

Problems of Post-harvest Technology in Southeast Asia

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Fresh Fish Handling

The improvement of fresh fish handling remains the most important fisheries task facing the countries of the region.

Nobody would deny that good keeping quality of wet fish can be attained only by a quick chilling on board immediately after catching. But the need to chill fish aboard is still far from the thoughts of fishermen who are quite enthusiastic about the quality of the catch they haul.

There is a clear need for technologists in charge of fisheries development to demonstrate the advantage of ice through extension activities.

Research by MFRD and by Tropical Products Institute (U.K.) indicates that well-chilled wet fish from tropical waters can tolerate a month-long storage in the iced condition. It is interesting to note that fish from warm waters may be better preserved by chilling than those from temperate waters.

Information of this kind should be actively disseminated to fishermen and fishing industries who have long been accustomed to handle their catches without a single piece of ice aboard.

Fishermen should also be urged to check the residual amount of ice in the fish hold during the voyage home and in the vehicles that transport fish from the landing site to the point of marketing to ensure that the fish remain chilled. New ice should be added if necessary.

If commercially feasible, installation of mechanical refrigeration systems in fishing boat holds and in lorries should be considered. These facilities will extend the range of the vehicles allowing wet fish to reach remote places where new markets for fresh fish could be created.

Promotion of sales of wet fish may be possible, particularly in inland areas where demand may well exist. On the other hand, it should be remembered that people accustomed to freshwater fish are sometimes prejudiced against fish of marine origin or iced fish. Patient extension work may be required to introduce a new eating habit.

A major obstacle to the chilling of wet fish is non-availability of reasonably-priced ice. In some developing countries, one ton of block ice may cost about US\$50. Ice production should be encouraged not only for fish chilling but for the preservation of vegetables and other perishable items.

A related issue is live fish transportation. A remarkable growth has been seen in inland fisheries and aquaculture for species of fish reared in a brackish or marine environment.

Traditional Products

Many types of traditional fish products may be seen in the region. Long-established food items such as dried, salt-dried, boiled, salted, smoked and fermented fish play an important part in the diet of the population.

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Processing of fish by traditional methods is usually a cottage industry carried out with restricted facilities, limited investment in equipment, and little hired labour.

It should be noted that small-scale production can result in better quality control. Quite often, in smaller operations, the owner of the firm serves as the chief technologist of processing and accumulates considerable experience in a specific product. So, it may be suggested that an operation of this kind should not necessarily be enlarged even when more production is required by the market — not if the firm wants to retain its reputation for good quality.

The need to upgrade the quality of these traditional fish products must be seriously considered.

The most important factor in determining product quality is the character of the product and the freshness of raw material. Since chemical composition of fish muscle changes with the season, technologists in charge should always be aware of delicate changes in the nature of fish as well as the progress of spoilage.

For the production of dried fish, an artificial drier may be useful—particularly in the rainy season. Operation of these driers should be carried out with close attention to the quality of the finished product.

Smoked fish is another popular product in hot and humid zones. Smoking is an effective way to protect wet fish from deterioration, since fish can be dehydrated concurrently in the smoking kiln. This form of processing has been used in temperate areas like Europe and North America since ancient time and the products have contributed to the nutrition of the people.

Since smoking has an antioxidative effect for oil in fish, it may be a good way to extend the shelf life of fish — in particular fatty fish. Otherwise these fish will readily develop rancidity.

Various types of smoking oven have been reported. Sometimes, a less sophisticated oven design is more practical and convenient to operate. The “Chorkor” named after a village in Ghana and developed by a woman of that country is a simple device that can smoke about 240 kg in a single operation.

Fermented products such as fish sauce or fish paste, have been widely consumed in the region and some is being exported. Techniques for shortening the fermentation period have occasionally been tried but there have been no commercial applications. The conventional technique is to hold the mixture of fish and common salt in the tank for about one year.

Fish sauce may be one product which needs quality standards and inspection, since as a liquid form, it can easily be adulterated. In some areas, a flavouring agent such as MSG is incorporated into the sauce. This may enhance the taste of the product, but from the view of good manufacturing practice, it may be condemned as an adulterated product.

Fish Products for Export

Southeast Asian countries export fish products not only to western countries, but to their neighbour nations.

For example, fresh fish trade has long been established between Thailand, Malaysia, Indonesia and Singapore. In addition, varieties of conventional products, such as dried, salted, smoked and fermented fish are distributed through foreign trade.

Increasing quantities of frozen items, like shrimp, squid, bivalves and surimi are being shipped to Japan, U.S. and European countries.

Expanded exports may be desirable for the developing countries in terms of the earning of foreign exchange. But, it should be noted how much emphasis has been given to this part of market.

In an article prepared by FAO experts, certain developing countries are reported to have built export trade in fish and fish products valued at around US\$500 million a year. At the same time these very countries are importing fish products at a cost over US\$1000 million annually.

If these figures reflect a substantial deficit in domestic fish supplies, then a drive to expand export markets should be regarded as a questionable policy.

The story just related applies to the government policy of the countries involved and I must say at this point that I am reluctant to draw from it any general conclusion; there may well be cases in which a food policy of self-sufficiency may not be practical.

However, when it comes to the topic of how to feed the people of country, self-sufficiency must be a high priority policy goal to secure the stability of the peoples' life and the independence of the nation. It should be pursued wherever natural resources are available in the form of agriculture, animal husbandry and fisheries products.

While development of domestic marketing just cannot take place on a scale which will make any real impact, the export trade is easier and more attractive to products and processors. This is because most export industries are based on joint ventures and because major aspects of operation are often conducted by experienced technologists from buyers' association.

