Management and Resources Utilization Session

Discussion Leader: W. C. Foster
Discussion Panel: J. Smith, J. Styron, R. Wildman

A Food Technologist Looks at Fish Protein Concentrate

H. M. Burgess

Q. Wildman: You listed a variety of political problems associated with FPC. Do you feel the government is doing what it should?

A. Burgess: Expanding the number of available fish species is a great step forward. However, only when FPC can be accepted as a food ingredient will the problem be solved.

Q. Foster: Are you supporting any research or applications using protein supplements?

A. Burgess: Yes, cereals is a good example. Pet foods probably make the greatest use of protein supplements. No one protein has all of the protein nutrition we would like to have, so we use a number of sources of protein such as soy, meat scrap, fish meal, wheat and other sources which give a final product of good nutritional value. As the amount of meat protein

available becomes less, we must turn more to vegetable sources. Fish protein complements the nutritional aspects of these vegetable proteins nicely. Use of a little of the leaf proteins may become important in the more distant future. The competition for FPC may well come from the "single cell proteins". These are yeast or bacteria grown on petroleum products or agricultural wastes.

Q. Weddig: We might be able to meet an increased demand for the more desirable fish by using FPC as a supplement. Are there any facts about this?

A. Burgess: If an FPC which swells, holds water and eats well can be developed, one can visualize extending the desirable fish or even creating new fish products.

Q. Schaefers: Based on the extent of the work done to date, is there just not enough information on the fish supplement?

A. Burgess: We are beginning work on practical applications and it is going well in spite of the limitations already discussed.

Q. Idyll: Does it seem to you that FPC had a dim future and did not do anything? Is it possible to produce FPC?

A. Burgess: I think FPC had and still has a bright future. It has run into some stumbling blocks which are not insurmountable. Other approaches to the making of FPC have been tried, such as the Ezia Levin process at New Bedford, using methylene chloride as the solvent. The important factor is to find very cheap fish and perhaps to be able to operate at sea.

Q. Erkins: Are we not talking about a product with low cost marketing?

A. Burgess: The fish meal business is at an all time high both in terms of consumption and price. With the mounting prices for protein to feed people we need to break into the food chain and eliminate one step. Currently we feed the fish meal to other animals or even fish, and then eat these animals. The efficiency of this process is obviously not very good. So to be able to feed the fishes that made the fish meal directly to people would be the preferred route to follow. However, we need that product development that will put the fish meal or the FPC into a form that will be acceptable to the consumer.

Fish Protein Concentrate: the Growth of an Industry

E. Schaefers[1]

Q. Smith: Will United States plants be able to compete with foreign producers?

A. Schaefers: Based on present information, I would say we can expect to

[1] E. A. Schaefers presented this paper and answered discussion questions in the absence of the author, G. M. Knobl, Jr.

be competitive in the marketplace. While at present there is no large-scale FPC production, we feel that the demonstrated ability of the closest U.S. product to FPC, fish meal, to compete successfully on a worldwide basis with foreign producers is a good sign.

Q. Styron: The original estimates of the cost of FPC per pound of protein were made several years ago. Since then, costs associated with FPC production have risen considerably. Do you have a current estimate on the necessary price range of FPC if it is to be competitive cost-wise with other protein sources? Also, do you have estimates of the current market potential?

A. Schaefers: On both questions: Yes we do. Actually, Dr. Knobl had a section on this in his paper which I didn't have time to give. It follows: In the United States, according to a report by Hammonds and Call, the market for FPC's depends upon price-functionality relationships.

An FPC with no functional properties will have to be lower in cost than a more functional FPC.

Hammonds and Call assumed a price range for FPC of between 28.8 to 53.8 cents per pound of protein. They state that this price range would place FPC, cost-wise, between soy flour (12.6 to 16.4 cents per pound of protein) and nonfat dry milk (55.6 to 69.4 cents per pound of protein). Furthermore, since this range is neither clearly lower than that of present protein ingredients, nor clearly higher, the functional characteristics of FPC then becomes crucial in determining the market potential. Starting at the low price range (29 cents per pound of protein) they conclude that FPC could compete with soy flour providing taste advantages are realized (soy flour has a bitter-beany taste when present in concentrations of greater than 4 to 5 percent by weight of finished product).

