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Studies on the comparison of fish meat qualities between two mackerel species, spotted mackerel *Scomber australasicus* and Pacific mackerel *S. japonicus*

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博士学位論文内容要約
Summary

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論文題目 Title	Studies on the comparison of fish meat qualities between two mackerel species, spotted mackerel <i>Scomber australasicus</i> and Pacific mackerel <i>S. japonicus</i> (ゴマサバおよびマサバ筋肉の品質の比較に関する研究)		

Chapter 1 describes the effects of freezing and thawing on the meat quality of spotted mackerel. The fish meat was kept at 4 °C for different time intervals before it was frozen at -20, -30, and -60 °C. For fish with low freshness and a high freezing temperature, large ice crystals in the muscle were observed and a large amount of drip and low a^* value were detected. These factors indicate that quality of the frozen fish meat with a low freshness and high freezing temperature was high. In addition, protein degradation occurs as freshness decreases, and tissue degradation causes the formation of large ice crystals.

Chapter 2 compares meat quality between spotted mackerel and Pacific mackerel. These two species are genetically closely related, but show differences in meat quality. In unfrozen fresh fish, spotted mackerel meat was softer than Pacific mackerel meat. In frozen fish, the ice crystals were larger in spotted mackerel meat than in Pacific mackerel meat. After thawing, spotted mackerel meat was softer than Pacific mackerel meat. Based on SEM, the connective tissue structure in the unfrozen muscle of spotted mackerel was thinner and the quantity of collagen of spotted mackerel was lower than those of Pacific mackerel. These findings suggest that muscle structure and biochemical components before freezing may influence ice crystal formation and meat toughness can be reduced during thawing. In addition, the total selenium content in the muscle, which affects antioxidant function and meat color, in spotted mackerel was higher than that of Pacific mackerel. Chapter 3 shows that fish muscle quality is influenced by seasonal variation in the chemical composition. To improve fish quality and commercial value, the deterioration in fish meat quality must be characterized so that post-mortem muscle softening can be prevented. Chemical composition and biochemical properties, such as muscle toughness, gonadosomatic index, water content, crude lipid content, pH, and cathepsins B and L activity, were measured in two mackerel species. In spotted mackerel, muscles were softer in May and September. Furthermore, in both species, gonadosomatic indexes were high in April and May, muscle water content was high and crude lipid content was low in February, and cathepsins B and L activity was high from April to June. A significant positive correlation between breaking strength and pH and a significant negative correlation between breaking strength and gonadosomatic index were detected in spotted mackerel. A positive correlation between breaking strength and pH and a negative correlation between breaking strength and cathepsins B and L activity were detected in Pacific mackerel. These observations suggest that the toughness of both spotted mackerel and Pacific mackerel meat is strongly influenced by pH and cathepsin activity.