

## Effect of storage of surimi from the fish croaker on the organoleptic quality of surimi-based products

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### ● ABSTRACT ●

To know the effect of storage of surimi on the organoleptic quality of surimi-based products, the meat of fish, croaker was used. In the preparation of surimi, the meat to water ratio used for washing was 1:2. Again the washing process was repeated for two times and 30mM MgCl<sub>2</sub> was used in washing. Then these samples were mixed with cryoprotectants, frozen at -40°C for 4 hrs and stored at -20°C. After 1 day, it was removed from the freeze, thawed and the different surimi-based products were prepared with respective amount of ingredients. Setting was done at +40°C for 3 hr. These surimi - based products were analyzed at each storage period up to six months for organoleptic quality by subjecting them to sensory evaluation tests. Among all the products, chikuwa provided more value for all attributes as the meat had the best value of protein.

**KEY WORDS :** Surimi, Storage, Organoleptic quality, Croaker

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### ● INTRODUCTION ●

Surimi is a washed minced meat with cryoprotectants added for longer frozen shelf-life. Surimi-based products are prepared by extruding the surimi paste, prepared with other added ingredients into various shapes. The products may resemble shell fish meat such as crab, lobster, scallop or shrimp (Lee, 1984). It is hoped, development of quality surimi-based products from fishes of India, will enable their effective utilization for direct human consumption. This will, not only pave the path for elimination of protein malnutrition, but also increase foreign earnings from export by entrepreneurship development in production of surimi and surimi-based product and provide better returns to poor fishermen. The results may also be useful to any unemployed person to establish fast food center in the suitable area to enhance his socio-economic condition.

Organoleptic characteristics perhaps constitute the

most important aspect of quality evaluation of surimi-based products especially from consumers point of view. In the present study, the different products in different storage periods were compared to organoleptic qualities on the basis of sensory attributes like appearance, texture, flavour and overall liking by panel tests.

### ● MATERIALS AND METHODS ●

Marine fish, croaker (*Johinus dussumieri*) was used in the present study. In laboratory the fishes were washed and dressed by removing scales, skin, viscera and head. After washing and dressing, the meat was picked by meat picking machine and the picked meat was minced by mincer. For the preparation of surimi, the minced meat of each species was then washed with chilled potable water. Meat to water ratio used for washing was 1:2. In order to enhance the desired functional properties from protein foods, MgCl<sub>2</sub> was used in washing as a treatment.

Then both these control and treated samples were mixed with cryoprotectants like sugar(4%), sorbitol(4%) and polyphosphate(0.2%) by silent cutter, packed in polythene and frozen at -40°C for 4 hrs (Suzuki, 1981). Then stored at -20°C. After 1 day it was removed from the freeze, thawed and the different surimi-based products were prepared with respective amount of ingredients. Setting was done at selected temperature and time as

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+40°C for 1 hr for sardine and mackerel meat and 3 hr for pink perch and croaker meat.

### Preparation of fish sausage:

The thawed meat was mixed with several ingredients in a silent cutter. First the meat was ground to about 2-3 minutes by adding little by little in the mixer. Various ingredients were added one by one as prescribed. Mixing process was finished within 15 minutes. After mixing the meat with ingredients, finally got the fish paste, which was transferred to a clean, dry container.

The fish paste was taken in a hand stuffer and filled into synthetic casings. Stuffing was done as quickly as possible. Otherwise setting of the paste takes place and product becomes hard and stuffing will be difficult; even taste gets affected. During stuffing care was taken to prevent the entry of air inside the casings. The air pockets, if present inside the casings may burst during heating. The quantity of the paste to be filled into the casing should be adjusted, so that each casing received an equal amount of paste (100g+3 g). The paste was filled into one casing and its weight was adjusted by weighing. Then it was ringed. By observing the size and length of the weighed casing, the other casings were filled.

The open end was twisted and ringed. The excess casing was trimmed and the residual paste sticking was washed off in soap water. The presence of it may aid in the growth and easy entry of microorganisms in sausages. After washings in soap water, they were rinsed in fresh water and wiped with a cloth. The casings were incubated at +40°C for 1 hr for sardine and mackerel and 3 hr for pink perch and croaker. Then the casings were boiled in water at a temperature of 90°C for about 50-60 minutes. The product also was cooked at the same time. Care was taken to monitor and keep the temperature constant. After boiling, the casings were cooled by dipping the casings in ice cold water for about 20 minutes at a temperature less than 20°C. The casings were boiled at 100°C for 30 seconds. Boiling and cooling may give bad appearance to the product (wrinkle formation). To prevent these wrinkles on the surface of sausage, reboiling was done. After heat processing, the casings were dried by an air blower. The dried casings were stored in a cool and dry place at a temperature of +2°C. The equipments used were dismantled, washed with soap solution, wiped, dried and oiled to prevent rusting. The ingredients used for the preparation of the product are given below:

### Ingredients:

Ingredients are fish meat (70.0%), salt (2.0%), sugar (1.5%), polyphosphate (2.0%), spices (1.0%); (a)

coriander (0.3%), (b) chilli powder (0.3%), (c) peeper (0.2%), (d) garlic (0.1%), (e) ginger (0.1%), mono sodium glutamate (0.2%), potassium sorbate (0.2%), colour solution 2 % of carmosine (0.13%), starch 9.0%, cold water 10.0%, fat vegetable oil (5.0%).

