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Value addition to shrimp waste by developing silage

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Shrimp farming is identified as one of the growing agricultural industries in Sri Lanka. Annual shrimp production is approximately 16,684 tonnes and the estimated waste accumulation is about 8,342 tonnes per annum, which is usually discharged into lagoons or abandoned land without prior treatment and so causes serious environmental problems. Therefore value addition and utilization of shrimp waste is both necessary and urgent. Objectives of the study were, to add value to the shrimp waste generated from the processing industry by developing an acid digested shrimp silage, to evaluate the quality of shrimp waste, and to determine the composition, quality and storage stability of the developed product with the intension of producing an animal feed ingredient.

Quality of the shrimp waste was evaluated by analyzing proximate composition and freshness parameters including Total Volatile nitrogen (TVN), Tri Methyl Amine (TMA) and Tri Methyl Ammonium Oxide (TMAO) content. Optimum concentration, acid type and ratio needed to produce silage were selected after monitoring the pH changes of silage produced by mixing 50 g of waste with different concentrations of formic acid (45 %, 65 % and 85 %) and acetic acid (50 %, 75 % and 99 %) at different acid to waste ratios (10 %, 25 %, 35 % and 50 %). 65% formic acid at 10 % of acid to waste ratio was selected as the optimum condition. A batch of silage was produced following the selected optimum conditions. Proximate composition of the developed product was analyzed. In order to evaluate the storage stability, the degree of hydrolysis, TVN, TMA, TMAO, and pH of the developed product was analyzed at weekly intervals for a period of six weeks.

Proximate composition of shrimp waste was as follows: moisture 76.66 %, crude protein 11.49%, ash 5.13 % and crude fat 4.30 % whereas TVN, TMO TMAO values were 15.35, 10.23, 5.12 mg N/100 g respectively. A significant decline ($P < 0.05$) in protein (10.21 %) ash (4.93 %) and fat (2.70 %) in silage was observed, due to addition of water through acid. During the storage, TVN (23.99 - 45.50 mg N/100g) content of the product continuously increased up to six weeks while TMA (10.41 mg N/100g) and TMAO (3.53 mg N/100g) content were stable throughout the period. pH of the silage was changed from 3.72 to 3.85 showing a similar pattern as TVN. The degree of hydrolysis of the product increased with time. Moisture content of the silage (78.03 %) was stable during the storage period. According to the above findings, freshness of shrimp waste generated from the processing industry complies with the requirements of an animal feed ingredient. A concentration of 65 % of formic acid at acid to waste ratio of 10 % can be used to produce stable shrimp silage.

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