NOTE: II

COMMERCIAL STUDIES ON RADIATION PRESERVATION OF FISH AND SHELL-FISH IN CANADA*

Considerable work has been carried out at Fisheries Research Board Laboratory, Halifax on radiation preservation of certain species of fish and shell-fish, on laboratory scale, results showing promise (Power *e . al* 1964 A & B). These studies were followed up by testing the results under commercial conditions with the co-operation of a local fish producer and the Atomic Energy of Canada Ltd. Haddock, two varieties of flounders (Yellow Tail flounder and American Plaice) and scallop were chosen for these experiments.

Fish fillets or scallop meat were packed in 6 *lb* wooden boxes lined with parchment paper, and irradiated in mobile Co-60 source (Atomic Energy of Canada Ltd.) at room temp. Flounder fillets and scallops were exposed to 75, 150 and 225 Krad doses while haddock fillets were exposed to 50, 100 and 200 Krad. Unirradiated samples, packed similarly, served as controls and frozen samples were used as reference. One box from each treatment was immediately taken in ice to laboratory for assessment of quality using bacterial counts, TMA content and organoleptic scores. Rest of the treated and untreated boxes were shipped in ice in refrigerated box car to Montreal city (900 miles) and back to Halifax. Boxes were re-iced in the transit when necessary. Time lapse in transit normally was 40 to 44 hrs. In the laboratory, samples stored in ice were analysed twice a week. The results of the different experiments are summarised in this note.

Yellow Tail:

Irradiation reduced the initial bacterial load in proportion to dose. The growth rate, after a small lag phase, was faster in irradiated fish than that in the unirradiated fish. TMA formation was quite low in irradiated fish throughout the storage period. Irradiated fish remained organoleptically acceptable for 4-5 days longer than the controls, but the initial quality, as judged by organoleptic score, suffered to some extent. 75 Krad and 150 Krad were equally effective in extending the shelf-life but, gave more acceptable product than at 225 Krad which induced greater changes in taste, texture and flavour. 75 Krad with the least effect on texture and flavour seemed to be the optimum dose for irradiation.

American plaice:

Number of bacteria and rate of their growth were very low in the irradiated American plaice till the time of their rejection by the taste panel. TMA formation in the fish was considerably slowed down at all dose levels. Irradiated

*These studies were carried out at Technological Laboratory of Fisheries Research Board of Canada, Halifax, Canada, during author's visit under Colombo Plan Scholarship.

American plaice was preferred to unirradiated fish by the taste panel and scored higher in taste and overall grade even from the first day. It is known that plaice is the one fish which improves in flavour on storage. So irradiation seems to have the desirable 'ageing' effect on the fish. Textural changes were slight but desirable since, the fish otherwise is slightly more soft than desired. Extension in storage life was of the order of 2-3 days at 75 Krad, higher doses having no further advantage.

Scallops:

In scallops, initial bacterial counts were lowered by irradiation in proportion to dose. Bacterial growth rate, while unaffected by 75 Krad, was slowed down by 225 Krad. In samples irradiated at 150 Krad bacterial growth increased after initial slow period. At the time of rejection by taste panel, irradiated scallops had lower counts than the spoiled untreated scallops. TMA formation was almost stopped by 150 and 225 Krad doses while at 75 Krad it was only slowed down. Radiation odours were not generally noticed in irradiated scallops, but undesirable changes in texture and flavour did occur at higher doses. Organoleptic gradings indicated one week's extension in storage life of scallops irradiated at 75 and 150 Krad. At 225 Krad samples were rejected much earlier due to radiation induced undesirable changes. Optimum dose therefore was again 75 Krad although the extension in storage life obtained in laboratory studies (Power *et. al*, 1964A) was 2 to 4 times greater than that observed in commercial trials.

Haddok fillets:

Irradiation of haddok fillets resulted in lower bacterial counts, proportional to dose. When rejected, irradiated fillets had lower bacterial counts than those of controls at the same stage of spoilage. TMA production was slowed down by irradiation. Irradiation flavours were slight to moderate in samples exposed to 100 and 200 Krad. 200 Krad induced many undesirable changes in flavour and texture. On the basis of organoleptic scores a dose of 50 Krad extended the shelf-life of this fish by 3 days while 100 and 200 Krad doses extended by 6 days. 100 Krad was therefore, considered as an optimum dose. However, in laboratory studies a dose of 75 Krad gave 13 days extension in the shelf-life of haddock fillets (Power *et. al*, 1964 B).

These studies revealed that the extension in shelf-life obtained by irradiation under commercial conditions would be much less than that realised under laboratory conditions. To get the maximum benefit of radurization it is therefore essential to adhere to proper handling and transportation methods.

REFERENCES

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Britannia Sea Foods,
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