

Quality of Cured Fish on the West Coast - Comparative Study with the IS Specifications

V. MURALEEDHARAN, G. R. UNNITHAN, K. GEORGE JOSEPH* and
T. S. UNNIKRISHNAN NAIR *

Central Institute of Fisheries Technology, Cochin - 682 029

Moisture and salt content in cured fish products from various centres on the west coast of India are compared. The moisture contents varied in samples from different centres, whereas the salt content remained more or less uniform. The deviations from the Indian standard specification were highly significant in both cases. The high mean moisture values and low salt values with respect to accepted standards are indicative of the improper drying and poor salting.

George Joseph *et al.* (1983) reported wide variations in the quality in the commercial dry salted fish products from different centres on the west coast. This was attributed to the non-uniformity of processing practices adopted at each centre. An attempt is made to study the extent of such variations in moisture and salt contents in cured fish collected from different centres, and to compare them with those specified in Indian standard specifications for such commodities.

Materials and Methods

Analytical data of cured fish products, collected for 319 samples were statistically analysed for the study, covering six major cured fish centres on the west coast for the same period, namely, Chavakadu, Calicut, Cannanore, Mangalore, Karwar and Goa. As the composition of fish varies from species to species, the drying procedure also is bound to vary and hence comparison between centres was made species-wise. The mean moisture and salt values for each centre, the respective standard errors and 95% confidence intervals for the mean were worked out and compared. The deviations of the mean values from IS specifications were tested using t-test.

Results and Discussion

The mean moisture values of different varieties of fish (Centre-wise), standard

errors and 95% confidence intervals for the means are furnished in Table 1. Of the four centres from where samples of oil sardine were obtained, the highest moisture percentage of 50.96 was recorded at Calicut Centre. The standard errors were found to be low and consequently the confidence intervals (CIS) were narrow.

An average moisture level of 41.30% was observed at Mangalore while at Karwar, it was only 33.12% for white baits. For silver belly, the highest moisture was recorded at Calicut (46.96%) and the lowest at Mangalore (29.93%). For sole also Calicut reported the highest moisture (52.83%) with Mangalore recording the lowest (25.47%). For both lactarius and mackerel, the values at Mangalore were lower than that of Karwar.

In all these products it was observed that the standard errors were within reasonable limits and the 95% confidence intervals were non-overlapping which indicate that the mean moisture values were significantly different from centre to centre.

In the miscellaneous variety, the CIS of Goa and Calicut almost coincide and hence they may be combined. Here also the Mangalore product reported the lowest moisture content. In general among the centres observed, the drying rate was maximum at Mangalore and minimum at Calicut.

Further analysis was carried out to study the variation, if any, of the observed moisture

* Research Centre of Central Institute of Fisheries Technology, Calicut-673 005.

Table 1. Mean values and confidence interval of observed moisture percentage

Fish	Centre	No. of observations	Mean values %	Standard error	95% CIS for the mean	t-value	Remarks
Sardine	Calicut	15	50.96	0.436	(50.00, 51.92)	**	Mean values are significantly different between centres. All values are higher than the accepted maximum
	Karwar	28	42.40	0.833	(40.68, 44.11)	**	
	Chavakkadu	12	40.41	0.264	(39.83, 40.99)	**	
	Goa	9	39.15	0.340	(38.39, 39.91)	**	
White bait	Mangalore	15	41.30	0.152	(40.97, 41.63)	**	Mean values are significantly different between centres. They are very high compared to the standard
	Karwar	14	33.12	0.273	(32.53, 33.71)	**	
Silver belly	Calicut	15	46.96	0.553	(45.77, 48.14)	**	The difference between centres are highly significant. Mean values at Goa and Mangalore are lower than the maximum
	Karwar	24	40.61	0.814	(38.92, 42.30)	**	
	Goa	12	31.98	0.431	(31.03, 32.93)	**	
	Mangalore	10	29.93	0.261	(29.34, 30.52)	**	
Sole	Calicut	20	52.86	0.625	(51.55, 54.17)	—	Mean values are significantly different between centres
	Karwar	30	52.52	0.587	(31.32, 33.72)	—	
	Mangalore	14	25.47	0.380	(24.65, 26.29)	—	
Lactarius	Karwar	25	45.82	0.880	(44.00, 47.63)	—	Moisture values are significantly different between centres
Mackerel	Karwar	13	53.67	0.561	(52.46, 54.88)	**	Mean values are significantly different
	Mangalore	15	38.32	0.393	(37.48, 39.16)	**	
	Goa	9	48.48	0.660	(46.96, 50.00)	—	Moisture values at Goa and Calicut may be combined
	Calicut	10	48.25	0.701	(46.85, 50.03)	—	
	Cannanore	8	42.25	0.436	(41.22, 43.28)	—	
	Mangalore	6	40.48	0.586	(38.97, 41.99)	—	

