

SPC/Fisheries 21/Information Paper 13
2 August 1989

ORIGINAL : ENGLISH

ALTERNATIVE PRODUCT FORMS FOR TUNA

- A REVIEW -

by Nick A.D. Trachet

Fishery Programme Officer

**South Pacific Regional Fishery Support Programme
UNDP private Mail Bag, Suva, Fiji**

This paper appears as CHAPTER 4 in THE MARKETING OF MARINE PRODUCT FROM THE SOUTH PACIFIC. Peter Philipson, (ed.) Institute of Pacific Studies, University of the South Pacific. Suva, Fiji.

Reproduced with permission from the author and the Forum Fisheries Agency, Honiara, Solomon Islands.

ALTERNATIVE PRODUCT FORMS FOR TUNA

- A REVIEW -

by Nick A.D. Trachet

Fishery Programme Officer

South Pacific Regional Fishery Support Programme
UNDP private Mail Bag, Suva, Fiji

Introduction:

There has been increased local involvement with aspects of tuna handling in the South Pacific over the last fifty years. At present, a number of transshipment centres, canneries, and katsuobushi (smoked skipjack) plants are operating in the region (Doulman, 1987). Recently, some initiatives of sashimi grade export have been added to this, but clearly the emphasis remains very much on canning. The market of canned tuna remains controlled by transnational corporations who led the way in the region and beyond. Canning, as a processing form of tuna, became so popular that, at the start of the eighties, 80% of the world catch of tuna went into cans (Owen, 1986).

Tuna canneries in the South Pacific need not automatically copy these product forms without realizing the advantage of their small scale and thus greater flexibility. Producing conventional canned tuna implies competing against the U.S and Thai giants, mostly with the same products, in the same market place.

The tuna industry has long been known for its lack of imaginative marketing efforts (Owen, 1986). International competition between canners has led to maximal cost cutting, resulting in a dull product perceived by the consumer as a low quality convenience food. Only very recently have some European canning companies started to improve the apparent quality of their products through (e.g.) combined canning (Say, 1988).

In Europe at least, a movement "away from the can" is taking place. In the presence of attractive packed fish and other food products, the can appears out of date. The contents are invisible, the overall appearance of the package poor. Fish processors selling canned products have started hiding cans in multicolored boxes or switching to more modern ways of packaging of which the plastic can, where at least the contents are visible, is the closest to the original.

Even as a convenience food, canned tuna is missing its point. Most are still of a difficult-to-open type and once opened, many consumers find it necessary to prepare the contents further..

All the above results in cans at minimal profit margins. When any element in the canning process suffers a price rise, forcing the overall price up, there is a loss of sales in favour of cheaper and easier foods of convenience (Owen, 1986; Narasaki, 1988). All this has its feedback on the price of the raw material and thus on the Pacific countries and the fishermen's income from their tuna resources.

The Review of Tuna Alternatives :

Believing the Pacific countries could benefit from alternative processing possibilities that could generate higher returns from the tuna fishery, a worldwide review was started of the available information and literature on alternative tuna products. To date, although the search is still ongoing, letters requesting information and bibliographic searches have been sent to 65 Fisheries research institutes in 35 countries.

Results:

At the time of the drafting of this paper, surprisingly little information has been obtained from the inquiries. This could indicate that, even in countries regularly landing or importing tuna, not much effort is being invested in research on this subject by fishery research centres. This might be due to two factors: or the idea of canning tuna has become so well established, only few people have thought of researching other possibilities, or the alternatives were proven unfeasible or less interesting at an early stage, and therefore discarded or not followed up. Or, not enough effort has been invested in the marketing of these products. As we will see from the evolution in the private sector, from which, for obvious reasons, much less technical information is available, the second statement is not true.

There is a need for research centres to get more involved in alternative tuna product development. Without freely available information on this subject, the governments and companies from the South Pacific risk to remain behind in the more rewarding aspects of tuna processing, losing once again the benefits of their national resources.

The following pages give a view of what has been found in correspondence and literature in the first months of the review.

Existing alternative possibilities:

Sashimi:

This is first grade tuna meat, mostly sold fresh for raw consumption. The possibilities and difficulties with these products for the Japanese market have been widely researched and described by different authors. Because of the uniqueness of this product, and the covering of some aspects of it in another chapter, comment here is limited to listing a number of relevant papers found during the research (annex 1).

Originally focused on fresh fish in Japan, the scope for sashimi tuna is gradually widening, with the acceptance of frozen products and the growing popularity of Japanese style raw fish in the United States. It is to be expected Europe will also follow in the future. As there is no preconception in these new markets, certain problems regarding tradition, consumer preferences and quality factors badly understood by foreigners, associated with marketing sashimi in Japan will be avoided.

