Short Paper

Glucose Level of Canned Sardines*¹

Most of the recent work concerning the establishment of the chemical quality index for canned marine products has centered around various amines, ammonia, amino acids, nucleotide breakdown products, volatile components, fatty acid composition, and the decomposition of proteins.¹⁻⁷⁾ On the other hand, the correlation of sugar or carbohydrate content of canned fish products with their quality has not so far been focused. In the present work, the glucose levels of canned sardines were studied in relation to the quality since it was found that those of raw sardines significantly increased during ice-storage.

Sardines *Sardinops melanosticta* were stored in ice for 0, 3, 6, and 11 days and processed according to the conventional canning procedure⁸⁾ (24 cans each). These samples were subsequently evaluated by the organoleptic evaluators in the Japan Canned Foods Inspection Association. The organoleptic evaluation

is specific for the fish species or not, but this result is of interest in connection with the evaluation of fish freshness. Though glucose was lost in the course of heat-sterilization process, its level was still higher in canned sardine meats with the longer storage in ice. Average loss rates of glucose during the sterilization of canned sardines were 58.6% for 0-day cans, 71.4% for 3-day cans, 74.1% for 6-day cans, and 77.7% for 11-day cans. These losses of glucose could be due to the browning reaction which takes place during the heat-sterilization process. The glucose level in the liquid also increased with the ice-storage period. Glucose levels in both canned meats and the liquid were significantly different between the storage periods in ice, suggesting that the glucose level of the canned sardines is well-correlated with the freshness of raw fish. These results indicate that the higher the glucose level in the canned sardine meats or the liquid, the poorer their quality. Therefore, the glucose level in the canned

Table 1. Glucose levels of raw sardine meats, canned sardine meats, and the liquid portions

Storage period (days)	Organoleptic score	Glucose level		
		Raw meat* ¹	Canned meat* ¹	Liquid* ²
0	a'	1650±237	685±51	293±47
3	b'	3410±377	976±82	415±53
6	b'	4960±427	1290±145	604±62
11	c	8660±522	1930±242	877±92

*¹ $\mu\text{g/g}$ on the dry basis. *² $\mu\text{g/ml}$.

of canned sardines gave the scores of a' (0-day), b (3-day), b' (6-day), and c (11-day). For the determination of free glucose, the cans were opened and the content was separated into the meat and the liquid portion (simply called the liquid hereafter). The liquid was filtered through a No. 2 filter paper and diluted 25-fold with distilled water. 5 g of meat was homogenized with distilled water and the total volume was made to 50 ml. The homogenate was filtered through a No. 5C filter paper to obtain the clear extract. Free glucose in the liquid and the meat extract was determined using the Glucostat reagent (Worthington Chemical Corp.) which is specific to β -D-glucose. The content of glucose in meats was expressed as $\mu\text{g/g}$ on the dry basis in order to eliminate the variation of water content.

Table 1 shows the glucose levels of raw sardine meats, the canned sardine meats, and the liquids. It is apparent from this Table that the glucose level of raw meats increased significantly with the period of storage. This is mainly due to the hydrolysis of glycogen during ice-storage. It is not clear whether the increment of the glucose content in raw sardines during ice-storage

meats or the liquid might serve as a potentially useful index of quality for canned sardines. From the practical point of view, the use of the glucose level in the liquid from the canned sardines would be suitable, because this eliminates such techniques as water extraction, filtration, and the determination of moisture contents.

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*¹ イワシ水煮缶詰のグルコース含量.

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