

Change in Quality of Different Variety of Fish During Long Distance Transportation

It is known that fatty fish undergo spoilage more quickly than lean fish under similar conditions of handling and storage. Information on the varying abilities of lean fish to withstand rigors of long distance transportation is non-existent. This information will be very useful to select suitable types of fish for long distance transportation so that loss due to deterioration in quality will be reduced to the minimum. The present study was undertaken to find out whether some variety of fish in iced condition can withstand the rigors of long distance transportation better than some other types of fish.

Total bacterial count (TBC) was chosen as the indicator of quality. 137 consignments of 13 variety of fish transported as iced-fish from Kakinada to Howrah by rail were employed for the study. Second-hand tea chests with gunny insulation were used for transporting the fish. Total bacterial counts of each consignment were determined both at the despatching and receiving centres.

Total bacterial counts of the consignments at the two centres were compared after making logarithmic transformations for each variety of fish. The application of paired 't' test showed that the change in TBC during transportation was not significant in respect of *Sciaenids*, *Synagris*, *Hilsa keeli* and tilapia. While the increase in TBC between the two centres was found to be significant ($P < 0.05$) for *Chanos chanos* and ribbon fish, it was highly significant ($P < 0.01$). For other variety namely, cat fish, *Polynemus*, horse mackerel, eels, rohu, mullets and seer. The mean total counts with respect to species and the respective increase (%) in the total counts are presented in Table 1 in ascending order of magnitude. While sciaenids, *Hilsa keeli*, *Synagris* and tilapia showed minimum increase ($< 1.6\%$) in TBC, mullets registered the highest increase (37%) followed by seer (29.3%).

The difference in the change in total count was found to be significant between species.

Species	No. of observations	Mean total count (log)		% increase	Remarks
		Kakkinada	Howrah		
Sciaenids	11	4.5636	4.5246	-0.86	N.S.
<i>Hilsa keeli</i>	11	4.5142	4.5600	1.02	N.S.
<i>Synagris</i>	14	4.6633	4.7132	1.06	N.S.
Tilapia	6	4.3246	4.3946	1.62	N.S.
Chanos	23	4.4773	4.8380	8.06	*
Ribbon fish	5	5.2159	5.7529	10.30	*
Cat fish	14	4.4237	4.9575	12.07	**
Horse mackerel	6	4.3745	5.0261	14.90	**
Rohu	9	4.1594	4.8849	17.44	**
Eels	11	4.2065	4.9929	18.70	**
<i>Polynemus</i>	9	4.3190	5.2450	21.44	**
Seer	12	3.8174	4.9339	29.25	***
Mullets	6	3.9962	5.4736	36.97	**

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

by applying the analysis of variance technique. It was found that the variation in the total count was highly significant ($P < 0.01$) among the different variety of fish (Table 2). This implies that changes in TCB during transportation of iced fish varied significantly between species.

Further attempts were made to pool the different variety into homogeneous groups on the basis of the change in total count during transportation. Least significant difference (LSD) were calculated with the respective mean difference in the total count. On the basis of the total bacterial count, different variety were grouped into 4 homogeneous groups comprising (i) 1, 2, 3, 4 (ii) 5, 6, 7 (iii) 8, 9, 10, 11 and (iv) 12, 13 of Table 1.

Group 1	Group 2	Group 3	Group 4
Sciaenids	Chanos	Horse mackerel	Seer
<i>Hilsa keeli</i>	Ribbon fish	Rohu	
<i>Synagris</i>	Cat fish	Eels	Mulletts
Tilapia		<i>Polynemus</i>	

It is seen that seer and mullets had the minimum TBC at the despatching centre but underwent the highest increase in TBC during transportation. Similarly a few of the

other variety had high TBC at the despatching point but had undergone low levels of increase in TBC during transportation. This indicates that an initial high TBC need not be accompanied by a correspondingly higher increase in TBC nor low initial TBC should lead to a low level increase in TBC during transportation in iced condition.

Table 2. ANOVA

Source	S.S.	df	m.s.	F
Between fish	23.3025	12	1.9419	3.617
Error	66.6764	124	0.5369	
Total	89.8789	136		

The present study shows the existence of differences in the amenability of different variety of fish to deterioration in quality during transportation as iced-fish under similar conditions of handling. Further studies are warranted to confirm these findings.

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