

**Cuttlefish Quality  
and  
Handling Trials**

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**Seafish Report No. 465**

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Revised April 1996

# **The Sea Fish Industry Authority**

## **Seafish Technology**



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Seafish Report No. SR465

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January 1996 (rev April 1996)

### **Cuttlefish Quality and Handling Trials**

#### **Summary**

In conjunction with the Marine Technology department's cuttlefish capture trials, the Fish Technology department conducted trials to investigate factors affecting cuttlefish quality. The trials studied the effects of both icing delay and gutting delay upon cuttlefish quality. Although the extent of the trials was limited they showed that cuttlefish spoil rapidly if not chilled and that even a short delay of 6 hours between bringing them aboard and icing has a significant effect on quality. The gutting delay trials have showed that the gut membrane of the cuttlefish is very strong, and for cuttlefish stored from capture at chill temperatures, it takes approximately 9–10 days before this membrane weakens, ruptures and effects the cuttlefish's quality. Some damage to cuttlefish was noted, caused by certain capture methods used, especially pots.

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## 1. Introduction

In May and June 1995, in conjunction with the Marine Technology department's cuttlefish capture trials, the Fish Technology department conducted a small series of trials to investigate factors affecting cuttlefish quality. The aim of these trials was to determine the effects of both icing delay and gutting delay upon cuttlefish quality.

Prior to the trials a preliminary study was carried out to determine if the Torry fish quality scoring scheme for cooked squid was applicable to cuttlefish (see Table 1).

**Table 1 - Cooked squid Torry fish quality score scheme**

Score	Cooked flavour of squid	Days in ice (ungutted)
10	fresh, characteristic of shellfish, sweet, meaty	6-8
9	slight loss of freshness, creamy, sweet, meaty, metallic	
8	slightly sweet, slightly meaty, creamy, milky	
7	no sweetness, caramel	
6	neutral	8-10
5	slightly sour	
4	sour, musty, cabbage	
3	slightly bitter, overripe cheese, oily, slight sulphide	13-14
2	bitter, sulphide	
1	strongly bitter, putrid	

It was found that the flavour changes in cuttlefish matched those of squid and so the scheme was used.

## 2. Methodology

A number of sea trips were made from Hastings to observe capture and handling and to identify if changes in handling practices at sea are necessary and would be practical. The vessels were under 12 metres in length, of wooden construction and worked by a skipper and two crew. Hastings has no quayside for the vessels to moor alongside, so vessels are worked off the beach. The vessels are launched with the aid of a tractor. At the end of the trip the vessels are hauled back up the beach by an onshore winch.

Cuttlefish were being caught by tangle nets and pots, as part of the Marine Technology department's cuttlefish capture trials (see Figure 1). The normal practice was to store the cuttlefish, ungutted, in plastic fish boxes on the deck of the vessel with no icing or further protection applied (see Figure 2). The cuttlefish were iced when the vessels came ashore, usually after 6-8 hours (see Figure 3).

It was concluded that two parallel series of trials should be carried out, to establish the effect of delays in both icing and gutting.



Figure 1 - Untangling  
a cuttlefish from a net on a Hastings boat

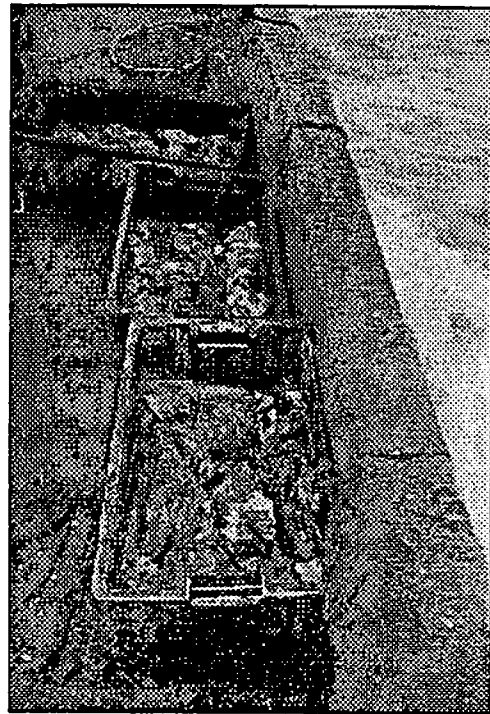
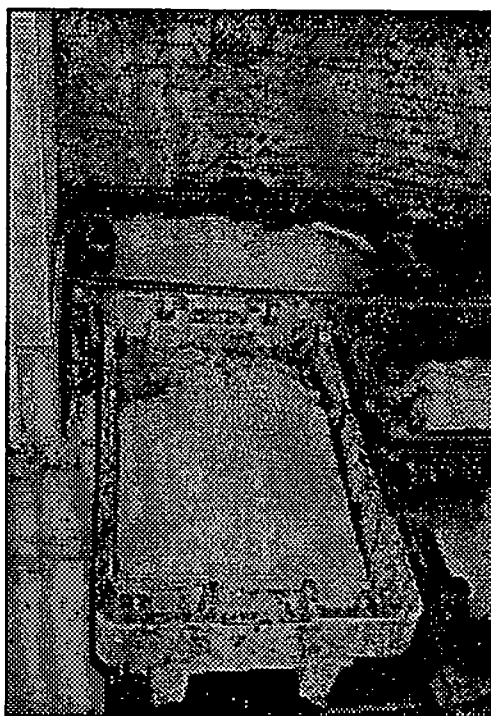