### Preparation of kamaboko:

Itasuki kamaboko:

The thawed meat paste was piled on a thin wooden slab, set at standardized temperature and time and steamed. The period of steaming depends on the size (80-90 minutes for large size and 20-30 minutes for smaller size).

Chikuwa:

Chikuwa was made by wrapping ground meat paste around a brass tube or wooden stick, set and broiled the surface. Broiled chikuwa of good quality is white inside and golden brown on the surface.

Hampen:

Hampen is white and has a spongy texture. The sponginess was obtained by mixing air into the meat paste during the grinding process. The paste was made into square and was boiled at 80° – 90°C for 20-30 minutes.

Ingredients:

Ingredients are fish meat (70.0%), salt (2.0%), sugar (1.5%), MSG(0.2%), starch (9.0%), oil (5.0%), chilli powder (1.3 %), chilled water (11.0%).

### Preparation of fish cake:

Chilled surimi was subjected to grinding for 3 minutes in a silent cutter. Salt was added and mixed thoroughly, so as to solubilise the meat. Oil was heated in a pan. Onion paste were put into this oil and fried brown colour. Then ginger paste and garlic paste were added and fried, followed by addition of other spices. After frying for some time, water was poured into the pan. It was cooled for some time. The slurry was filtered through a coarse cloth. This spice slurry was kept in chilled condition till use. Starch, chemicals and sugar were added to the spice slurry and stirred thoroughly so that no clumps were formed. This slurry was added to the surimi and mixed thoroughly. Finally, colour was added and mixed. The paste so obtained was formed into different shapes, usually in the shape of rectangular cakes and allowed to set at standardized temperature and time. Then the cakes were steamed for 1 hour, cooled and stored in refrigerator for use.

**Ingredients:**

Ingredients are minced fish meat(60.0%), table salt(1.0%), sugar(1.0 %), onion (15.0%), garlic (3.0%), pepper (0.3%), coriander powder (0.3%), chilli powder (0.5%), garam masala powder (0.5%), colour (Ponceau 4R) 0.1 ml, starch flour (6.0%), chilled water (6.0%), vegetable oil(6.0%), polyphosphate(0.1%), monosodium glutamate (0.1%), potassium sorbate (0.1%).

**Preparation of fish ball:**

The surimi was thawed and mixed the fish meat with fried onions (onions cut into very small pieces and fried it in vanaspati) and chilli powder, coriander powder and turmeric powder. Beaten egg, bread powder, salt and aginomotton (MSG) were added and mixed homogeneously. Balls of about 3 cm diameter were prepared, set and steamed for 20-30 minutes. The cooked fish balls were cooled and packed in thermoformed trays and stored.

**Ingredients:**

Ingredients are fish mince (1000g), chilli powder (30g), coriander powder 10g, turmeric powder (1 spoon), vanaspati(150g), onion (200g), bread powder (30g), MSG (½ spoon), salt to taste, beaten egg (1 no).

**● RESULTS AND DISCUSSION ●**

These surimi - based products were analyzed at each storage period for organoleptic quality by subjecting them to sensory evaluation tests. Twenty members of experienced panelists were comprised a panel. They assessed the products by nine point hedonic scale for various quality attributes like appearance, flavour, texture and overall liking (Table 1-6). Like wise each month interval up to six months (180 days) the stored surimi was used for the preparation surimi-based products and organoleptic study was done.

Texture of surimi - based products as fish sausage, itasuki kamaboko, chikuwa and hampen was better than other products like fish cake and fish ball, as these products contained more starch (Table 1-6). In chikuwa for the attribute texture the score was 7.4 and 9.0 in control and 30 mM MgCl<sub>2</sub> treatment, respectively. But after 180 days it was decreased to 5.6 and 7.2, respectively (Table 3). As the storage period increased all attributes decreased. Value of flavour was more in case of chikuwa than other products. In fresh condition the score for flavour for chikuwa in 30 mM MgCl<sub>2</sub> treatment was 8.7. Over all liking was better for chikuwa irrespective of products. Among all products, chikuwa provided more value for all attributes as the meat had the best value of functionality

**Table 1 : Effect of storage of surimi on the organoleptic quality of fish sausage**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearances	7.1	6.6	6.5	6.4	6.3	6.3	6.1	6.0
	Texture	7.3	6.0	5.9	5.8	5.7	5.6	5.5	5.4
	Flavour	7.2	6.0	5.8	5.7	5.6	5.5	5.4	5.3
	Overall liking	7.2	6.3	6.2	6.1	6.0	5.9	5.8	5.7
30mM MgCl <sub>2</sub>	Appearance	7.3	7.0	6.9	6.8	6.7	6.6	6.5	6.3
	Texture	8.9	7.8	7.7	7.6	7.5	7.4	7.3	7.1
	Flavour	8.5	7.7	7.6	7.5	7.4	7.3	7.2	7.0
	Overall liking	8.7	7.5	7.4	7.3	7.2	7.1	7.0	6.8

