

SILAGING OF FISH WASTE

Liquefied fish products are being produced by ensilage processed in the Scandinavian and other Western countries for feed, or by traditional "Fermentation", processes in the South East Asian countries for use as Food. The idea of obtaining fish proteins in soluble form by proteolysis has engaged the attention of Research Laboratories during the past couple of decades and has found its climax of concept in the "Biological Procedures" for the preparation of fish protein concentrates for human consumption. Such products although now totally unfamiliar might have a future in India too, if only as a means of utilizing (i) Seasonal surpluses of pelagic fishes especially the oil sardine (ii) The so called trash fishes from the mechanized trawlers (iii) The Elasmobranch fishes obtainable comparatively cheaper (iv) Offal from canning and freezing plants (v) Shrimp wastes from similar plants and (vi) Shark liver residue after oil recovery.

Autolysis

Proteolytic enzymes inherent in fish are distributed in its various parts, potency being variable with part. The proteases of the pyloric caeca, the intestinal mucosa and the stomach are significantly potent in autolysis of whole fish, while in the absence of these enzymes in the eviscerated fish, cathepsins assume importance. The optimum temperature for autolysis is in the region of 30-40°C, the pH optima being in the acidic range for flesh and chiefly on the alkaline side for viscera.

Processes which utilize autolytic degradation of fish generally depend upon some means of preventing undesirable micro-biological (putrefactive) spoilage. In ensilage, sulphuric, formic or the organic acids produced by fermentation of a carbohydrate substrate serve to lower the pH to the acidic side, while in traditional fish sauce production in South East Asia, common salt acts as a preservative.

Ensilage

The process popular in Europe, especially in the Scandinavian countries, consists in storage of fish or fish offal after mincing in sulphuric acid. The mass is held at a pH of 2.5 to 4 for a couple of weeks. Extensive hydrolysis takes place both due to the action of the acid and the pepsin-type natural enzymes of the fish. The protein is degraded to non-protein nitrogen. The silage is neutralized with lime before using in feed formulations.

True ensilage is carried out by mixing together minced fish and molasses and inoculating the mass with a strain of lactic acid bacteria. The pH covers and prevents putrefactive spoilage. The fish autolyse. The resultant autolysate is used as a feed supplement. *Aerobacter*, *Aerogenes*, *Streptococcus*, *Laetis*, *S. plantarum* and other carbohydrate fermenting micro-organisms are used.

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