FPC priced between 40-50 cents per pound of protein with a very bland taste but a low level of functionality could penetrate the following U.S. markets:

". . . baby food at 2.4 million pounds of protein yearly; breakfast cereal at 1.4 million pounds; candy at 16.6 million pounds; and diet drink at 2.2 million pounds. These markets total to a potential volume of 22.6 million pounds of protein or 28.3 million pounds of FPC." They add however: "If functional properties can be developed along with acceptable taste, FPC in the 40-50 cents per pound protein price range could also compete in a number of other markets currently using nonfat dry milk. Moderate fat absorption would open the canned and processed meat markets using 16.1 million pounds of protein yearly. The abil'ty to prolong freshness and shelf life would open the baked goods market at 68.3 million pounds of protein yearly. Whippability and emulsion stabilization would open the desserts and toppings market at 28.6 million pounds of protein yearly."

One other market potential is the U.S. school lunch program -- notably the "Type A" school lunch. It has been stated that in a few years there will be 55,000,000 children getting school lunches at a cost of $7 billion at 1968 price levels. The animal protein in the lunches represents 60 percent of the cost. Fish protein concentrate is now being investigated as a source of protein for these lunches.

Q. Wildman: You mentioned that Canada has approved more types of fish than the U.S. Food and Drug has for us. Why is this?

A. Schaefers: The U. S. Food and Drug Administration gave authority to use only those species on which toxicological data had been presented. The Canadian Food and Drug Directorate permits the use of all fish in the family in which toxicological data for species had been submitted.

Q. Foster: You showed slides of and discussed four FPC plants. Where are their products being marketed?

A. Schaefers: We really haven't been able to get a handle on this, and it appears to be in the category of a "trade secret". We are quite certain, however, that much of the present production is going into products which are being test marketed in various countries throughout the world.

Nightlighting -- A Harvesting Strategy for Underutilized Coastal Pelagic Schoolfishes

D. A. Wickham

Q. Smith: Would you comment on the reality of the methods described in your paper?

A. Wickham: Nightlighting is successfully used with many types of fishing gear in many fisheries around the world. For example, the Japanese saury catch is obtained primarily by fishing with lights and the Russians use nightlights with nets and fish pumps to capture kilka, sprat and anchovies. We feel the results from our field studies indicate nightlighting is a realistic approach for broadening the existing purse seine fishery to include the large stocks of fish which are presently unavailable to the conventional fishing gear used in the Gulf of Mexico. Nightlighting does require further development, however, especially experimental production fishing to establish production levels and procedures, before we can recommend that commercial fishermen adopt these techniques or invest in the necessary hardware. Regarding the netless fishing concept; although our preliminary studies indicate its soundness it especially requires further development.

Q. Styron: What would be the cost of a netless harvesting system?

A. Wickham: The figures projected by Dr. Klima indicate a netless

harvesting system would be comparable in cost with a conventional menhaden vessel with the advantage of reduced manpower requirements.

Q. McKee: Are there laws against nightlighting and electric fishing?

A. Wickham: I do not know of any laws restricting the use of nightlighting techniques, however, several Gulf states do have laws concerning electro fishing. Our field studies in state waters are conducted under experimental permits and have not been restricted by these laws. I am presently not familiar with the various state fishing laws, however, as part of our program, we are planning to contract for a survey of the laws which may restrict the introduction of these techniques.

Bullis: (Comment) Laws restricting electric fishing apply only to state waters and these techniques can be used outside these limits. Some states make provision for commercial fishermen to conduct projection fishing with experimental gear. If these experimental methods present no real risk to the fish stocks, the restricting laws can be modified or lifted to permit their use.

Q. Idyll: How many species of fish within the 12-mile limit can be harvested with light attraction techniques?

A. Wickham: We have captured over 50 species in the light field during our field experiments in the northern Gulf but less than 10 species, primarily Clupeids and Engraulids, appear in potentially commercial quantities. The species and their numbers change during the year and the type and quantity of fish in any one area depends on the time of year. Commercial production with a netless harvesting system would require moving it at regular intervals to remain in high density fish areas throughout the year.