

Solid Loss and Weight Gain in Prawns During Storage in Ice

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Loss of solids from and gain in weight of the meat of whole prawn and prawn meat stored in ice have been studied to explain the mechanism of solid loss. Two stages are identified in this phenomenon. In the first stage water is absorbed without loss of solids resulting in a maximum increase in weight. In the second stage both solids and water are lost resulting in gradual decrease in weight from the maximum reached but not reaching the original weight. It is inferred that whole prawns stored in ice up to two days give the maximum peeled yield without loss of nutrients and at the same time making the peeling process easier.

Loss of solids from prawns during storage in ice was studied by Collins (1961) and Govindan (1962). Govindan (1962) reported a maximum of 30% loss in solids and 10-14% increase in weight in prawn meat held in ice for a fortnight and explained the phenomenon as the simultaneous dissolution of solids and absorption of water, the latter being more, resulting in weight gain. The data presented by Govindan does not cover the first two days of storage in ice. Hence it is worthwhile to study the changes occurring in the first two days also so that the phenomenon can be better understood and explained. Results of the experiments carried out with this objective are presented here.

Materials and Methods

Extremely fresh prawns, *Metapenaeus monoceros* caught in stake nets were collected and brought to the laboratory within 2 h after catch. A part of it was peeled (400 pieces per kg) and weighed into polythene bags in 100 g lots without washing, mixed with equal quantity of crushed ice, tied water tight and the bags were stored in crushed ice in an insulated box. Each bag was withdrawn at intervals of 2, 4, 6, 24, 30 and 48 h. After removing the ice pieces, the prawn meat was drained for two min and weighed. The entire sample was used for determination of solid content by drying at $103 \pm 2^\circ\text{C}$ to a constant weight.

The remaining portion of the whole *Metapenaeus monoceros* (200 pieces/kg) was used for further experiments. Before icing 100 g of prawns were peeled, the peeled yield was noted and solid content was determined. Whole prawns were stored in 100 g lots as in the previous experiment and one bag each was withdrawn at intervals, the peeled yield was noted and the solid content in the entire prawn meat was determined. The above experiment was repeated with *Penaeus indicus* (130 pieces/kg). The gain in weight and solid content were expressed as percentage of the original (uniced) meat.

Results and Discussion

The results are presented in Tables 1 and 2. The results in Table 1 show that the weight gradually increases up to 24 h followed by

Table 1. Weight gain and solid content in prawn meat during storage in ice

Storage period h	Weight gain (as % of original material)	Solid content
0	0.0	21.8
2	8.9	20.5
4	10.2	20.2
6	11.4	20.1
24	15.1	20.6
30	12.1	18.4
48	12.1	18.2

slight reduction. The solid content shows slight decrease in the first 2 h and then remains almost constant up to next 24 h. There is definite decrease after 30 and 48 h. The initial decrease in solid content may be due to the dissolution or washing out of the surface slime and dirt. The increase in weight of prawns up to 24 h without decrease in solid content proves that the absorption of water from the melting ice without loss of solids is the main process in the initial stages of storage in ice. The decrease in solid content after 30 h show that loss of solids starts only after a maximum water absorption. Data in Table 2 shows slightly increased solid content after icing of whole

Table 2. *Weight gain and solid content in the meat of whole prawns stored in ice*

Storage period, days	<i>M. monoceros</i>		<i>P. indicus</i>	
	Weight gain (as % of the meat of original material)	Solid content	Weight gain (as % of the meat of original material)	Solid content
0	0.0	22.5	0.0	22.00
1	12.5	23.2	9.3	22.50
2	16.7	22.2	17.0	20.48
3	13.8	19.9	13.0	20.60
4	14.6	19.3	—	—
6	—	—	14.2	18.04
7	10.4	17.1	—	—
8	—	—	8.9	16.55
9	16.7	17.0	—	—
10	—	—	10.9	16.19
13	—	—	4.0	15.60
15	—	—	5.2	15.10

prawns for a day. This is attributable to the better yield on peeling, as prawns after

icing for a day is easier to peel. The solid content remains almost constant for the first two days in *M. monoceros* and for the first three days in *P. indicus*. The gain in weight of the meat reaches the maximum in two days and then decreases. The solid content shows decrease after 2 and 3 days in the two cases. The percentage decrease in solid content and weight of prawns are not the same; the decrease in weight being more. This is so in all the three experiments. Thus, in the second stage both solids and water are lost from the prawn meat but the weight does not reach the original.

These results show that during storage of prawns in ice, water is absorbed initially and it reaches a maximum. Then solid and water are lost simultaneously. The increase in weight reaches the maximum in one day in prawn meat and two days in whole prawns. Thus it can be inferred that whole prawns stored in ice upto two days give the maximum yield without loss of nutrients, at the same time making the peeling easier.

The authors are grateful to Shri M. R. Nair, Director, Central Institute of Fisheries Technology, Cochin - 682 029, for according permission to publish this paper.

References

- Collins Jeff (1961) *Com. Fish. Rev.* 23 (7), 1
- Govindan, T. K. (1962) *Indian J. Fish.* IX, B, 7