

## Development of extruded snacks by incorporating shrimp protein powder and hydrolysate

Shrimp processing industries generate large quantities of waste in the form of head waste and shell which quite often becomes a considerable waste disposal problem. The shrimp head waste, which represents about 33% of total weight is presently either converted in to manure or discarded. These wastes are rich in useful biomolecules and nutrients such as chitinous polymers, carotenoid pigment and protein. Protein hydrolysates have many uses in developing specialty foods such as non-allergic infant formula, sports drinks, diet supplement etc. Hydrolysates can be prepared from shrimp head waste by enzymatic hydrolysis and can also be used for food flavouring, colouring and protein enrichment. In modern days there is an ever increasing awareness about health foods. Fish and shellfish are gaining acceptance due to its nutritional and functional properties. A wide range of fish based products are available in the markets. Extrusion cooking is a food processing technique which is used worldwide to transform various ingredients in to ready-to-eat snack products. Different types of cereal flours are mainly used for extrusion processing.

In the present study, shrimp hydrolysate (SH) was prepared from shrimp head waste and shrimp powder was prepared from peeled and cooked shrimp. Further, it was incorporated with cereal flour (rice flour and corn flour) and extruded using twin screw extruder. Extruder conditions maintained were screw speed 350 rpm; barrel temperature 120 °C and the die diameter 2.5 mm. Shrimp hydrolysate and shrimp powder was added to cereal flour at the concentration of 5-10%. Fifteen formulations were made by using mixture response surface methodology.

Proximate composition of shrimp hydrolysate was 4% moisture, 70% protein, 10.97% fat and 11.44% ash on dry weight basis and that of shrimp powder was 7.3% moisture, 77.87% protein, 4.85% fat and 4.58% ash on dry weight basis. The average

moisture content of all the extruded products varied between 4.20% and 4.72% and the average protein content of the extruded products varied between 9.19% and 15.75%. The effect of addition of shrimp hydrolysate and shrimp powder on the colour of extruded snacks revealed that L\* values decreased with increase in addition of SH. Further, an increase in a\* values was observed with addition of SH. Sensory evaluation showed that among the 15 formulations, the four formulations (Table 1 & Fig.1) showed more acceptability by the panelist. Table 1. Ingredient composition of extruded snacks preferred by sensory panel

Sample	Rice flour (%)	Corn flour (%)	Shrimp powder (%)	Shrimp hydrolysate (%)
A	90	-	10	-
B	90	-	5	5
C	22.5	65	7.5	5
D	65	22.5	7.5	7.5

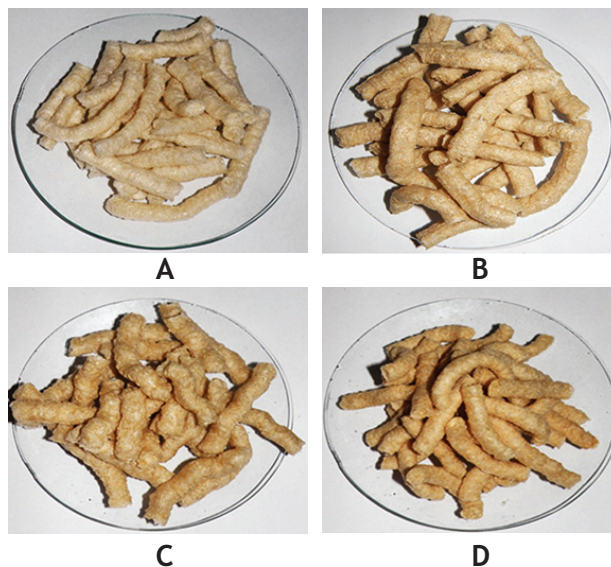


Fig. 1. Extruded snacks preferred by sensory panel

Further, B formulation had higher score than others. It was also observed that addition of shrimp hydrolysate in excess of 5% level reduced the expansion ratio and increased the crispiness.

Results suggested that shrimp hydrolysate and developing protein-rich extruded products without shrimp powder can be used at 5-10% level for affecting sensory characteristics.

**Jeyakumari A., Joshy C.G.\*, Bindu J.\* and Zynudheen A.A.\***

*Mumbai Research Centre of ICAR-Central Institute of Fisheries Technology, Mumbai*

*\*ICAR-Central Institute of Fisheries Technology, Cochin*

---