Figure 2 - Uniced cuttlefish on vessel



**Figure 3 - Cuttlefish iced on Hastings fish market**

Ice was taken to sea for the trials. Cuttlefish samples were taken and some were immediately iced, others were stored at ambient temperatures, 12–18 °C, for various time periods of 6–36 hours. Some cuttlefish that were immediately iced after capture were gutted after various delays of 1–12 days to determine what impact this had upon their quality. All the samples were brought back to the Seafish Fish Technology laboratory in Hull, where they were stored on ice for up to 16 days after capture, during which time a taste panel carried out standard Torry cooked fish quality assessments at regular time intervals.

### 3. Results

#### 3.1 Icing Delay Trials

The Torry cooked fish flavour scoring system is a commonly used indicator of fish quality and useful storage life. The end of the useful storage life of a product is usually defined commercially as when the flavour falls below neutral and off flavours start to develop. This is generally when the Torry score falls below a score of 6, as is the case with cuttlefish. The results are detailed in figure 4 overleaf. These show a deterioration in fish quality, as measured by the Torry score, as the time delay before icing increases. Most striking is the difference between the directly iced, 0 hour, and the 6 hour delay samples. Here a 1 Torry point difference is evident a day after capture and this difference is maintained right through to 16 days after capture. The useful storage life of the directly iced samples is 16 days compared to only 12 days from the 6 hour delay samples. This equates to a 3–4 day shelf-life difference caused by only a 6 hour delay in icing.

#### 3.2 Gutting Delay Trials

The gutting delay trials were carried out by comparing cooked flavour scores, as measured by the Torry scoring scheme, from different gutting delays, at various time intervals after capture. The results are detailed in Table 2. The left hand column shows the days elapsed since capture when the samples were assessed, the middle column shows the days between capture and gutting and the right hand column shows the quality scores. The data of importance is that where a significant difference in quality score emerges between two samples assessed on the same day since capture but with different gutting delays. This does not appear until 14 days after capture, where there is a two point quality difference between cuttlefish gutted after 9 days and after 12 days. These findings are confirmed by the samples assessed 16 days after capture.

**Table 2 - Gutting delay results**

Days in iced storage since capture	Gutting delay ( days)	Torry cooked flavour score
5	1	9.5
5	5	9.5
7	5	8.5
7	7	8
8	4	8.5
8	7	8.5
9	7	8.5
9	9	8.5
14	9	7
14	12	5
16	9	5.5
16	12	4.5



