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A Food Engineer Views the Surplus Problem

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IT SEEMS TO THE WRITER that all too frequently we disregard the tremendous influences of past discoveries in nutritional science upon present-day dietaries. In the span of a generation, we have witnessed at least five major scientific eras that chronologically have acknowledged (1) the practical value of *calories*, (2) the abandonment of starvation diets in treating typhoid and peptic ulcers, (3) other diets designed to avoid the presumed "auto-intoxication" influences of high protein intakes, (4) phenomenal properties of vitamins and mineral supplements, and (5) our present emphasis upon "high quality" protein diets. We are now generalizing that most foods rich in protein value are also comparatively good sources of many of the other essential nutrients. The inference is that for good nutrition we need first of all to worry about a proper supply of good quality protein foods. As a matter of fact, there is increasing evidence that our world food shortages are, in reality, shortages of protein with the proper nutritional qualities.

We are becoming increasingly conscious of the fact that we consume about 60 grams per person per day of animal (or "high quality") proteins and about 35 grams per person per day of vegetable (or "poorer quality") proteins.

The National Research Council, Food and Nutrition Board, has specified about 70 grams of total protein intake per person per day, or 100 grams for growing children and other nutritionally vulnerable individuals; we are also informed that the protein quota of the American soldier in World War II was much more liberal—140 grams per solider per day! Present-day disappearance rates indicate that we would have to increase our food protein resources about 50% for our population to be as well fed as the American soldier.

In 1950, 32% of the animal food protein production was consumed in all forms of meat, whereas nearly as much—or 30%—was consumed in the form of fluid milk, cheese, dry milk, and the like. Each year about 2 million tons of milk protein is produced, of which 820,000 tons is currently going into nonfood uses. That loss is greater than the total amount of the beef industry's 700,000 tons of the meat protein produced each year. The loss occurs primarily in skim milk, buttermilk, and whey.

The present use of relatively "low quality" proteins in our diet certainly is inefficient in view of the nutritional teaching that some foods contain all essential amino acids in amounts sufficient to meet human needs. Perhaps the way to better utilization of vegetable proteins has been pointed out by the suggestions for fortification of wheat protein with lysine, or corn protein with tryptophan—at least these have given encouraging results in experimental trials with laboratory animals. However, the food industries will probably be more interested in the other routes to improvement which are (1) use of proper food combinations (e.g., cereal and milk proteins) and (2) more even distribution of "high quality" proteins among daily meals. To make the latter effective, not only will proper educational means need to be implemented but the problem of food protein economics must be solved.

Efficiency Is Important

A good dairy cow produces approximately one pound of protein per pound of milkfat and can produce about 400 pounds of milk protein per year. A 1000-pound beef yielding a 600-pound carcass containing 15% protein provides about 90 pounds of edible meat protein. One acre of good American Corn-Belt land produces approximately 3 million calories of corn for direct human consumption. If the same corn is fed to dairy cows, the same acre will yield in their milk about 700,000 calories, whereas its energy value will fall to approximately 100,000 calories if used to fatten steers. By such crude reckoning, a man requiring 1 million calories per year could get those calories for three years from an acre of corn eaten as corn, for nine months from the milk it would yield, or for only six weeks if he ate it in the converted form of beef.

These examples are obviously generalizations of the most vicious sort, as many essential nutrients not supplied by the corn are needed in the human dietary. Then too, in man the nutritional efficiencies of both milk and beef are much greater than those of corn. But they do suggest the value of careful appraisals of nutritional efficiencies.

And what have these suggestions of nutritional efficiencies to do with solving our present-day farm surplus problem? Simply this—perhaps we need to evaluate not only our food production but its utilization in terms of nutritional efficiencies in order to realize maximum nutrition at minimum cost and effort from our limited food resources. The problem is most complex for the farm surplus problem involves not only our human dietaries but those of our farm animals as well. When nutritionally efficient food production is encouraged and implemented, we will probably find that most of our present-day nutritional shortages will disappear.

Another way of stating the same thought is to recognize from an engineering point of view that with all the progress that has been made in refining our carbohydrates, our fats and oils, our vitamins and minerals, we have not learned how to refine, recover, process, store, and distribute our food proteins without serious diminution of their nutritional qualities. Neither have our farmers solved the problem of producing foods rich in protein as economically as they have the crops basic to production of many refined foods. It is not normally appreciated that our retail food protein prices range from about $1.00 per pound in the form of nonfat dry milk solids to as high as $5.50 per pound for pork chop protein—and even higher for other types. We predict that when protein prices are quoted in our major food markets, most of our present food surplus problems will be in the process of being resolved.

This last statement begs the questions of why, and how. Not only is the quantity of protein supplied by the diet of vital importance to an individual's health at every age level, but we need it in appreciable quantities each day—about 5% of our total food bulk. This provides an interesting contrast with the more glamorized vitamins—usually needed only in parts per million.

Secondly, it is apparent that food protein deserves more careful appraisal—a key to proper and optimum nutrition. The time is rapidly approaching when it will prove the controlling economic constituent of our foods. The pressure of population alone will force it.

Consequently, it will take the best efforts of our nutritionists, biochemists, technologists, engineers, economists—and the practitioners of our new profession of econometrics—to pool their collective talents in unravelling and establishing the chemical, physical, and commercial values of food proteins. The dairy industry is already wrestling with the problem of tying product evaluations to a protein base.