

Changes in Nitrogen Fractions in the Fillets of Elasmobranchs during Salting

T.V. Sankar* and K.K. Solanki

Research Centre of Central Institute of Fisheries Technology, Veraval-362265

This paper presents the results of the study on the changes in the nitrogen fractions during curing of shark and ray. The loss of moisture, non protein nitrogen and soluble protein nitrogen upon curing in saturated brine at 27-30°C was rapid in the first 8 h followed by a much slower decrease for both shark and ray fillets. These losses were proportional to the salt uptake.

Elasmobranchs contribute to a major portion of fishery along the Saurashtra coast. Most of the catch, especially sharks and rays, is salted and cured and finds markets in India. A small portion gets reduced into fish meal.

The major disadvantage associated with sharks and rays is the presence of urea in the meat which limits its commercial utilisation. Hence removal of urea from the meat becomes a major step in the utilisation of their meat. Salting and desalting (Kandoran *et al.*, 1965) and icing shark fillets for few days (Solanki & Venkataraman, 1978) removed appreciable quantities of urea. However, very little information is available on the changes in the nitrogenous fractions during salting.

Love (1958) reported that the denaturation of fish protein during freezing and salting are almost similar. Protein denaturation by sodium chloride in cod (Duerr & Dyer, 1952) and Baltic herring (Linko & Nikkila, 1961) have been extensively studied. Fougere (1952) studied the moisture loss and salt uptake in cod muscle kept in salt solutions. Such studies on elasmobranchs are scanty. This study is an attempt on these lines to provide the much required information.

Materials and Methods

Skinless uniform fillets of size 21x4.4x1 cm from shark (*Scoliodon* spp.) and of size 20x3x4 cm from ray (*Trigon* spp.) were immersed in saturated brine at 27-30°C. The brine was changed initially after 4 h and then after every 12 h. Samples were taken out at intervals upto 72 h for analysis of moisture, salt, total nitrogen and non-protein nitrogen (NPN) (AOAC, 1975). The soluble protein nitrogen (SPN) was extracted by the method of King & Poulter (1985) with precooled buffers at room temperature and estimated by microkjeldahl method.

Results and Discussion

Fig. 1 shows the moisture loss and salt uptake in shark fillets as a function of salting time. The salt uptake showed a rapid increase with corresponding decrease in moisture content upto 12 h after which it slowed down. The pattern of salt uptake and moisture loss was similar but slower in ray fillets (Fig. 2). The final salt and moisture contents at the end of 72 h were identical for both the fillets.

The NPN contributed to 30 and 28% of total nitrogen in shark and ray respectively. The changes associated with NPN during curing are given in Fig. 3. The rate of removal of NPN was found to be proportional to the rate of salt uptake in both cases.

*Present address: Central Institute of Fisheries Technology, Matayapuri P.O., Kochi-682029