Alternative canning:

As mentioned above, a careful study of the type of can to be used could already enhance the appeal of tuna products in general. Introduction of the ring-pull type can in France for example made sales more successful. Not only the material as will be discussed further, but the size also should be researched in function of the consumer's tastes (Owen, 1986).

In Europe, the use of boil proof plastic cans is rapidly gaining importance. These may be produced from rolls out of which cup and lid are formed, thus greatly reducing transport cost of the raw material. Research proved plastic cans are not inferior to their metal counterpart where processing or storage properties are concerned (Schulz & Schulz, 1985; Paulus, 1987) and they enhance the appeal of the product through the visibility of the contents. although the end product does not require chilled storage, it can be presented chilled to the consumer (a metal can would rust) thus improving the cosmetic image of freshness.

Considerable scope exists for the utilization of the retortable pouch, invented in the late fifties and much improved since. This is basically a bag, formed of layered plastics

and metal foil. With these flexible packings, shapes can be produced permitting milder (or shorter) heat processes with very beneficial effects on texture, flavour and colour, without being less sterile (Keay, 1982). The applications of Retort Pouches for fish products are discussed by different authors (Etoh, 1982; Keay, 1982; Adams et al., 1983; Chinivasagam & Etoh, 1985). Comparative studies established the superiority of the retortable pouch in energy and time efficiency during processing and in organoleptic qualities of the end product (Adams et al., 1983; De Oliveira et al., 1986).

In Hawaii, the WRAF corporation has recently purchased the Hawaiian Tuna Packers site with the intention of setting up a retort pouch facility as an alternative technology to a conventional cannery.

Combined canning:

Under combined canning is understood here the packing of tuna meat in traditional cans with other ingredients to obtain a ready to use or value added product. SOFCOL of Thailand recently started to pack tuna with sauces adapted to the local taste. The European Sales Company John West started a complete line of canned tuna in sauces (in mayonnaise, with sweetcorn, in curry, tomato or barbecue sauce). The French firm Saupiquet made a similar move on the continent including more drastic mixes like a "french country salad". It is aiming also for the German and English markets (Globefish database).

Frozen tuna meat:

A market for well frozen tuna meat for broiling and grilling is gradually evolving in Europe and the US (barbecue). Loins of albacore find a ready market in mainland USA. Consistent with the health movement in the industrialized world, one can expect the importance of these products to grow steadily. One of the major attractive features is the meatlike appearance of the cooked tuna. The perspectives for frozen tuna meat are excellent. One European processor was reported to comment: "Tuna is the frozen product of the future ... it is a product that people know and trust. In a frozen form, it will appeal to a wider market." (Seafood International, April 1988)

The idea proved quite successful at the 1987 ANUGA fair in Cologne, Germany where a project with Infofish promoted different value-added products (kebabs, steaks) based on tuna from South-East Asia (FAO, 1987). As a result, yellowfin steaks from this region are now being sold by large European distribution chains and are promoted heavily in the press (FAO, 1988). From this project, some production sheets and flow diagrams are available (Perovic, 1987).

Porter Frozen Foods from the U.K. sells yellowfin tuna either whole or in 200 gram steaks in the wholesale and retail market. Marr from Hull (U.K.), recently introduced a range of three boneless and skinless yellowfin steak products. Breaded, battered or natural, they come in colour printed carton 8 oz. packages.

An economic feasibility study for a small-scale tuna steak freezing plant, including the use of liquid (Freon) immersion freezers was published for the U.S. (Teixeira & Dolande, 1985). The results proved positive.

Prepared and mixed products:

The possibilities in this sector are only limited by the imagination of the product developer and the taste of the consumer in a given target country. Products like these should therefore be tailor made for any specific market. The possibility to include other local ingredients in these products is an opportunity not to be neglected.

Tuna (and Mushroom) pies were launched four years ago in the U.K. by Tiffany Foods, Sussex, who won an award with this product (Seafood International, April '86). Stouffers (U.S.A) added in 1986 tuna lasagna to its "Lean Cuisine" product line (same source). The products tested during an FAO project in Panama (Perovic, 1987) ranged from tuna sauce to a tuna salad with brown beans. All were stored frozen.

"Heat treated" products, like pre-grilled steaks and tuna fritters (bigeye and yellowfin), formed part of the Infofish project already mentioned. Here too, Perovic (1987) provided technical details for the production.

