EXPERIMENTS IN CONSTITUTING A TASTE PANEL FOR CANNED AND FROZEN PRAWN PRODUCTS

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With a view to constituting a taste panel in the laboratory for detecting the flavour changes in canned and frozen prawn, three methods of panel selection viz; scalar scoring method, range and deviation method and triangular method were tried. Out of the three triangular method was found to be suitable for panel formation in canned and frozen prawn. Using this method a panel of six members was formed for detecting flavour changes in the two products.

INTRODUCTION

Although search has been going on for objective tests for the evaluation of quality of processed fishery products, subjective tests depending on organoleptic characteristics still remain to be the most reliable. In subjective evaluations, the acceptability of a particular food item generally depends on the opinions of a selected well trained panel. Unless the panel members are selected properly, these tests become less reliable. A reference to literature gives a number of tests for the selection of panel members for sensory evaluations. Boggs and Hanson (1949), Caul (1957), Peryam (1958), Bradly (1953), Kramer & Twigg (1962) and the Comm ttee on sensory evaluation of the Institute of Food Technologists (1964) have reviewed the tests used in sensory evaluation of food products. The present paper deals with the experiments carried out to constitute a permanent taste panel for two of the most important components of India's fish export viz; frozen prawn and canned prawn.

MATERIALS AND METHODS

Members of the Institutional staff who were found most sensitive to primary tastes like salty, sweet, sour and bitter (FAO Tech. Report No. 2308, 1967) formed the subjects for further experiments in the selection of panelists for the two specific commodities viz, canned and frozen prawn. Three methods of panel selection were tried. The first was scalar scoring method (Bradly; Kramer and Twigg; Committee on sensory evaluation of the Institute of Food Technologists, *loc. cit*). Ocean fresh prawns were used for the trial. Three different quality samples were prepared by

keeping one portion completely in ice for a day, another kept at room temperature for 5 hours and then stored in ice and a 3rd portion kept at room temperature for 12 hours and then stored in ice. Next day these samples were taken and cooked in 3% brine under identical conditions. Triplicates of each of the samples were presented at random to the potential panel members who were requested to score the samples one by one for their freshness in a form prepared for this purpose. The data collected were statistically analysed and the results are given in Tables I (a) & (b).

The second method tried was the range and deviation method suggested by Kramer and Twigg *(loc cit)*. Triplicates of the samples were prepared as before and supplied to the potential panel members along with three reference samples belonging to the three qualities. They were asked to point out similarity of the test sample to the reference samples and to follow a schedule for scoring. The range and deviation of the scores were calculated (Table II).

TABLE I (A) – RESULTS OF SCALAR SCORING TEST ANALYSIS OF VARIANCE TABLE FOR FLAVOUR SCORES

Source	SS	DF	MS.
Total	93.0893	125	
Bet. samples	2.7143	2	1.3572*
Bet. Panel members	38.5893	13	2.9684*
Samples x panel members	21.2857	26	0.8187**
Error	30.5000	84	0.3631.

TABLE I (B) – RESULTS OF SCALAR SCORING TEST ANALYSIS OF VARIANCE TABLE FOR FLAVOUR SCORES

Source	SS	DF	MS.
Total	71.000	111	
Bet. samples	19.000	1	19.000**
Bet. panel members	12.875	13	0.990**
Samples x panel members	17.375	13	1.387**
Error	21.750	84	0.259

* Significant at 5% level.
** Significiant at 1% levei

TLBLE II RESULTS OF RANGE AND DEVIATION METHOD (FLAVOUR SCORES)

Members	Range of sum	Sum of ranges	Range of sum/sum of ranges	sum of Deviation
1	4	1	4 (sig)	4
2	2	5	0.4 (N. S)	8
3	2	5	0.4 (N. S)	6
4	4	3	1.33 (N. S)	7
5	4	3	1.33 (N. S)	8
6	3	4	0.75 (N. S)	8
7	4	4	1.00 (N. S)	4
8	5	2	2.50 (sig)	2
9	0	6	0 (N. S)	8
10	3	4	0.75 (N. S)	6
11	2	3	0.67 (N. S)	7
12	2	5	0.40 (N. S)	6
13	3	3	1.00 (N. S)	10
14	4	4	1.00 (N. S)	4

Sig – Significant at 5% level.
N. S. – Not significant.

The third method was the triangular method suggested by Boggs and Hanson, Peryam, Bradly and Kramer & Twigg *(loc cit)*. The number of triangular tests that has to be conducted for infallible ability was calculated from Wald's sequential analysis method (Bradly *loc cit*). The average number of triangular tests required for infallible ability was given by $El(n) = \log \frac{(A-B)}{A} / \log \left(\frac{Pl}{Po}\right)$ where A and B denote the probability of selecting an unacceptable member and probability of rejecting an acceptable member respectively and Po and Pl are respectively the

maximum unacceptable and minimum acceptable ability. For the trials, A and B are taken each equal to 0.05, Pl = 0.95 and Po = 0.58. By using these values the average number of triangular tests required was estimated to be six. After determining the number of tests to be conducted the samples were prepared as follows. A portion of the fresh prawns were canned immediately after arrival and the other portian was kept at room temperature for 5 hours and subsequently stored in ice for one day and then canned in order to get a minimum difference second rate sample. Samples were canned by following the standard procedure of canning of prawn (Choudhuri and Balachandran, 1965). In preparing the samples care was taken to select prawn belonging to the same species and size grades so as to form a homogeneous lot. Each panel member was given three samples two of which were similar and they were asked to pick up the odd sample on the basis of flavour and to state which one was good. Six series of experiments were conducted using the same potential panel members. Samples were supplied to judges in random order using random numbers. The colour of the material was masked with the help of colour light to avoid possibility of judging by colour alone. In the case of frozen prawn three sets of six trials were conducted. In the first set the comparison was between fresh frozen and that frozen from three day iced prawn. In the second set ice storage period was reduced to two days and in the third set it was further reduced to one day. The material was quick frozen in a Jackstone contact freezer at-40°C. Before each trial the material was thawed and cooked in 3% brine under identical conditions and given to members in the triangular way.

