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Experiments with Pandalus sorting machines at Iceland

by

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Abstract

This paper reports some of the results of experiments with two types of shrimp sorting machines carried out in Ísafjarðardjúp and Húnaflói during 1972/73. The hopper sieve and the rotary sieve are both designed to separate a mixed catch of shrimps into two size categories - marketable and small - on the basis of body thickness.

Survival rate of small shrimps rejected by the sieves is seen to be relative to a) the time of air exposure on deck prior to sieving, b) duration of hauls and c) size of catch. Observed survival rate varied from over 90% down to less than 60% with increase in these parameters. Moreover, the survival rate of sieved "smalls" was found to be only 2% lawer than that of control samples taken from the catch prior to sieving. It is therefore assumed that shrimp

mortalities are mostly the result of damage sustained before sieving.

The separation of shrimps into the two size categories, marketable and smalls, was found to be effective by both machines and only a relatively small amount of small shrimps was retained with the market catch, or 18-22% by number. The amount of large shrimps rejected with the "smalls" back to the sea proved to be 12-33% by number.

Introduction

According to producers of peeled frozen shrimps a very considerable proportion of shrimps up to 17 mm carapace length pass between the rotating cylinders of the peeling machines and are disposed of at the best of times for meal production. The reason for this is the difficulty in adjusting the cylinders to a mixed catch of small and large shrimps, resulting in the "smalls" passing through with the waste.

A study made of the Arnarfjörður shrimp fishery in April 1972, showed that 29% by weight of the month's catch was made up of shrimps less than 17mm carapace length and no less than 57% by number of individuals. Mortalities of small shrimps were therefore very considerable, not to mention the addititonal dilemma of a considerable proportion of the smaller shrimps being completely wasted.

As a possible solution to the conservation of young shrimps some trials of shrimp sorting machines were carried out in Ísafjarðardjúp and Húnaflói during 1972/73. This paper reports the results of some observations made during this work.

The sorting machines

The hopper sieve is designed to separate a mixed shrimp catch into two size categories (marketable shrimps $>$ 16 mm carapace length; small shrimps $\leq$ 16 mm carapace length), on the basis of body thickness. The larger shrimps are retained by the sorting grid, whose "mesh-size" is adjustable, and fed straight into boxes for landing. Small shrimps

pass between the rods and are returned to the sea in a flow of sea-water.

The rotary sieve consists only of one rotating cylinder and is designed to separate a mixed shrimp catch into two categories on the basis of body thickness as described above. The larger shrimps are retained by the cylinder rods and fed into boxes for landing, whereas small shrimps are returned to the sea in a flow of sea-water. The constant flow of sea-water during sorting serves the dual purpose of cleaning the landed catch and minimizing damage to small shrimps returned to the fishery.

Neither machine was built to cope with the sorting of the by-catch, although certain alterations in design could be made for that purpose.

Survival rates of shrimps

Figure 1 shows the % survival of small sorted shrimps plotted against time of air exposure. Survival rate decreases from 80-90% at 15 min. air exposure, to 60-70% at 45 min. air exposure, depending also on the duration of hauls and size of catch. 15-45 min. is considered sufficient time to sieve most hauls of shrimps, as 600-800 kgs can be sorted per hour. Although no difference was observed in survival rates at air temperatures ranging from ÷ 7°C - + 5°C, extremes in temperatures are likely to increase mortalities of shrimps at least near the surface of the heap on deck and thus in closest contact with the air.

In Figure 2 the % survival of small sorted shrimps is plotted against the combined effect of haul length and size of catch, designated by length of tow x catch.

Comparison of the two sorting machines gave no indication of a difference in survival rates of small shrimps by the two sieves.

In some experiments with the hopper sieve, the survival rates of control samples prior to sieving as compared to sieved small shrimps were studied. These showed average survival rate of 82% in control samples compared with 80% for the sieved "smalls".

It can therefore be safely assumed that shrimp mortalities were likely the result of damage sustained before sieving rather than from the use of the sorting machines themselves.

Separation of shrimps

Figure 3A shows the length frequency distribution of samples of P. borealis retained by three trawls with varying mesh-sizes, i.e. 30, 35 and 38 mm mesh. Although a considerable decrease is seen in the proportion of small shrimps with increased mesh-size (shaded histograms) the percentage is still relatively high even with the largest mesh, or 43% by number, as compared to 51% with the smallest mesh. Figure 3B shows length frequency distribution in the hopper sieve trials, in which the catch prior to sieving had 52% "smalls", sieved market catch had 18% "smalls" and small shrimps returned to the sea had 67% "smalls". The corresponding percentages for the rotary sieve (Figure 3C) were 54, 22 and 88%.

Relatively few small shrimps were thus retained in the marketable catch or 18% (hopper sieve) and 22% (rotary sieve). The number of large shrimps rejected with the "smalls" to the sea were 33% (hopper sieve) and 12% (rotary sieve). It is thought that the difference observed with the two sorting machines may be linked with the initial length distribution of the samples, rather than reflecting different performances of the two sieves.

Figure 1. The relationship between % survival of sieved "smalls" and time of air exposure. The effect of duration of hauls and catch is also shown.