# The effect of icing delay on ungutted cuttlefish and the deterioration in quality over time on cooked flavour scores.

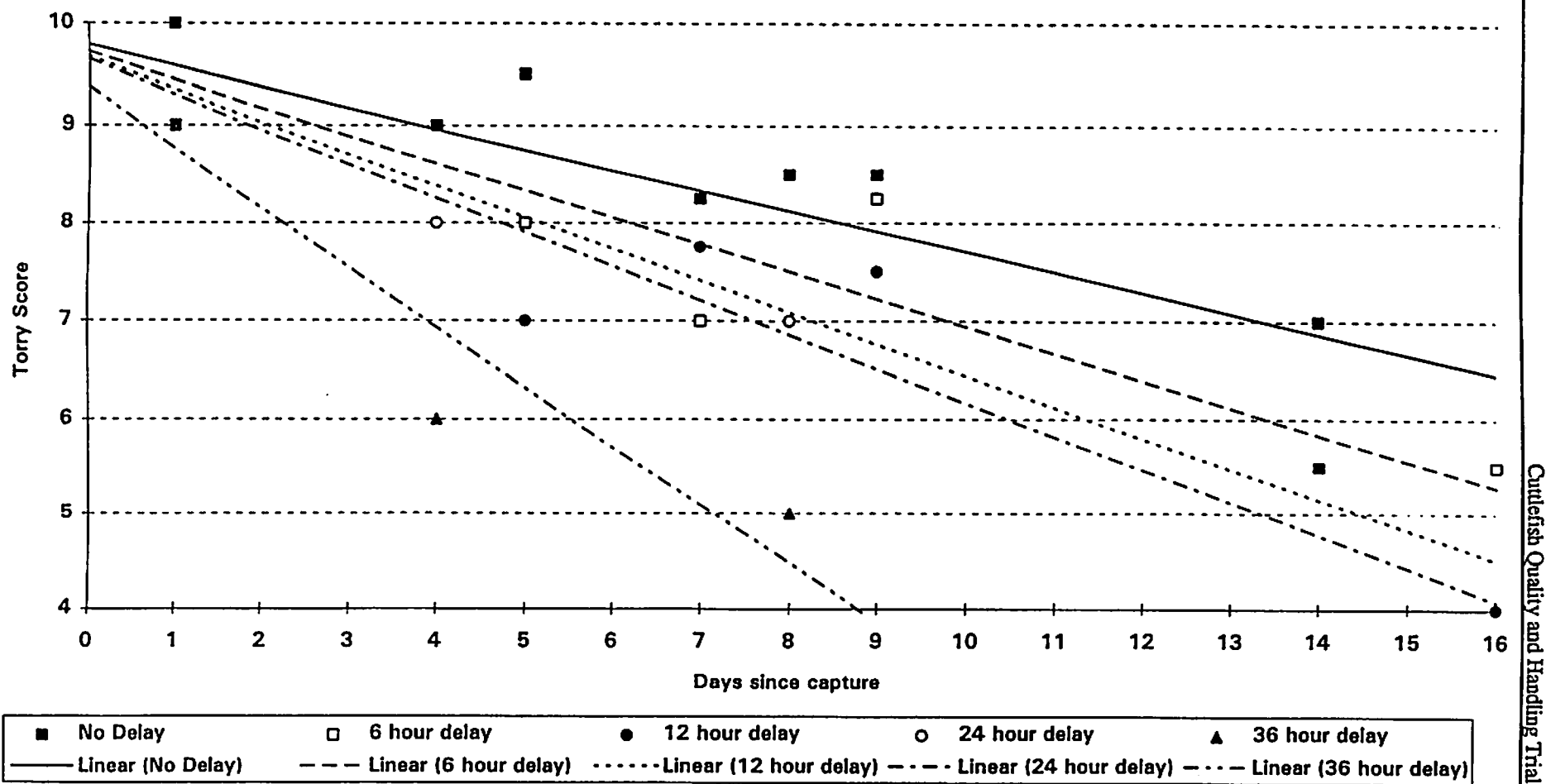


Figure 4 - The effect of icing delay and the deterioration in quality over time on cooked cuttlefish flavour scores

### 3.3 Fishing Vessel Observations

Some physical damage was caused to the cuttlefish by both fishing methods used, tangle netting and potting. Cuttlefish taken from tangle nets had surface abrasion to the skin from the netting, though this was not severe and should not affect the end product. Potting resulted in some badly damaged cuttlefish (see Figure 5). Underwater video film showed some of the cuttlefish colliding the posterior end of their body against the side of the pots.

Cuttlefish handling on the vessels was limited to placing the cuttlefish into fish boxes for storage. Washing of the cuttlefish causes problems of the water becoming contaminated with the black cuttlefish ink and staining the vessel deck or fishhold. Due to the complicated anatomy of cuttlefish, gutting at sea is not a viable option.