** significant at 1% level; — standards not available

values from the accepted maximum standards. The deviations from the Indian standard specifications (Table 3) were tested by the t-test and were found to be highly significant ($p < 0.01$). The mean values were much higher than the accepted standards at all centres except Mangalore and Goa for silver belly. From this it is to be concluded that drying is improper in these centres especially at Calicut and varies from centre to centre.

The analysis of salt levels of products from various centres showed (Table 2) that the value for sardine was minimum at the Calicut centre (17.37%). The CIS of Karwar, Chavakkadu and Goa are more or less identical indicating uniform salting at these three centres for sardine. For silver belly and sole also minimum salting was observed at Calicut (17.71% and 17.39% respectively) and the CIS were overlapping.

Table 2. Mean values and confidence intervals of observed salt percentage

Fish	Centre	No. of observations	Mean value %	95% CIS	t-values
Sardine	Calicut	15	17.37	(16.92, 17.82)	**
	Karwar	28	18.45	(17.87, 19.02)	**
	Chavakkadu	12	18.68	(18.07, 19.28)	**
White bait	Goa	9	19.05	(18.49, 19.60)	**
	Mangalore	15	19.19	(18.75, 19.64)	**
Silver belly	Karwar	14	21.07	(20.56, 21.58)	**
	Calicut	15	17.71	(17.03, 18.39)	**
	Karwar	24	18.68	(18.20, 19.16)	**
Sole	Goa	12	17.77	(17.18, 18.36)	**
	Mangalore	10	18.36	(17.34, 18.99)	**
	Calicut	20	17.39	(16.84, 17.94)	**
	Karwar	30	18.62	(17.64, 19.60)	**
Lactarius	Mangalore	14	18.77	(18.28, 19.26)	**
	Karwar	25	18.19	(17.56, 18.82)	**
Mackerel	Mangalore	15	19.86	(19.49, 20.23)	**
	Karwar	13	23.77	(23.23, 24.32)	**
	Mangalore	15	23.56	(23.08, 24.04)	*

Table 3. Indian standard specifications for cured fish

	Moisture %	Sodium chloride %	Acid insoluble ash %	Remarks
Dry salted mackerel	35.0 Max.	25.0 Min.	1.5 Max.	IS 4301-1967
Dry salted sardine	35.0 "	25.0 "	1.5 "	IS 3853-1966
Dry salted white baits	20.0 "	25.0 "	7.0 "	IS 2883-1976

The values at Karwar and Mangalore were different for both white baits and lactarius. For mackerel species higher and uniform salting rate was observed at Karwar and Mangalore. In general, the salting rates appear to be more or less uniform in most of the centres.

The minimum accepted salting standard is 25% which is much higher than the observed values and the application of t-test reveals that the deviations of the mean values at all centres were significantly different

($p < 0.01$) from IS specification, which is an indication of the very poor salting procedure throughout the west coast.

The authors are grateful to Shri M. R. Nair, Director Central Institute of Fisheries Technology, Cochin-29 for the permission to publish this paper.

Reference

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