A study on shelf life of export oriented fresh chilled Yellowfin tuna loins in relation to histamine content

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Introduction

Sri Lanka has become a leading country which produces Yellowfin tuna (*Thunnus albacores*) and other large pelagic species in the Indian Ocean. (Indian Ocean Tuna Commission, 2011). To meet export market, maximum histamine content of the product should not exceed 50 ppm (Food and Drug Administration, 1998). Seafood processing factories guarantee a shelf life of 14 days for the product fresh chilled Yellowfin tuna loin, even though shelf life of different Yellowfin tuna loin batches is varied. Shelf life can be exceeded or not exceeded 14 days in different batches. These batches represent Yellowfin tuna received from different fishing harbors in different proportions. According to the fishing harbor environmental factors and practices followed by fishermen can be varied. There is evident that depending on the nature of the environment, different proportions of decarboxylase positive bacteria would be present in water and external fish tissue, and therefore the level of histamine and other toxigenic amines formed in fish tissue would not be uniform (Yoshinga and Frank, 1982). This research is to identify whether these fishing harbors have an effect on the shelf life of fresh chilled Yellowfin tuna loin in relation to histamine content.

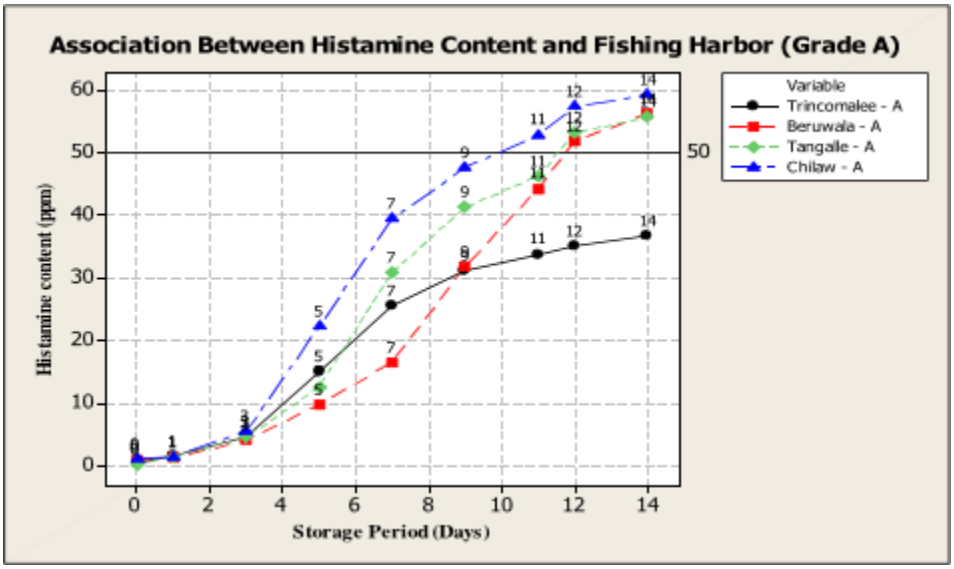
Methodology

The study was carried out at SGS Lanka (Pvt) Limited, Colombo 02. The sample collection and background study of fresh chilled Yellowfin tuna loin exportation was done at Global Seafoods (Pvt) Limited. Three repeated experimental trials on histamine analysis of Yellowfin tuna loin samples were conducted during a time period of 42 days. Storage time period of each set of samples for an experimental trial was 14 days. Selected fishing harbors were Beruwala, Tangalle, Chilaw, and Trincomalee. Yellowfin tuna loins of Grade A and B were selected from each fishing harbor. All collected samples had an on-broad freezing time period, which was varied between 18 - 22 days. Labeled and vacuum packed samples were stored at 0 ^{0}C, in the fresh chilled condition. Histamine analysis was carried out from the time period of zero day of storage to 14 days of storage. Histamine was analysed using flurometric method according to the AOAC official methods of analysis. Data collected from the three experimental trials were analysed using Minitab 14 statistical software. Descriptive statistics of means, Standard deviation, two-way ANOVA and one way ANOVA with tukey's pairwise comparison was applied in analysing the results. A significance level of 5 % was used.

Result and Discussion

Histamine content was increased with storage time period in each and every sample. The increment pattern of Yellowfin tuna loins received from four selected fishing harbors of Grade B did not show any significant difference (P>0.005). It was concluded that there was an effect from fishing harbor on average histamine content of Yellowfin tuna loins within fish grade A (P<0.005). Further analysis of one way ANOVA with tukey's pairwise comparison revealed that Trincomalee fishing harbor had the least contribution for histamine formation.

Figure 01: Association between the average histamine content of Yellowfin tuna loins and



fishing harbor (Grade A – Histamine analysis experiment 1)

According to Figure 01 the shelf life of Yellowfin tuna was varied between 10 to 14 days. Figure 2 revealed a Shelf life of 9 to 10 days in Yellowfin tuna loin samples of Grade B. Higher bacterial loads seemed to be associated with the formation of higher amines in storage (Koutosomanis *et al.*, 1999). Thus this study reveals due to high microbial contamination in Grade B, a significant difference cannot be identified in the pattern of histamine formation of the loin samples received from four different fishing harbors. Furthermore due to high microbial contamination histamine formation was happened at an alarming rate. Fish grading A with the least microbial contamination had shown a difference in histamine formation according to the fishing harbor. It was proven Yellowfin tuna loins received from Trincomalee fishing harbor had the best shelf life in relation to the histamine content with in the "A" grade fish. The reason behind this is histamine formation is highly affected with the amount of microflora and the microbial load that could contaminate a fish would not uniform from place to place, due to factors like environmental conditions, post harvest practices followed by fishermen and fish catching methods.

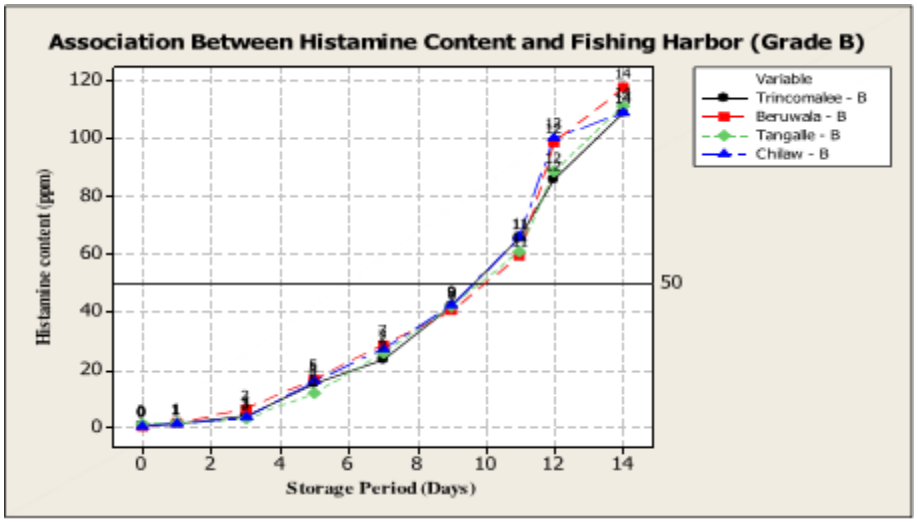


Figure 02: Association between average histamine content of Yellowfin tuna loins and fishing harbor (Grade B - Histamine analysis experiment 1)

Conclusions

Shelf life of fresh chilled Yellowfin tuna loins, in relation to histamine content was highly dependent on the fish grading rather than the conditions of the fishery harbor.

Acknowledgement

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