In the sixties, 5 plants in the U.S were known to produce frozen tuna pies. A description of an industrial recipe is given by Tressler (1968). The product is said to be still popular.

Smoked products:

Tuna, as a scombroid fish, is quite suitable for smoking. Nevertheless, the developments in smoked tuna products seem to be recent. The number of parameters in smoked products is so high (salt content, moisture content, amount of smoke applied, temperature of processing, etc.) that large variety in the end product is possible, adapted to different tastes. As one New Zealand Processor put it in his letter, the largest effort, as with most products, lies in the marketing aspect.

For the technical aspects, an extensive and simple literature on smoking techniques has been published by the Torry Research Station, Aberdeen, U.K.

Smoked tuna products are already successfully marketed locally in New Zealand and Australia. WAIMEX, a Western Australian company smokes bluefin for export claiming it to be an acceptable substitute for smoked salmon. It is presented vac-packed in sizes ranging from 100 grams to whole fillets. The quality of their smoked tuna (Esperance Brand) is said to be enhanced by using Banksia and Jarrah nuts in the process.

In Fiji, Feeders Ltd. in Suva produces a range of smoked fish products, including smoked albacore, upon request from buyers.

A company in the Marshall Islands exports smoked "Sea-Snack-Packs" to the U.S Mainland under the "Spicewind" brand. This product doesn't require refrigeration (S. Roberts, pers. comm.).

In Europe, the British company Hales Snail has been smoking tuna fillets for the past seven years, and is now, after initial marketing problems, successfully selling in the U.K, the Far East and the Middle East (under the Porter's brand name).

Published trials have been obtained from different sources: in Ghana for skipjack (Balogun et al., und.), in New Zealand slender Tuna (Scott, 1984), in Fiji for different species (Sawada, 1974).

Katsuobushi Products:

In addition to canned tuna, this is the other industrial tuna product being manufactured in the South Pacific area (Doulman, 1987). Being an ethnic Japanese commodity, with little or no possibilities of outlet to other markets at present, the varieties (also called fushi) are complex (Van Eys, 1983). This product is usually produced in close guidance by some Japanese counterpart. Production opportunities will be limited to islands with enough wood supply and the Japanese market is slow growing but it is believed by at least some authors that there are further possibilities for export of this product from developing countries (Van Eys & Mizuishi, 1983).

Dried products:

As some dried tuna products are traditional in island communities, these could be used as a base for export quality products. Tuna Jerky (a snack type product) is being produced by U.S. firms in Hawaii, but no further information has yet been found on the processing.

Fish Sausage:

Fish sausage production from tuna meat in Japan started in the fifties and has become an accepted product in that country. General information on the processing was found in a copy of an unidentified article by Amano. The production was also extensively tested in Malaysia (Wan Rahimah, 1984). The Japanese product is intended to be like a cooked meat sausage, masking the fish taste, but in other countries trials were done at making true fish sausages from different raw materials: Mullet in the U.S., kahawai, trevally and red cod in New Zealand (Thomas, 1966).

A Costa Rican Company has been reported (Globefish database) to produce "Tuna Frankfurters" from the normally discarded dark meat. Most of the production is exported to the United States.

Miscellaneous:

Many more exotic tuna products and by-products are used in the world. As examples can be listed the fermented skipjack stomach (shiokara) and insulin production from tuna intestine in Japan, or the utilization of tuna red meat in seasoning fish wafers (Thankamma et al., 1985).

Conclusions:

Although not questioning the important role the tuna canning industry will continue to play in the South Pacific region, this paper notes that the technology of food canning is evolving fast and modern opportunities should be kept in mind while planning new initiatives in the domestic tuna industry.

In addition to innovative canning, there is ample room for a small volume, high quality industry in the South Pacific, based on alternative tuna products. The processing and packaging technology for these products is already present elsewhere or in other sectors, and easily transferable. The development of new products is not the most difficult point. The largest effort would be in a serious marketing strategy to reach this consumer who is able, and willing, to pay for quality products. Joint ventures with established importers in the industrialized countries might help to overcome many problems.

Many authors have highlighted the possibilities for developing countries to go into value-added production (FIIU, 1987; Van Eys, 1987). The FAO has been promoting the idea through its Committee on Fisheries (FAO, 1983). In view of the scale of many Pacific Islands economies, and the prohibitive distances and freight prices to the markets, value added products might well prove a rare opportunity for development and foreign currency earnings.

Literature reviewed:

Adams, J.P., Peterson, W.R. & Otwell, W.S. (1983). Processing of Seafood in Institutionalized Retort Pouches. Food Technology, April 1983, 123-127.