Figure 5 - Pot damage to cuttlefish

## 4. Discussion

Cuttlefish are prone to rapid spoilage if not chilled immediately after capture. However a problem may occur if ice is used as the melt water becomes contaminated by the black cuttlefish ink and causes staining of the vessel's fish room or deck. Contaminated bilge water pumped overboard in port may also cause a problem. On large vessels with refrigerated fishholds, storage of cuttlefish without ice in the fishhold may be acceptable, but cannot be considered as a direct substitute for ice which results in more rapid and effective chilling. To maintain cuttlefish quality on smaller vessels there is no alternative but to use ice. However, at Hastings and possibly at other small ports or landing areas, there is a difficulty in taking ice onboard vessel due to the lack of a quayside. If required, boxes of ice have to be carried over the beach and then hand hauled up onto the vessels prior to sailing.

Apart from icing the cuttlefish, it was evident from the sea trips and these trials that any other handling operation onboard vessel is not feasible or necessary. The gutting delay trials have shown that the gut membrane of the cuttlefish is very strong and for cuttlefish stored from capture at chilled temperatures it takes approximately 9–10 days before this membrane weakens, ruptures and effects the cuttlefish's quality. Gutting cuttlefish is not a simple operation. The process is essentially filleting with the gut removed at the same time. The cuttlefish is separated into a

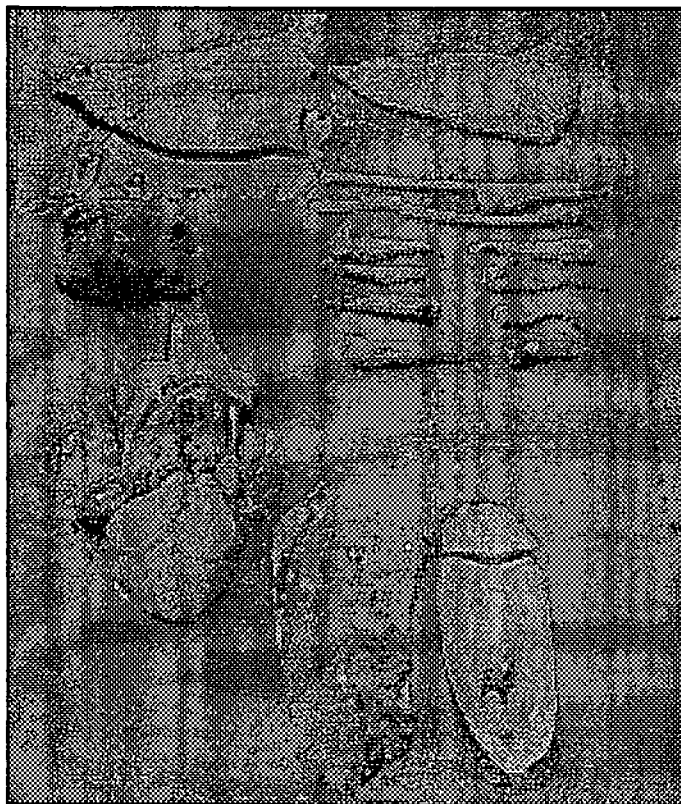


Figure 6 - Cuttlefish filleted

number of components: the mantle, tentacles, head, guts, skin and cuttlebone (see Figure 6). This processing is not suited to a fishing vessel environment. In addition, the washing of the ungutted cuttlefish at sea is not recommended as this exacerbates the ink problem.

It was evident from the sea trips that some damage to cuttlefish is being caused by the capture methods used, especially the pots. Further assessment of the effects of fishing gear upon cuttlefish quality is necessary to fully assess the extent of the problem .

## 5. Conclusions and Recommendations

This report is based on the findings of a small-scale series of trials. Although the major findings seem clear, this should be borne in mind when considering the weight which can be attached to them. Ideally further trials should be carried out to provide confirmation.

The conclusions and recommendations derived from these trials are:-

1. Cuttlefish should be chilled as soon as possible after bringing aboard as they spoil rapidly if not immediately chilled.
2. During the trials, ungutted cuttlefish rapidly chilled after bringing aboard had a useful storage life of about 16 days, this reduced to 13 days with only a 6 hour delay in chilling after bringing aboard.
3. Washing and icing may cause practical problems due to ink running off from the cuttlefish.
4. Gutting at sea is not considered necessary or practicable but to minimise quality loss, chilled cuttlefish should be gutted within 9 days of capture.
5. The Torry fish quality scoring scheme for cooked squid was considered to be applicable to cuttlefish.
6. The capture methods, particularly potting, resulted in some damage to the cuttlefish but further work is required to determine the extend of this.