OVERVIEW OF A SIMPLE, SYSTEMS BASED APPROACH TO THE REDUCTION OF BLOWFLY INFESTATION OF CURED FISH

by

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ABSTRACT

Insect infestation of traditionally cured fish continues to be an important cause of post-harvest losses in many developing countries and has resulted in the widespread abuse of unsuitable insecticides by fish processors in some areas (Walker, 1987; Esser, 1994). Although, this practice is highly undesirable for both health and environmental reasons, processors are unlikely to change their practices until a viable alternative method of insect control is provided.

This contribution describes a prototype strategy for controlling blowfly infestation in traditionally cured fish in the tropics. Unlike previous programmes of insect control, the strategy is systematic in its approach. This enables the underlying causes of the infestation to be identified and addressed, thereby reducing the long-term need for continuous application of control measures. The flexibility of the systematic approach enables the strategy to be fully transferable between locations, and allows for seasonal variations in the severity of infestation.

INTRODUCTION

Studies have shown that the cause and likely severity of infestation at any processing site, is subject to large variations (Walker, 1988; Esser, 1987; Johnson, 1997). Relying on the use of any single control measure to combat infestation at all sites is therefore impractical. By studying the timing, mode and cause of the infestation relative to each processing step, it is possible to select control measures which are appropriate to the nature of the infestation occurring at each and any site (Johnson, 1997; Johnson and Esser, 1998). As socio-economic considerations can be taken into account when control measures are selected, the limitations which hindered the uptake of previous non-insecticidal control measures may be overcome.

THE CONTROL STRATEGY

The strategy follows a logical system of control based upon the prevention of infestation "risk factors". These risk factors are associated with the processing practices being followed and the external conditions at the site, and are known to influence the level and occurrence of blowfly infestation in traditionally cured fish (Johnson and Esser, 1998).

HOW TO APPLY THE CONTROL STRATEGY

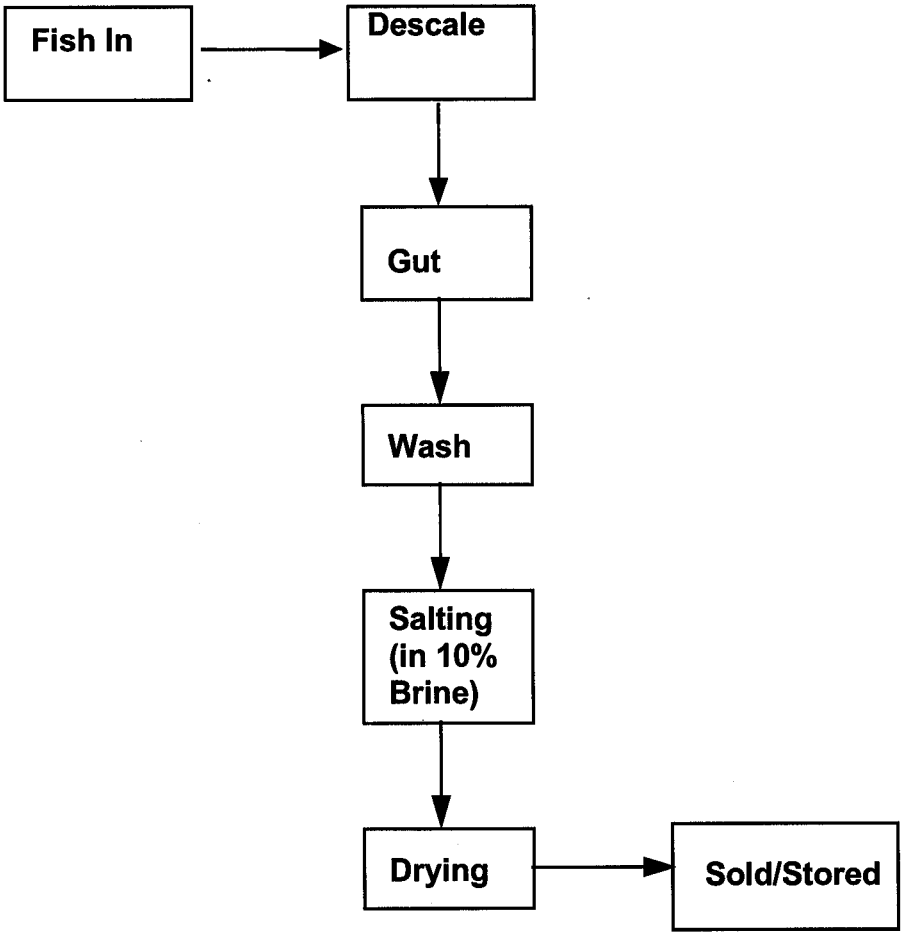
The strategy is implemented by considering the curing process systematically, from the receipt of the raw fish, through processing to the dispatch of the finished product. This takes the form of an audit conducted at the processing site, comprising 5 steps:

1. identify the processing sequence;
2. determine the timing and mode of infestation relative to the identified processing steps;
3. consider which processing risk factors may be influencing the infestation;
4. consider which external risk factors may be influencing the infestation;
5. select control measures appropriate to the circumstances of the infestation at the site.

By separating the process into discrete stages, it is possible to quantify the severity of the infestation at each infestation point. This enables the processor to prioritise where the application of control measures is most critical to the reduction of blowfly related losses at his/her site.

THEORETICAL APPLICATION OF THE STRATEGY

Example Flow Diagram for the Production of Salted, Dried Fish



APPROPRIATE CONTROL MEASURES

Fish In:

1. a) hold fish in ice and process ASAP
   b) where possible, only process fresh fish
   c) if spoiled fish must be processed, grade the fish for freshness then separate each grade during processing.
2. a) always follow good hygienic practices. Wash hands and knives regularly, and stack fish on clean surfaces, raised off the floor.

Preparation:

1. a) all fish waste should be collected and disposed of away from the site (see above)
   b) in some areas, there may be a market for the fish waste for conversion into poultry feed or fertilizer.

Salting

1. a) fly-proof lids should be fitted to all salting tanks
   b) if tanks or boxes are not available for dry salting, netting should be erected over the stacks of fish to prevent blowflies from gaining access
2. inspect all fish prior to brining. Any which are found to be infested should either:

- have the eggs and larvae manually removed
- be thoroughly washed under clean running water to wash off any eggs or larvae present
- try to minimize the level of infestation by applying large amounts of salt to the infested areas. This measure will not be effective if larvae have already burrowed into the flesh
- be processed separately from non-infested fish and losses in these fish accepted.

Drying

1. a) fly-proof netting should be erected over areas where fish are to be dried.
   b) if the level of oviposition is not high, eggs can be manually removed from the fish
   c) applying large amounts of salt to areas where eggs are likely to be deposited may deter oviposition
   d) whenever possible, fish should be dried on raised racks constructed of an open material which will allow air to circulate beneath the fish
   e) turn fish regularly to increase the rate of moisture loss from the underside of the fish
   f) where fish must be dried upon the ground, clean concrete is the most suitable surface
   g) never dry fish upon sand or loose earth as larvae can burrow into the ground in such areas to escape the intensity of the sun, and to pupate, thus sustaining the blowfly population at a site.
2. a) fish should never be overlapped during drying
   b) infested fish should be discarded or dried away from the other fish
   c) ensure the surface on which the fish are to be dried is free of larvae and debris containing eggs or larvae.

CONCLUSIONS

The strategy described offers processors of traditionally cured fish a flexible and sustainable way to control blowfly infestation in their product. By providing processors with the means to select control measures appropriate to the particular circumstances of infestation at their site, a high level of control should be achieved. Furthermore, the underlying causes of the infestation will be tackled thereby reducing the need to apply some control measures over time. Prioritizing where control is most needed, and, where available, offering a choice of effective control measures, processors will be in a position to adopt those measures applicable to their particular socio-economic circumstances. In this way, the economic limitations which hindered the application of previous control measures may be overcome.

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