Amano, K. (unknown date). Fish Sausage Manufacturing. (Possibly in Bergstrom ed.: Fish as Food. Acad. Press NY, London, 265-280.

Balogun, A.M., S.O. Talabi, S.O. Sorinmade & O. Olokun (unknown date). Product Technology of Skipjack Tuna Caught in Nigeria's EEZ. unidentified FAO source, 291-299.

Chinivasagam, H.N. & S. Etoh (1985). Vacuum Pouch Product Development in Sri Lanka. In: Spoilage of Tropical Fish and Product Development, FAO Fisheries Report No.317(suppl.), Rome 1985, 249-254.

De Oliveira, L.M., L.F.C. Madi, C.I.G.L. Sarantopoulos, E.E.M. Mori & I. Shirose (1986). Atum em conserva: Potencialidade de uma embalagem alternativa. Bol.ITAL, Campinas, 23(1), Jan-mar 1986, 117-125.

Doulman, D. (1987). Domestic Tuna Industries. In: The Development of the Tuna Industry in the Pacific Islands Region: An analysis of Options. D. Doulman, ed., East West Centre, 1987, 3-31.

Etoh, S. (1982). Manufacture of Vacuum Pouch from Small Varieties of Fish Like Sardines. FAO Project report, Institute of Fish Technology, Colombo, 13 May 1982, 13 pages.

F.A.O. (1983). Committee on Fisheries. International Trade in Fish and Fisheries Products. COFI/83/9, July 1983, 9 pages.

F.A.O. (1987). Promotion of Value-added Fishery Products from INFOFISH Member Countries, Progress Report of TCP Project TCP/RAS/6653, FAO, FID, 28/10/87, 10 pages.

F.A.O. (1988). Committee on Fisheries. Opportunities for Fishery Products and Marketing Developments. COFI:FT/II/88/5, June 1988, 7 pages.

FIU (1987). Possibilities of Entering Markets for Value-added Products. Infofish Marketing Digest No 2/87, 11-14.

Keay, J.N. (1982). Retort Pouch Processing of Fish Products. Infofish Marketing Digest No 4, July 1982, 28-32.

Narasaki, O. (1988). Demand for Canned Tuna and Price Trends. FFA News Digest, 1/88, 8-13.

Owen, P. (1986). Breathing New Life into the Tuna Industry. Infofish Marketing Digest No 5/86, 37-40.

Paulus, K. (1987). Vergleichende Untersuchungen über die Qualitätsveränderungen verschiedener sterilisierter Lebensmittel in Metall- und Kunststoffpackungen. ZFL-Intern. Zeitschrift für Lebensmittel-technologie und Verfahrenstechnik. 38 Jahrgang 1987 - Heft 3, 5 pages.

Perovic, V. (1987). Report on the Production of Samples made of tunafish (bigeye, yellowfin) and Swordfish at Bali Raya Canning Plant, Bali, during the Period 11.7 - 10.8.87. Infofish, internal report, TCP/RAS/66553, 1987, 25 pages.

Perovic, V. & R. Frederick, (1987). Estudio preliminar de factibilidad de productos no tradicionales a base de atun. TCP/PAN/4503 (1), Documento de campo, FAO, mayo 1987, 20 pages.

- Sawada, T. (1974): Report on the Pilot-Scale Preparation of Speciality Fish Products. Local Tuna Fishery Project, Suva, Fiji, FAO, Rome, 1974, 9pp.
- Say, M. (1988). Alternatives to Make a Profit. Foodnews, may 6, 1988, 10.
- Schulz, E. & D.F. Schulz-Bodecker (1985). Gasdichte Tiefziehpackungen - geeignet für Pasteurisation und Sterilisation. (Aus Lebensmitteltechnik Nr6, June 1985) Information Wolff Walsrode AG, 6 pages.
- Scott, D.N., S.M. Temple & G.Summers (1984). Processing Slender Tuna. Fish Processing Research group Internal Report, D.S.I.R., New Zealand, July 1984, 4 pages.
- Teixeira, A.A. & J.J. Dolande (1985). Economic Feasibility of Individual Quick Frozen Vacuum Packed Tuna Steaks. IIF-IIC-Commission D1, D2 and D3, Orlando, Florida, USA, 1985: 265-273.
- Thankamma, R., A. Lekshmy Nair, A. Vasanth Shenoy & K. Gopakumar (1985). Suitability of Tuna Red Meat for Preparation of Wafers. Fishery Technology, 22(1), 1985, 45-47.
- Thomas, J. (1966). Development of a Fish Sausage. Food Technology in New Zealand, August 1966, 305-306.
- Tressler, D.K. (1968). Prepared and Precooked Fish and Fishery Products, Chapter 12 in : The Freezing Preservation of Foods, D.K. Tressler and B.S. Van Arsdel, eds., AVI publ.Co. Westport, USA, 1968
- Van Eys, S. (1983). Katsuobushi - A Japanese Speciality. Infofish Marketing Digest No 2/83, 23-27.
- Van Eys, S. & P. Mizuishi (1983). Producing Fushi for the Japanese Market. Infofish Marketing Digest No 3/83, 21-25.
- Van Eys, S. (1987). Value-added Products from Developing Countries. Infofish Marketing Digest No 5/87, 17-19.
- Wan Rahimah, W.I. (1984). Fish Sausage - Its Preparation and Quality Changes during Storage. MARDI Res. Bull., (1984) 12,1, 86-94.

