Adoption of Recommended Quality Control Practices by Fish Processing Factories

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Responses to mailed questionnaires from 31 fish processing factories revealed that for 55 recommended practices in quality control, the percentage of adopters varied from 21.43 to 100. The adoption index was not correlated to any of five variables studied. The mean adoption index did not differ significantly between five other criteria related to fish processing. Rate of rejection or reprocessing at the factory itself was highly correlated with the amount of water used per tonne of processed material.

The fish processing industry in India is mostly export oriented and therefore, quality control forms a very important aspect of it. As a result of several studies, many recommendations have been formulated for the hygienic production of fishery products (Iyer *et al.*, 1966; Pillai *et al.*, 1969; Chaudhuri *et al.*, 1970; Mathen *et al.*, 1970; Iyer *et al.*, 1970; Iyer *et al.*, 1973; Iyer, 1973a, b; Iyer *et al.*, 1974; Iyer *et al.*, 1975; Prabhu *et al.*, 1976). As a result of these studies and related training programmes, technologists, managers and others working in fish processing establishments have been exposed to these recommendations. The present study seeks to report the extent of adoption of these recommendations under factory conditions.

Materials and Methods

In early 1986, mailed questionnaires were sent to the technologists of all known fish processing factories in India. The questionnaires solicited information on the adoption of 55 recommended practices and related information. Responses were received from 31 fish processing factories.

Results and Discussion

Table 1 shows the percentage of adopters of the 55 recommended practices. It is seen that the values ranged from 21.43 to 100. Obviously, there are some difficulties in the implementation of many of these recommendations. These need to be studied

Table 1. *Extent of adoption of recommended quality control practices*

	Name of practice	% adopters *
1.	The floor of the processing hall should be smooth and cemented	100.00
2.	The shape of the processing hall should be such that water always flows to the drain	100.00
3.	The construction of the roof of the processing hall should be such that dirt and dust accumulate to the minimum	96.77
4.	The floor-wall joints should be rounded	77.42
5.	The wall should be cemented and well-polished to a height of at least 4 ft. from the floor	87.09
6.	The roof wall joint should be tight	100.00
7.	All doors and windows should be fitted with fly control nets	100.00

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Table 1. (Contd.)

8.	The drainage channels should have grills of suitable mesh size to prevent entry of rodents	96.77
9.	The doors should be of self-closing type	96.77
10.	There should be sufficient ventilation in the processing hall	96.77
11.	The light bulbs over the processing table should be protected	96.77
12.	The water front should be at least 10 ft. away from the unit	84.00
13.	The lavatories should be situated away from the plant	93.55
14.	The doors of the lavatories should not open into the processing hall	90.32
15.	The main doors of the lavatories should be of the self-closing type	74.19
16.	The gutters should have rounded bottom	73.33
17.	The ground should be well-drained	96.77
18.	The utensils for handling raw material and processed products should be separate	87.09
19.	All the food contact surfaces should be smooth and free from pits and crevices	96.77
20.	The food contact surfaces should be of non-absorbent type	96.77
21.	Enamelled or wire-meshed utensils should not be used	63.33
22.	The utensils used for waste materials should be separately identified by some marks or colour	83.87
23.	Before starting each day's work, all the utensils should be cleaned with a detergent and adequately sanitized by chlorinated water	96.77
24.	The above procedure should be followed after finishing each day's work also	96.77
25.	In the operations for (23) and (24) above, the chlorinated water used should have a strength of 100 ppm	31.03
26.	The equipment should not be corroded	100.00
27.	The raw material should be stored away from the processing hall and not inside it	72.41
28.	The glaze water should be precooled	100.00
29.	The glaze water should be precooled to a temperature of 1°C	21.43
30.	The glaze water should be chlorinated	96.43
31.	The glaze water should be chlorinated to a residual level of 5 ppm	82.14
32.	The water used for processing should be chlorinated	90.32
33.	The water used for (32) above should be chlorinated to a residual level of 10 ppm	43.33
34.	Chlorine level indicating paper should be used for adequately chlorinating the water for processing	82.76
35.	Ice should be prepared from chlorinated water only	83.33
36.	The factory workers should wear clean overalls and head coverings	96.77
37.	Before starting the work, the workers should wash their hands from elbow down using soap	96.77
38.	(37) above should be followed by disinfection using chlorinated water	80.65
39.	The level of chlorination in (38) above should be 100 ppm	31.03
40.	The process (37 to 39 above) should be repeated each time the workers leave the processing hall and return for work again	80.00
41.	Spitting in the premises should be prohibited	96.77
42.	Use of tobacco in the premises should be prohibited	93.55
43.	A person known to be affected with a communicable disease should not be permitted to work in any area of the unit	100.00
44.	Workers with some injury in their hands should not be allowed to handle the material	100.00
45.	The workers should be got examined medically	93.55
46.	(45) above should be done at an interval of every 3 months	41.94

Table 1. (Contd.)