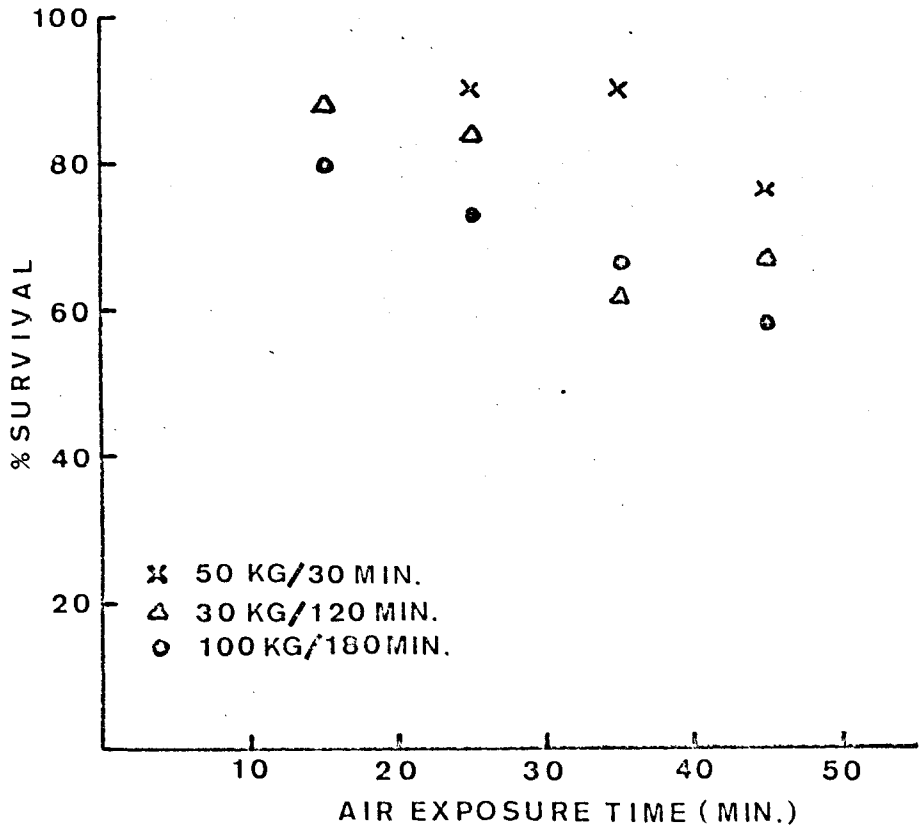

Figure 2. The relationship between % survival of sieved "smalls" and increasing units of duration of haul x catch. The effect of varying air exposure times is also shown.

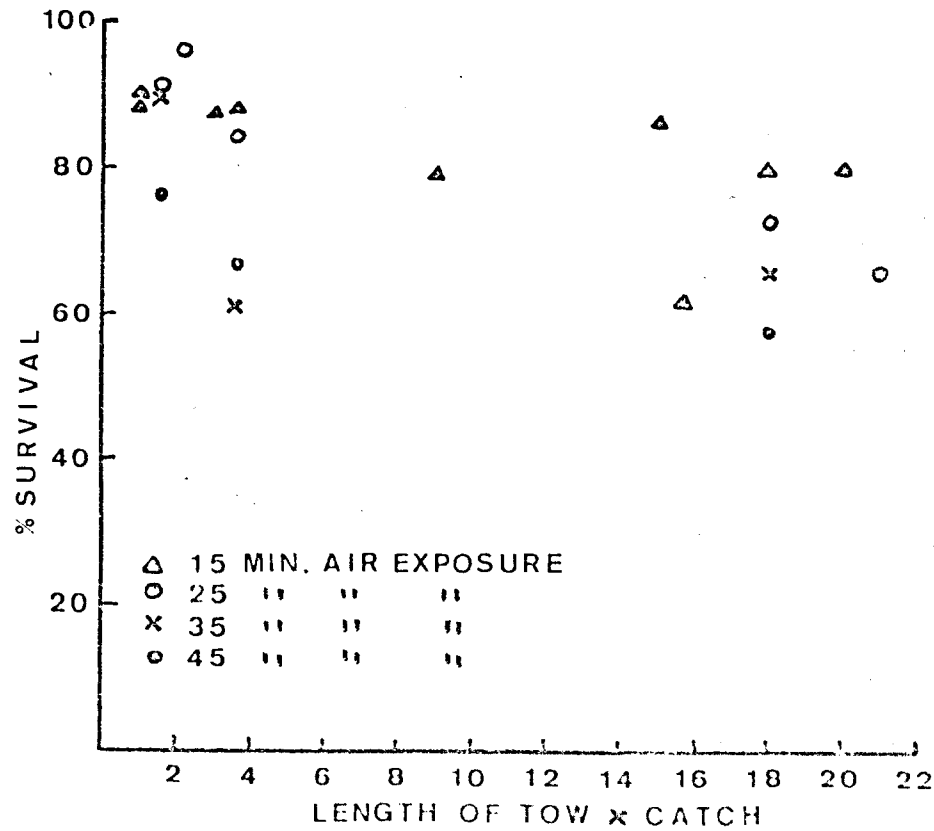

Figure 3. The length frequency distributions of samples of Pandalus borealis retained by 30, 35 and 38 mm mesh-sizes (A). The length frequency distributions of samples prior to sieving, sieved marketable and sieved "smalls" in the hopper sieve trials (B). The length frequency distribution of samples prior to sieving, sieved marketable and sieved "smalls" in the rotary sieve trials (C).