Production of fish soup cube using Yellow fin Tuna (*Thunnus albacares*) Fish Powder

H. M. C. P. Weerasuriya[1], S. Ariyarathne[2*] and E. D. N. S. Abeyrathne[1]

[1]*Uva Wellassa University, Badulla, Sri Lanka*

[2]*National Aquatic Resources Research and Development Agency (NARA), Crow Island, Colombo- 15, Sri Lanka*

Abstract

Contribution of yellow fin tuna is significant for the export fishery industry in Sri Lanka. Waste generated during processing of tuna is about 40-45% of total body weight and is good quality raw material for value addition. In this study fish powder was prepared using belly flap and trimmings of yellow fin tuna. Main Objectives of the study were to convert the fish soup powder mix in to a cube using gelatin as a binder and to determine the most favourable gelatin percentage and shelf life of the product at room temperature. Trials were conducted in two steps to select the optimum gelatin percentage, initially for 0%, 12.5%, 25%, 37.5%, and 50% and subsequently for 5%, 7.5%, 10%, 12.5% and 15%. Best combination was 5% gelatin according to the results of cutting strength obtained by texture analyzer. Proximate composition of fish soup cube was 31% of protein, 18.5% fat, 46% ash and 3.5% moisture content. Shelf life study trial was run for one month storage period in room temperature while testing for quality changes by chemical and microbiological parameters. Initial amount of moisture content, TVBN level, pH, water activity, yeast and mold count and total plate count were about 3.5±0.22 %, 2.35 ± 0.78 mg/100mg , 5.7 ± 0.07, 0.510 ± 0.007 , 5 cfu/g, 55 cfu/g respectively and changed to 10.30 ± 0.60 %,4.70± 0.16mg/100mg, 5.27 ± 0.03,0.550 ± 0.009, 35 cfu/g and 1.45 x 10^2 cfu/g in room temperature correspondingly within acceptable limits of SLSI. Sensory evaluation proves that there was no significant difference from commercially available non fish base soup cubes. The study revealed that fish soup powder can be converted into cube using 5 % gelatin and shelf life of the product can be extended for a month at room temperature.

Keywords: fish soup cube, Yellowfin tuna, Gelatin

* *Corresponding author: asuseema@hotmail.com*

Introduction

Tuna species are one of the most popular marine fish species in fin fish processing industry in Sri Lanka. Among several tuna species yellowfin tuna (*Thunnus albacares*) has a high demand in the export industry (FAO, 2004). But approximately 40-45 % of total body weight of tuna fish is removed by the processing industry as waste (Madhumita *et al*, 2011). Production of soup cubes using trimmings and belly flaps of yellowfin tuna fish powder will be a good solution for value addition to the waste generated from the fish processing industry.

Materials and Method

Types of ingredient used		Tuna Trimmings; Onion, garlic,curry leaves, cloves and coriander; Vegetable fat, citric acid, MSG, corn flour and skimmed milk
Processing method of ingredients		Boiling, pressing, drying and grinding to small particles; Drying and grinding to small particles; Add directly
Basic product		Soup powder mix
Processing steps	Step-1	Determination of suitable range of gelatin percentages needed to form a cube structure (0%, 12.5% , 25%, 37.5%, 50%)
	Step-2	Determination of most suitable gelatin percentages needed to form a cube structure (5%, 7.5% , 10%, 12.5%, 15%)
Analysis	Cutting strength of soup cube	Measuring of cutting force needed to cut the soup cubes made with different percentages of gelatin and available soup cubes in the market
final product		Comparison and selection of suitable gelatin percentage and preparation of final product
Analysis	Proxim-ate	Evaluation of proximate composition of fish soup cube and similar products in market
	Sensory	Sensory evaluation of tuna soup cube with market products
	Shelf life	Storage trial and Analysis of physiochemical and micro biological changes during storage in room temperature

Results and Discussion

According to the results obtained by texture analyzer strength of the fish soup cube was increased with the increasing gelatin level. Soup cubes without gelatin (0% gelatin) indicated the lowest mean strength of 231.5±0.93 N and unstable texture. Highest mean strength was indicate by 50% gelatin as 266.7 ± 0.96 N. Commercially available soup

cubes recorded the mean strength of 258.7 ± 1.10 N. According to statistical analysis there was no significant difference between the soup cubes made with 5% gelatin and commercially available soup cubes. Therefore 5% gelatin was selected as the best gelatin level for the preparation of fish soup cubes.

According to the results of proximate analysis fish soup cubes contain 31 % of protein, 18.5% of fat, 46% of ash and 3.5 ± 0.22 % of moisture content. Low moisture content of the fish soup cube will increase the shelf life of the product (Kilinc *et al.*, 2009). The samples stored in room temperature have absorbed moisture from the surrounding atmosphere and it has increased the moisture content dramatically with the time up to10.30 ± 0.60 %. TVBN level has increased with time. The increase in TVBN is expected because it is related to bacterial spoilage. Highest TVBN level was observed as 4.7093 ± 0.1683 in the fourth week. However products did not reach the limit of acceptability (35 mg /100 g) with regard to TVBN level. The pH of samples has been decreased with the time. Lowest pH was observed 5.27 ±0.03 in the 4th week. pH level of the samples stored at room temperature maybe decreased due to formation of lactic acid from enzymatic reaction of glycogen in the tissue which decreases the pH value (Love, 1980) or may be due to slight rancidity, which might occur with available moisture. Water activity (a_w) in samples has been increased with the time. Highest a_w was observed as 0.55 ± 0.01 in the 4thweek but it never reached the limit of acceptability (0.6) in regards to water activity of dry soup mixes. Water activity has its most useful application in predicting the growth of bacteria, yeast and mold (Rockland *et al.*, 1980). The initial TPC of fish soup cube sample was 55 Cfu/g, and the initial YMC of fish soup cube sample was 5 Cfu/g. The low initial TPC and YMC indicated very good quality of fish soup cubes. Highest TPC and YMC were recorded at the end of the storage period as 145 and 35 Cfu/g respectively. According to recommended limits of Sri Lankan Standards (SLS) for dry soup mixes, TPC and YMC were observed within the recommended level throughout the storage period (106 CFU/g, 104 CFU/g).

Conclusion

The study revealed that fish soup powder can be converted into cube using 5 % gelatin and shelf life of the product can be extended up to month at room temperature.

References

- FAO, (2014).Nutritional elements of fish. Accessed: 15/04/2014. Available : http://www.fao.org/fishery/topic/12319/en

- Kilinc, B., Cakli, S., Dincer, T., and Tolasa, S. (2009). Microbiological, chemical, sensory, color, and textural changes of rainbow trout fillets treated with sodium acetate, sodium lactate, sodium citrate, and stored at 4 C. Journal of Aquatic Food Product Technology, 18(1-2), 3-17

- Love, R.M. (1980).The chemical biology of fishes,2, Academic press ,London.

- Madhumita, D., Shubhadeep G. and Maheswarudu G.. 2011. Tuna fish waste as an aqua feed substitute at Visakhapatnam, Regional Centre of CMFRI, Visakhapatnam

- Rockland, L. B., and Nishi, S. K.. (1980). Influence of water activity on food product quality and stability. Food Technology (USA)