This may also lead to quality control and quality standards being developed for export products using criteria set by the importing countries.

Presumably conduct of quality control of this type might contribute to some upgrading of products for domestic market but that depends on how actively the government staffs concerned with quality control exchange information with the export business people.

It is the government, which must take the lead in improving the various aspects of the industry's operation. These include technological improvement, market stimulation (by providing facilities for landing), ice making, distribution and so on. It is often observed that governments usually say fish marketing is better left in the hands of the existing private sector. The private sector, on the other hand, tends to be reluctant to engage in domestic marketing unless it can be assured a profitable outcome.

The conservation of energy is becoming essential to the world economy, since it has been estimated that fossil fuels will not be available in the coming century at the present level of consumption. In other words, we have to provide certain alternative energy sources for our survival.

Utilization of Available Resources for Direct Human Consumption

The term "available resources" here cited means fish varieties hitherto underutilized because of difficulties in making from them, edible forms for human consumption.

Good information about the raw material in question should be assembled or investigated prior to new product development.

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Generally speaking the work of inventing a new product from fish previously regarded useless, cannot usually be undertaken by private industry, except by a few firms in which the technologist can engage in product development. Biochemical or chemical information about raw material of any new species of fish is indispensable to technologists in developing a new technique. Perhaps, research of this type can only be undertaken on governmental basis or by international organization.

The importance of a basic knowledge of raw material may readily be understood when one reflects on the quality difference in wheat species and types of products prepared thereof.

A new engineering development may also be needed, for without the invention of appropriate machinery, separation of meat portion from small pelagic fish will be almost impossible.

Selection of the product form as well as the nature of finished product will be important and difficult to decide. Consumer preference are conservative in many countries and it may be impossible to introduce a completely new product no one has ever eaten before.

Therefore, it is useful to remember that the product prepared from available resources does not have to be literally "new". In other words a product that is conventional in one country can be new in another.

Surimi in frozen form, produced on an industrial scale is an example of a new product invented in Japan about 20 years ago. But long before that fresh surimi had been prepared every morning at more than 3000 plants of *kamaboko* manufacturers.

Food habits have changed throughout human history. This reminds us to expect introduction of new product when social and economical environment permits.

For example, growth of wheat imports has been remarkably rapid in the tropical countries, where temperate crops like wheat have not traditionally been grown, except on elevated land. But, wheat products, usually bread, have become a basic food staple for many people.

The lesson is that the possibility of putting new fish products into the markets of the region should not be ignored.

In this context, we should seek out potential resources and set out to solve the problems by the application of technology or by market introduction. Survey should be undertaken of all countries concerned with such problems.

The Role of Post-harvest Technologists

The role of the technologist in charge of product improvement in the fish and fish product industries is one of great importance.

It may often not be practical to keep such a technologist on the staff of a private firm. So we must focus here on the technologist working for government.

The expert needed should be a multi-talented technologist who can handle product quality improvement and also advise management of industry.

People with these qualifications may be hard to find at the moment but government should try to nurture them in order to plan and expand product development in the fisheries industries.

This could be done, so to speak, through self-training. Technologists who take up these positions will attain the capability on the job.

Government should provide a technological laboratory to the technologists to use as their base of activities. This is necessary because the problems brought in by the industries need to be checked as to various categories of examination, including chemical, microbiological or engineering nature.

The technologist should always be aware of the way the industry concerned works, otherwise he will not be able to provide sensible answers to the problems brought to him by industry. One way to make sure that the technologist understands the industry is for him to pay frequent visits to the industry and learn the actual operation there starting from raw material to finished product.

At the very beginning of his visit, he might not be greeted with a smile, but once he demonstrates his wish to help they will probably let him see and learn, and eventually help.

As for the situation in this region, there seems to be less contact than there should be between industries and governmental staffs, including specifically technologists assigned to fish post-harvest technology.

Unless the technologist is experienced, he will not be able to communicate with the industry, or even to understand the questions asked. The needed capability cannot be achieved by the office-bound.

In some instance, an immediate response to a problem may not be possible. There may in such cases be an opportunity for the technologist to take up the question as his research subject, or at least, by laboratory examination, to prepare a satisfactory answer to the question.

Needless to say the research program of the laboratory must be relevant to the needs of the industries. Decisions should be made after a searching evaluation of the subject in terms of usefulness to the industries, the funds required, the point at which the project should be terminated, and so on.

From the perspective of the fisheries industry, research subjects can be chosen on the basis of the technologists study of current and future problems. In this context, knowledge and experience accumulated by the technologist would play a significant role in building the reputation of the laboratory.

It is often thought that little technological improvement appears in the laboratory, in particular, those run by government. Although this may be true in some respects, each case needs to be separately evaluated. If one technologist indicates his enthusiasm for a certain subject and comes up with a proper solution to a problem, even a small one, he may earn trust from the industry.

In terms of close liaison between technologists and industries, demonstrations of the results of the laboratory's work will be most useful and will provide an opportunity to confirm with the industry that the outcome can be brought into commercial reality.

Extension work is an important part of the technologist's job, since people in the industry do not necessarily have access to the literature or to developments occurring elsewhere. Topics that may be dated for the technologist may be quite new to people who have been absorbed in

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their own work. At the same time, people exclusively involved in certain products have less opportunity to acquire information about progress in other products.

Suspicion that confidential information may be leaked by technologists in governmental laboratories has been often noted. Government officials, including technologists, should always handle information collected about industries with great care and objectivity.

If people in government laboratories find it necessary to acquire confidential information they should work out an agreement with the industry in question beforehand, spelling out the conditions under which the material is handled.