**Table 2 : Effect of storage of surimi on the organoleptic quality of itasuki kamaboko**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearances	7.0	6.5	6.4	6.3	6.1	6.0	5.8	5.6
	Texture	7.3	6.0	5.9	5.8	5.7	5.6	5.5	5.4
	Flavour	7.2	5.9	5.8	5.7	5.6	5.6	5.7	5.3
	Overall liking	7.2	6.2	6.3	6.2	6.0	5.9	5.4	5.5
30mM MgCl <sub>2</sub>	Appearance	7.2	6.9	6.8	6.7	6.6	6.5	6.4	6.2
	Texture	8.9	7.8	7.7	7.6	7.5	7.4	7.3	7.1
	Flavour	8.4	7.6	7.5	7.4	7.3	7.2	7.1	6.9
	Overall liking	8.6	7.4	7.4	7.3	7.2	7.1	7.0	6.8

**Table 3 : Effect of storage of surimi on the organoleptic quality of Chikuwa**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearance	7.3	6.7	6.6	6.5	6.4	6.3	6.2	6.1
	Texture	7.4	6.3	6.2	6.1	6.0	5.9	5.8	5.6
	Flavour	7.3	6.2	6.1	5.9	5.8	5.7	5.6	5.4
	Overall liking	7.3	6.4	6.3	6.2	6.1	6.0	5.9	5.7
30mM MgCl <sub>2</sub>	Appearance	7.4	7.1	6.9	6.8	6.7	6.6	6.5	6.3
	Texture	9.0	7.9	7.8	7.7	7.6	7.5	7.4	7.2
	Flavour	8.7	7.8	7.7	7.6	7.5	7.4	7.3	7.1
	Overall liking	8.8	7.6	7.5	7.4	7.3	7.2	7.1	6.9

**Table 4 : Effect of frozen storage of surimi on the organoleptic quality of hampen**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearance	7.0	6.5	6.4	6.3	6.1	6.0	5.9	5.7
	Texture	7.3	6.1	6.0	5.9	5.8	5.7	5.6	5.5
	Flavour	7.2	6.0	5.9	5.8	5.7	5.6	5.5	5.4
	Overall liking	7.2	6.2	6.1	6.0	5.9	5.8	5.7	5.5
30mM MgCl <sub>2</sub>	Overall liking	8.0	6.7	6.6	6.5	6.4	6.3	6.1	5.9
	Appearance	7.2	7.0	6.9	6.8	6.7	6.6	6.5	6.3
	Texture	8.9	7.7	7.6	7.5	7.4	7.3	7.2	7.0
	Flavour	8.3	7.6	7.5	7.4	7.3	7.2	7.1	6.9
	Overall liking	8.6	7.5	7.4	7.3	7.2	7.1	7.0	6.8

**Table 5 : Effect of storage of surimi on the organoleptic quality of fish cake**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearance	7.2	6.6	6.5	6.4	6.3	6.2	6.1	6.0
	Texture	7.1	5.9	5.8	5.7	5.6	5.5	5.4	5.3
	Flavour	7.3	5.9	5.7	5.6	5.5	5.4	5.3	5.1
	Overall liking	7.3	6.2	6.1	6.0	5.9	5.8	5.7	5.5
30mM MgCl <sub>2</sub>	Appearance	7.3	7.1	7.0	6.9	6.8	6.7	6.6	6.5
	Texture	8.6	7.5	7.4	7.3	7.2	7.1	7.0	6.8
	Flavour	8.7	7.5	7.3	7.2	7.1	7.0	6.9	6.7
	Overall liking	8.7	7.4	7.3	7.2	7.1	7.0	6.9	6.7

**Table 6 : Effect of frozen storage of surimi on the organoleptic quality of fish ball**

Treatments	Attributes	Day							
		Fresh	1	30	60	90	120	150	180
Control	Appearance	7.2	6.5	6.4	6.3	6.1	6.0	5.8	5.7
	Texture	7.0	5.8	5.7	5.6	5.5	5.4	5.3	5.1
	Flavour	7.2	5.7	5.6	5.5	5.4	5.3	5.2	5.0
	Overall liking	7.1	6.1	6.0	5.9	5.8	5.7	5.6	5.4
30mM MgCl <sub>2</sub>	Appearance	7.2	7.0	6.9	6.8	6.7	6.6	6.5	6.4
	Texture	8.5	7.4	7.3	7.2	7.1	7.0	6.9	6.7
	Flavour	8.4	7.4	7.2	7.1	7.0	6.9	6.8	6.6
	Overall liking	8.5	7.3	7.2	7.1	7.0	6.9	6.8	6.5

of protein. In 180 days the products came down to dislike slightly/neither like nor dislike stage. So the liking ness definitely will decrease after this period. Salt,  $MgCl_2$  treated sample was liked more than control. Because the washing of meat in  $MgCl_2$  increases the functionality of protein (Das, 2009). As the storage period increased the rate of decrease in value of attributes were less. So, the products from surimi can be considerable for the studied period.

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