Guenther: Red meat people have recently been talking to chicken people. I always forget we're all in the flesh food business. How do you envision mixing poultry and red meat and what types of labeling problems do you think will result? I'd like to hear some reciprocity along those lines.

E. Reynolds: I don't really see any great problem. In our Meat Science Institute at Georgia this year, we covered the topic dealing with the sausage area and labeling requirements. We had nearly 100 different products that were brought in from all over, everything from smoked sausages to bolognas, some were restructured products containing combinations of meat and poultry. As long as it was labeled according to the ingredients contained, there didn't seem to be any problem. In Gainesville, Georgia today, we're producing a 90% lean product with 10% chemical fat delivered to your door either in a pre-blended form or frozen 50 lb. blocks for 23¢ per pound. I think when we consider that we have this type of product available, we have to wake up and look at different ways to utilize it.

Guenther: In fact, I was really referring to pictures of products that you had in the National Provisioner. What was the poultry content of those sausage items at your Meat Science Institute?

Reynolds: They ranged from 15% to 75%.

A. Pearson: I recently had the opportunity of visiting with the largest processor of poultry products in Michigan. He told me they had made some very good mixed products, but he said their acceptance has gone down and he felt that the consumer, at this time at least, preferred a straight product with which he was acquainted; for example, a beef product or a pork product. He said the consumer expected it to taste like beef, pork, or poultry rather than the mixed product. Do you think that in the long range that this is going to be a problem?

Farr: I can only speak of the experience of one operation that did produce a combination poultry-red meat type formed item and the market on it did dry up.

Pearson: It may be that they will accept a mixed product after they become used to the taste of it, where originally they expect something different.

J. Regenstein: I think one of the problems with the mixed products is that consumers don't know how to evaluate perceived value. When you're buying beef, you're paying for beef, you're getting it. But when you get a turkey/beef product, consumers question why they are being mixed.

D. Rice: I have one comment on the fact that we're seeing a lot of use of fanciful names. The consumer is beginning to accept products that don't necessarily have a traditional name. Perhaps we can utilize fanciful names for some of these mixed products.

Pearson: I want to change the tenor of the meeting. I have two questions. The first is: Does anyone here have experience about imparting antioxidant properties to the breading and the batter in such a way that you can prevent oxidation of these products during storage and during reheating? The second question that I want to ask: Is there a problem with these batters and breadings becoming soggy?

J. Cordray: From my experience, it is more successful