

Suitability of Tuna Red Meat for Preparation of Wafers

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Studies to find out the suitability of tuna red meat for preparation of wafers have indicated that the red meat as such is not a good raw material for the production of wafers. The wafers obtained had poor organoleptic quality and characteristic tuna red meat flavour unacceptable to consumers. Attempts to prepare the wafers with the red meat mixed with the meat of barracuda in varying proportions showed that the mixture of red meat and barracuda in the ratio 1:3 gives a product having excellent physical properties and good swelling characteristics. The overall organoleptic quality of these wafers was very much comparable to the wafers produced from other quality fish. Increasing the proportion of red meat not only affects the overall appearance of the product but also imparts the red meat taste to the product.

Attempts have been made in many areas of the world to develop nutritionally improved blended foods from inexpensive locally available food materials. Several methods have also been developed to process the waste from processing factories into products suitable for either animal or human consumption. Tuna is an important food fish. Large quantities of tuna are canned, a part converted into conventional canned products and the rest is consumed fresh. It is composed of red and white meat, the relative proportions of which vary from species to species. Chinnamma (1975) has reported about 11% red meat in tuna. Only the white meat of tuna is usually used for processing and the red meat is discarded as waste on account of its unappealing appearance and flavour. It is normally converted to animal feeds. Biochemical and nutritional quality studies on red and white meat of tuna and other fishes have been carried out by Ameano & Bito (1951), Matsura & Hashimoto (1954), Breaken (1956), Igarashi *et al.* (1957), Chinnamma (1975), Mukundan *et al.* (1979) and Lew *et al.* (1981). All these workers have reported that the tuna red meat is nutritionally comparable to any other fish.

With a view to utilize the tuna red meat for human consumption, studies were undertaken to evaluate its suitability as a raw material for the production of wafers.

Attempts were also made to prepare the wafers using red meat incorporated with meat of other types of fish. The results of the studies are presented in this paper.

Materials and Methods

Fresh tuna (*Euthynnus affinis*) and barracuda weighing 5 to 8 kg each were purchased from the local market, brought to the laboratory and processed immediately. Tuna was cooked at 110°C for 1h and the red and white meat were separated. Minced meat was prepared from the barracuda using a mechanical meat separator. It was also cooked at 110°C for 30 min. Both samples were packed in polythene bags and kept at -23°C until further processing.

Fish wafers were prepared from the cooked tuna red meat and barracuda meat using the method reported earlier (Venugopalan & Govindan, 1967). Five batches of wafers were prepared from (1) tuna red meat (2) barracuda meat (3) mixture of tuna red meat and barracuda meat in the proportion of 1:3 (4) 1:1 and (5) 3:1. Visual observations such as appearance of the wafers were recorded and organoleptic evaluations of the products were carried out by deep frying the wafers in oil and eliciting the opinion of a taste panel as to their acceptability.

Moisture, ash and fat were determined as described in AOAC (1975). Total nitrogen was estimated by the microkjeldahl method (Hawk, 1954) and the protein value compounded by multiplying by 6.25. Microbiological quality of the products was assessed by standard methods. (APHA, 1966)

Results and Discussion

Percentage yield of red meat from mackerel tuna (*Euthynnus affinis*) varied between 5.7 to 9.0% and that from skipjack (*Katsuwonus pelamis*) varied between 8.8 to 11.6%. Proximate composition of the fish meat used for the preparation of wafers is presented in Table 1. It may be seen that tuna red meat is very rich in protein and fat. Physical and microbiological characteristics of the different batches of wafers are presented in Table 2. Microbiologically all the samples were safe. Samples prepared from tuna red meat alone or having higher proportions of the red meat (Samples 1, 4 and 5) had unappealing colour and poor swelling property. The characteristic unacceptable flavour of cooked red meat was predominant in all these samples. Sample 3 having tuna red meat and barracuda meat in the ratio of 1:3 had acceptable colour and fla-

avour, and the swelling property was good. Taste panel studies revealed that this product was highly palatable and without any bad flavour or off-taste. A comparative evaluation of the wafers prepared from tuna red meat mixed with barracuda meat in the ratio 1:3 with wafers prepared from other fishes showed that there was no significant difference between the products and acceptability by the taste panel members was comparable.

Tuna red meat alone is not a suitable material for the preparation of wafers. However, tuna red meat incorporated with barracuda meat in the ratio 1:3 is a good raw material for the production of good quality wafers.

Table 1. Proximate composition of fish meat used for preparation of wafers

	Tuna red meat	Barracuda meat
Moisture, g/100 g	69.8	75.4
Protein, g/100 g	18.2	17.2
Fat, g/100 g	4.8	1.6
Ash, g/100 g	4.3	4.3

Table 2. Physical and microbiological characteristics of fish wafers

	Sample 1 Tuna red meat	Sample 2 Barracuda meat	Sample 3 Tuna red meat and barracuda meat 1:3	Sample 4 Tuna red meat and barracuda meat 1:1	Sample 5 Tuna red meat and barracuda meat 3:1
Colour	Red	White	Pale red	Brownish/ red	Red
Appearance	Fair	Good	Good	Fair	Fair
Swelling property	Poor	Good	Good	Fair	Poor
Total plate count*	100	150	120	100	130
Coliforms*	Nil	Nil	Nil	Nil	Nil
<i>E. coli</i> *	Nil	Nil	Nil	Nil	Nil
Faecal streptococci*	Nil	Nil	Nil	Nil	Nil
Coagulase positive staphylococci*	Nil	Nil	Nil	Nil	Nil

*Number of organisms/g

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