47. Adequate advisory posters showing the importance of hygiene should be exhibited in the processing hall	66.67
48. A sanitary survey of the factory should be conducted	96.67
49. (48) above should be done every 3 months	70.37
50. The cold storage should be maintained at a constant temperature of–20°C	58.06
51. Insecticides and such other toxic materials should be kept under lock and key	90.00
52. Toxic substances like insecticides etc. should be handled only by properly trained personnel	93.33
53. The lavatories should be disinfected daily	60.00
54. During plant operation, the waste material should be frequently removed from working areas	100.00
55. The top of the processing table should be made of non-corroding and non-reacting material	96.77

* n = 31, but there were a few cases of non-response in some practices.

Table 2. *Means and standard deviations of six variables connected with quality control recommendations*

Variables	n	Mean	S.D.
1. Adoption index	31	84.48	7.39
2. Average no. of samples examined per week	24	58.08	54.56
3. Rate of rejection or reprocessing at the factory itself (samples per tonne)	18	0.15	0.55
4. Average quantity of raw material handled per day (tonne)	31	3.88	3.75
5. Water used per day for processing ('000 litres)	28	15.39	21.71
6. Kilolitres of water used per tonne of processed material	28	8.28	18.44

Table 3. *Correlation coefficients between six variables connected with quality control recommendations*

Variables	X_1	X_2	X_3	X_4	X_5
1. Adoption index (Y)	–.03	.16	.11	.–11	–.18
2. Average no. of samples examined per week (X_1)		–.07	–.01	–.32	–.25
3. Rate of rejection or reprocessing at the factory itself (samples per tonne) (X_2)			–.25	.02	.83**
4. Average quantity of raw material handled per day (tonnes) (X_3)				.10	–.22
5. Water used per day for processing ('000 litres) (X_4)					.79**
6. Kilolitres of water used per tonne of processed material (X_5)					

** significant at 1% level

Table 4. *Difference in mean adoption indices of various categories of respone to different questions*

Question and category	Mean	S.D.	N	t
1. Do you have a separate quality control laboratory?				
a. Yes	83.78	8.33	20	
b. No	85.77	5.01	11	–0.70
2. Is your plant under self certificate scheme or any other similar scheme?				
a. MIPQC	83.61	7.00	14	
b. IPQC	85.20	7.61	17	–0.58
3. Is your technologist trained in quality control of fishery products?				
a. Yes	84.18	7.54	29	
b. No response	88.88	0.21	2	–0.85
4. Do you experience electric power failures?				
a. Often	79.09	6.99	3	
b. Sometimes	84.09	7.19	24	(See '6'
c. Never	90.91	3.40	4	below)
5. Do you experience shortage of ice?				
a. Sometimes	82.58	8.58	15	
b. Never	86.27	5.48	16	–1.39

6 The t value for response categories a and b is 1.10, for b and c is –1.80, and for a and c is 2.49. None of the t values reported in this Table is significant at the 5% level.

in detail and where scientific or technological problems exist the research workers should work again on these aspects. The average adoption index was 84.48 (S.D. = 7.39) which shows that on the average, the typical recommendation was fairly widely adopted. In Table 2, it can be seen that 58.08 samples were examined per week and 0.15 samples per tonne were rejected or reprocessed at the factory itself, on an average. From Table 2, it can be observed that none of the selected quantitative variables were related to adoption index. However, the rate of rejection or reprocessing at the factory itself was highly positively correlated to quantity of water used per tonne of processed material. The latter is also highly positively related to water used per day forne processing which seems quite natural. It is significant to note that neither the rate of rejection/reprocessing at the factory itself, nor the quantity of water used per tonne of processed material, are correlated significantly with the average quantity of raw material handled per day. This shows that in factories where more water per tonne of processed material is used, care should be taken to ensure its quality especially with regard to chlorination.

The different characteristics of fish processing factories with respect to separate quality control laboratory MIPQC/IPQC schemes, training of technologist in quality control, experience of electric failures and shortage of ice, were studied with respect to their relationship with adoption. The results reported in Table 4 reveal that the presence or absence of these did not make significant differences in adoption. The respondents were also asked about the frequency of sampling. Out of 24 who responded, 23 said that they sampled their products 'daily,' whereas one reported 'not daily'. Only one respondent reported that there was rejection of material from his factory by the importing country, this was on account of *Salmonella* and *Arizona*.

It is suggested that the present study needs to be replicated on a larger sample coupled with other instruments of observation.

The authors are grateful to the following for their help and co-operation, Shri M. R. Nair, Director, Central Institute of Fisheries Technology, Cochin–29, Smt. Mary Thomas, CIFT and Shri S. B. Sood, CIRG.

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