Microbiology in Quality Control: Cockle Depuration in Malaysia

ISMAIL HJ. ISHAK
Institut Penyelidikan Perikanan
Division of Fisheries, Malaysia

Introduction

The cockle industry in Malaysia is considered the largest in the world in terms of production. Cockles contribute about 13% of the total fishery production in 1984 and about 10% in 1985 (Annual Fisheries Statistics Malaysia).

The industry is expanding in terms of new areas being identified for culture. Currently about 4,000 to 5,000 hectares of mudflats along the west-coast of Peninsular Malaysia are being utilised for cockle culture as opposed to 2,085 hectares in 1981 (Ng, 1985; ASEAN Food-Handling Bureau, 1984).

However, this positive trend is in danger of being hampered by adverse reports linking food poisoning, infectious hepatitis and gastro-enteritis to the consumption of contaminated cockles.

Already there appears to be a decrease in demand for molluscs in general and cockles in particular for the past three years.

The Fisheries Department in recognising the problem and in its effort to gain back consumer's confidence, has embarked upon a programme to study the possibilities of purifying cockles prior to sale to the public. A pilot-scale depuration plant was established in June 1986 at the Fisheries Research Institute in conjunction with the ASEAN Food-Handling Bureau. Apart from equipment purchased by AFHB a Consultant was also engaged to help set up the depuration system and initiate bacteriological monitoring of the depuration process.

The Depuration System

The design is based on that described by Ayres (1978) who was also the project consultant. Basically, the system is of the high-density recirculating type utilising ultraviolet lamps as the source for sterilisation.

Prerequisite Studies

The physiological requirements of the cockles in terms of preferred salinity was determined prior to start of the depuration studies.

The same applies for efficiency studies of the ultraviolet lamps.

Bacteriological Methodology

The contamination levels of the cockles were estimated using the Most Probable Number Techniques. However, the culture media and incubation period were modified. Minerals Modified Glutamate Broth (OXOID) and an incubation period of 18-24 hours at 44.5°C were effected.

As for the lamp efficiency studies, Membrane Filtration was used in conjunction with Membrane Enriched Lauryl Sulphate Broth. The incubation period being 18-24 hours at 44.5°C using a water-bath.

Parameters Studied

1. Effect of time on purification.
2. Effect of stocking density on rate of depuration.
3. Effect of processing time on mortality.
4. Effect of handling/transport time on mortality before and after depuration.

Conclusions and Recommendations

Studies show that purification to acceptable bacteriological limits could be achieved within 36 hours.

Cockles to be depurated should be freshly harvested and not more than 1 day old post-harvest to avoid high mortality during and after depuration.

The system has been shown to be able to handle a stocking density of 160 kg/tonne seawater or 37 kg/sq. m. These compare favourably with figures quoted for oysters and mussels, that is, 100 kg/tonne seawater or 30 kg/sq. m.

The extra costs incurred was 3 sen/kg for a 36 hour-run. However, labour costs were not accounted for.

Depurated cockles were shown to survive up to 2 days post-depuration and this would have a bearing on siting of the depuration plant.

It is feasible to locate smaller units in hotels, restaurants and supermarkets within West Malaysia. It is also feasibel for exporters to Singapore and Thailand to establish such units too.

Future Directions

The next logical step would be to set up a purification plant based on the pilot study but on a semi-commercial scale.

Purification studies would be extended to cover other bivalves such as mussels and oysters.

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