In the case of frozen and canned prawn, data were collected according to the prepared proforma. The chi-square test was used for analysing the data.

Results and discussion

Table I (a) shows that the variation between samples was significant at 5% level while the variation between members and the interaction, samples x members, were significant at 1% level. The significance of the interaction may be due to the difference in flavour response of the members to the replicates of the same sample. This means that the panel members were not in a position to differentiate the best sample from worst when the samples were presented in replicates (Kramer and Twigg, *loc cit.*) Table I (b) also gives more or less the same picture. Because of this highly significant interaction separation of efficient panel members from others was found to be difficult. Also, the presentation of too many samples at a time to the panel members induced taste fatigue and taste adaption (Bradly, *loc. cit*). This highly violates some of the basic assumptions underlined in performing the analysis of variance table viz; independency and normality of error scores, homogenity of error variances and the additivity of treatment and environmental effects (Cochran & Cox, 1957).

Table II shows the range of sums, sum of ranges, range of sum/sum of ranges and sum of deviations for each member calculated by performing the range and deviation method. The significance of range of sum / sum of ranges shows how far the members can detect the difference in the flavour change of the samples and the amount of deviation gives an estimate of the reliability of the panel members. In the table this ratio was significant only for two members (1) and (8). These two members had succeeded in distinguishing the three different quality samples. But regarding their reliability it was found that the sum of deviation of all

panel members except that of (8) was quite large. Since there were three different quality samples it was not proper to consider a member as reliable in duplicating the scores to all samples of similar quality if the sum of deviation exceeded 3. In this respect the panel no. 8 was better compared to others. For this member the sum of deviation was two and for all others it exceeded 3. As a single test is insufficient to establish the reliability of a panel member (Kramer and Twigg, *loc. cit.*) a second series was conducted on similar lines with the same members. But here the picture was entirely different indicating that the test was not very effective in the case of a product like prawn where the flavour is produced by a combination of different taste factors unlike in the case of single flavours like saltishness or sweetness where it might be successful. Also taste fatigue and taste adaption are likely to affect the results as the panel members had to handle 12 samples of different freshness at a time. Table III shows the results of triangular test conducted for selection of panel members for canned prawn. Using the formula 1/3 (N + $\sqrt{13.270N}$) (Boggs & Hanson, *loc. cit*) where N represents the total number of trials, the number of correct identifications necessary for significance at 1% level is five out of six. Those members who have not reached the desired number five of correct identifications were not included in this table. Two members were correct in all the six trials in identifying the duplicates and in picking up the good samples and four members were correct in five out of six trials. These six members were selected in the panel for detecting the flavour change in canned prawn.

TABLE III SELECTION OF PANEL MEMBERS USING TRIANGULAR METHOD FOR CANNED PRAWNS

Panel Members	No. of times duplicates were idenified correctly	No. of times good samples were detected
1	5	5
2	5	6
3	5	5
4	5	5
5	6	6
6	6	6

Tables IV (a), (b) & (c) give the results of triangular tests conducted for the formu-

TABLE IV (A) SELECTION OF PANEL MEMBERS USING TRIANGULAR METHOD FOR FROZEN PRAWNS

Panel members	No. of times duplicates were identified correctly	No. of times good samples were detected
1	6	6
2	5	4
3	6	6
4	5	5
5	6	6
6	6	5
7	6	6

TABLE IV (B) SELECTION OF PANEL MEMBERS USING TRIANGULAR METHOD FOR FROZEN PRAWNS

Panel members	No. of times odd samples were detected correctly	No. of times good samples were detected
1	5	5
2	5	5
4	5	5
5	6	6
6	5	5
7	6	6

TABLE IV (C) SELECTION PANEL MEMBERS USING TRIANGULAR METHOD FOR FROZEN PRAWNS

Panel members	No. of times odd samples were detected correctly	No. of times good samples were detected
1	3	3
2	2	2
4	3	2
5	1	0
6	2	2
7	3	3

lation of a taste panel for frozen prawn in three sets of six trials each. Table IV (a) gives the number of times odd samples were detected and number of times good samples were detected in the 1 set of trials in which fresh frozen and three days ice stored-frozen prawns were given, IV (b) is that of set II in which fresh frozen and two days ice stored frozen prawn were given and IV (c) that of set III in which fresh frozen and one day ice stored frozen prawn were given.

In the first set seven members came out successful. These seven members were given the second set of samples in which six members came out successful and these six members were given the third set of samples. But table IV (c) shows that none of these members had reached the desired number five of correct identifications of the duplicates. This indicates that the detecting ability of the members were limited to change in flavour between fresh prawn and prawn stored in ice for more than one day and then frozen. As the ice storage period decreases the change in flavour becomes less appreciable as to make it difficult for differentiation by panel members.

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