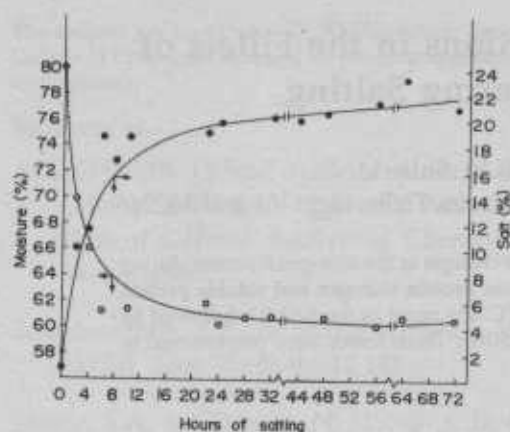


Fig 1. Moisture loss and salt uptake during salting of shark fillets

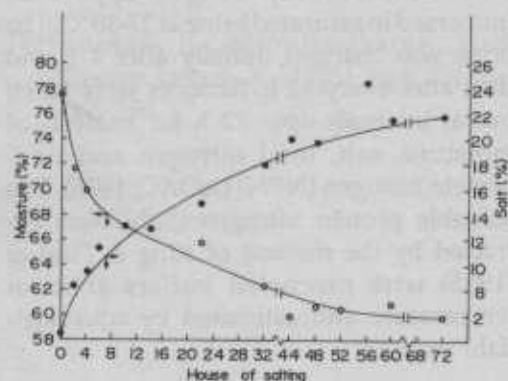


Fig 2. Moisture loss and salt uptake during salting of ray fillets

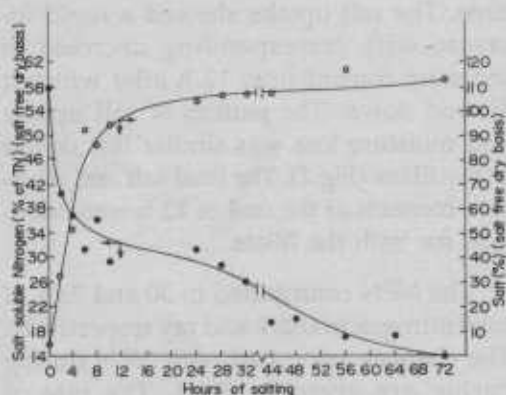


Fig 3. Changes in salt soluble nitrogen with NaCl uptake in shark fillets

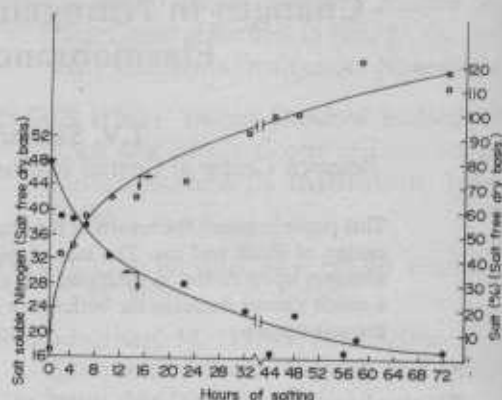


Fig 4. Changes in salt soluble nitrogen with NaCl uptake in ray fillets

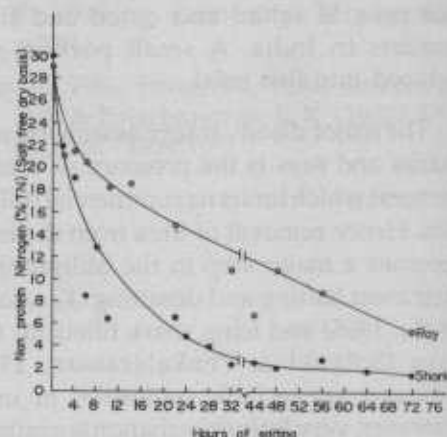


Fig 5. Changes in non protein nitrogen during salting of shark and ray fillets

There was a sharp decrease in SPN of shark (Fig.4) in the first 8 h followed by a slower decrease. The SPN level dropped from the initial value of 58% to 16% in 72 h. In the case of ray (Fig.5) a similar decline was noticed and the value changed from the initial value of 48% to 18% during the same period.

The uptake of salt into the meat is temperature dependent (Duerr & Dyer, 1952). Further they also observed that the fish myosin became denatured when a salt concentration of 8-10% was reached in the muscle. In the present study, since the experiment was carried out at higher tempera-

ture (27-30°C), the critical concentration of 8-10% of salt in the meat was reached much earlier. Thus, denaturation of myosin might have contributed in part to the sharp decline noticed in the SPN fraction. Further, even salt concentration as low as 2% caused myosin denaturation *insitu* at 0°C in Baltic herring (Linko & Nikkila, 1961).

Thus, the pattern of moisture, NPN and SPN changes as well as uptake of salt were similar in both shark and rays cured in saturated brine. The slight faster changes noticed in shark fillets could be due to the lower thickness of shark fillets in comparison to the ray fillets.

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