〈短報〉

Relationship between Temperature Dependency and Breaking Strength of Plaice Muscle during Low Temperature Storage

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There are several physicochemical studies(Iwamoto et al., 1987, 1988; Kim et al., 1992) regarding the post mortem rigor of raw fish flesh during low temperature storage, but rheological study was not carried out in these reports. In case of evaluating the quality of raw fish flesh, "sashimi", firmness is a very important index of freshness(Oka et al., 19 90; Ando et al., 1992). Recently, it has been reported that breaking strength using puncture test as mastication property is in good agreement with sensory test for the evaluation of changes in muscle firmness during ice storage(Ando et al., 1991).

In the present study, to know the effect of storage temperature on the rheological changes of plaice muscle, the relationship between breaking strength and temperature dependency was studied. Live plaices, *Paralichthys olivaceus*(30~35*cm* in body length and 600~700*g* in body weight) were killed at the brain instantly, stored at 0℃, 5℃ and 10℃ and used in studying the changes in breaking strength. A slice of 10*mm* in thickness was obtained using cross excision of muscle fibers at selected time intervals after death. A cylindrical plunger (8*mm* in diameter, simulating a molar tooth) was pierced into the slice at a speed of 1*mm/sec* and the maximum force recorded by a rheometer(Instron model 1011, U. S. A.) was regarded as the breaking strength. Data were expressed as the mean of 4~8 determination ± S. D..

Fig. 1. shows the changes in the breaking strength of plaice muscle during storage at various low temperature. The level of breaking strength in the muscle immediately after death was 1,050.00± 32.95 *g*. Values of breaking strength in samples stored at 5℃ increased rapidly than sample at 0℃ within 8 hrs storage, but the stored samples at 0℃ showed maximum value after 10hrs. Breaking strength in samples stored at 0℃ and 5℃ decreased significantly($p<0.05$) from 10hrs to 25hrs of store and then gradually decreased until 65hrs passed. But, in case of fresh flesh stored at 10℃, there was no increase of breaking strength during storage and those strength was decreased gradually through the whole storage time.

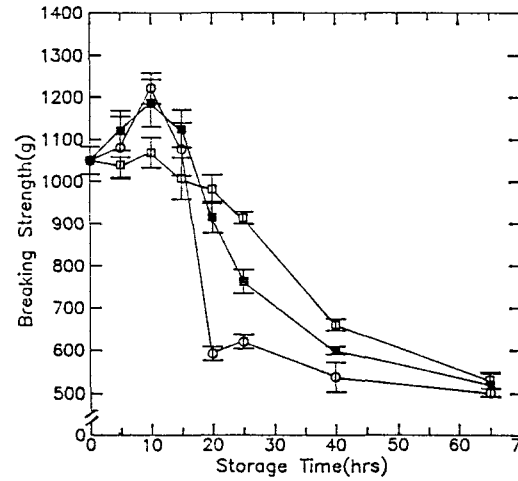

Fig. 1. Changes in breaking strength of plaice muscle during storage at 0℃(○), 5℃(■) and 10℃(□).

From the results above, it was suggested that the storage at low temperature(0~5℃) was effective in increase the breaking strength of fresh plaice flesh at early periods after death.

References

Iwamoto, M., H. Yamanaka, S. Watabe and K. Hashimoto. 1987. Effect of storage temperature on rigor-mortis and ATP degradation in plaice *Paralichtys olivaceus* muscle. J. Food Sci. 52, 1514~1517.

Iwamoto, M., H. Yamanaka, H. Abe, H. Ushino, S. Watabe and K. Hashimoto. 1988. ATP and creatine phosphate breakdown in spiked plaice muscle during storage and activities of some enzymes involved. J. Food Sci. 53, 1162~1165.

Kim, Y. Y. and Y. J. Cho. 1992. Early Changes after death of plaice, Paralichthys olivaceus muscle 1. relationship between early changes after death and temperature dependency. Bull. Korean Fish. Soc., 25(3), 189~196.

Oka, H., K. Ohno and J. Minomiya. 1990. Changes in texture during cold storage of cultured yellowtail meat prepared by different killing methods. Nippon Suisan Gakkaishi, 56(10), 1673~1678.

Ando, M., H. Toyohara and M. Sakaguchi. 1992. Post-mortem tenderization of rainbow trout muscle caused by the disintegration of collagen fibers in the pericelluar connective tissue. Nippon Suisan Gakkaishi, 58(3), 567~570.

Ando, M., H. Toyohara, Y. Shimizu and M. Sakaguchi. 1991. Validity of a puncture test for evaluating change in muscle firmness of fish during ice storage. Nippon Suisan Gakkaishi, 57(12), 2341.

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