APPENDIX 1 LITERATURE FOUND ON SASHIMI

- Franklin, P. & G. Kitson (1982). Sashimi, The Japanese Market. Infofish Marketing Digest, September 1982, 16-21.
- Gibson, D.J.M. (1981). A Handbook on Processing Southern Bluefin Tuna for the Fresh Chilled Sashimi Market in Japan. Ministry of Agriculture and Fishery, Wellington, N.Z., 34 pages.
- Goodrick, B. & B. Brown (1987). Development of a Longline Fishery for Export-Grade Tuna in Southern Queensland Waters. Final Report to the Fisheries Development Trust Account Committee. Queensland Department of Primary Industries, may 1987, 20 pages.
- Goodrick, B. (1987). Postharvest Quality of Tuna Meat, a Question of Technique. Food technology of Australia, Vol.39(7), July 1987, 343-345.

Jameson, J. (1984). Added Value Products - Preparation of Sashimi Tuna. In: The Australian Fishing Industry - Today and Tomorrow, 10-12th July 1984, Australian Maritime College, Launceston, Tasmania, Feb.1985, 331-341.

Japan Trade Research Associates (1985). Tuna Loining for Sashimi and Processing. FFA report 85/28, november 1985, 32 pages. .

Matthews, A.D. (1983). Muscle Colour Deterioration in Iced and Frozen Bonito, Yellowfin and Skipjack Tuna Caught in Seychelles Waters. J. Fd. Technol. (1983) 18, 387-392.

Nakamura, K., Y. Fujii & S. Ishikawa (1977). Experiments on the Prevention of "Burning" of Tunas - I. An Examination of Causes of Occurence. U.S Department of Commerce, NOAA, National Marine Fisheries Center, Translation No.46, 8 pages. (From: Bulletin of the Tokai Regional Fishery Research Laboratory No.90, August 1977, 39-43).

Nakamura, R., J. Akamine, D. Coleman & S. Takeshima (1986). The Management and Handling of Yellowfin Tuna in the Ika-Shibi Fishing Industry in Hawaii. Department of Animal Sciences, University of Hawaii, may 1986, 26 pages.

Q.F.I.T.C. Inc. (und.). Grading Yellowfin Tuna for Export. Queensland Fishing Industry Training Council Inc. "Handicard Series", 8 colour plates.

Q.F.I.T.C. Inc. (und.). Processing and Storage of Sashimi Tuna. Queensland Fishery Industry Training Council Inc., Brisbane, 10 pages.

Rowley, M. (1983). Guide to handling Chilled, Fresh Tuna for Export to Japan. Australian Fisheries, March 1983, 3 pages.

Tanigushi, H. (1977). How to Effectively Kill Tunas in Order To Maintain Quality and Higher Prices. U.S Department of Commerce, NOAA, National Marine Fisheries Center, Translation No 25, 4 pages.

Travis, W. (1977). The Fishing, Handling and Marketing of "Sashimi" Tuna. South Pacific Commission, SPC/Fisheries 9 / WP.31, 25 January 1977, 39 pages.

Williams, S.C. (1986). Marketing Tuna in Japan. Q.F.I.T.C.Inc., Brisbane, October 1986, 60 pages.

Wilson, M.A, & R. Cade (1981). Air-freighting Fresh Chilled Tuna to the Japanese Sashimi Market. Infofish Marketing Digest No.4/81, 45-47.

Yoshimura Industry Co. Ltd. (und.). How to Preserve Freshness in Tunas, part II. U.S Department of Commerce, NOAA, National marine Fisheries Center, Translation No 122, 53 pages.