Effect type chilli and concentration of CMC toward vitamin C and dissolved solid of smoked fish chilli sauce

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Abstract. The purpose of this research was to observe the effect of type chilli and concentration of CMC toward Vitamin C and a solid total of smoked fish chilli sauce. The treatments were: A Type of chilli (A1 cayenne chilli, A2 cayenne, and curly chilli, A3 curly chilli); B concentration of CMC (B1 CMC 0.5%, B2 CMC 1%). The parameters analysed were, vitamin C used titration and dissolved solid used gravimetry method. The data were used Anova testing. The result showed that treatment chilli combination significantly influence to increased Vitamin C compared without combination. Vitamin C A2B1 2.38% and A2B2 2.46%. The concentration of CMC non-significant to Vitamin C. Type chilli and concentration CMC non-significant influence to dissolved solid. The all treatment value of total solid > 40 as standard of chilli. So A2B2 could be used as good formula smoked fish chilli sauce to increased vitamin C and dissolved solids.

1. Introduction
Sambal is a processed product from chilli that is crushed and added to other additives that have a spicy taste and function as a complement in eating food. Smoked fish chilli sauce is a food flavoring ingredient and flavor enhancer. Generally the manufacture of smoked fish sauce uses cayenne chilli. But new innovations are needed to make chilli sauce using curly chilli or combination. In addition, to produce chilli sauce in accordance with the quality characteristics of the chilli sauce, it is necessary to add suitable stabilizers. The shelf life of smoked fish chilli sauce was relatively short, which is one week, so it is not feasible if it is improved as a food industry business for food security. The shelf life of smoked fish chilli sauce was greatly influenced by the processing and the number of preservatives used. The preservation process can be grouped into 3, namely: pasteurization, heating at 100°C, and above 100°C. In the pasteurization process, heating was intended to destroy most of the decomposing microbes, while most of the microbes that are left behind and still alive continue to be inhibited growth by storage at low temperatures or by other means such as preservatives.

Smoked fish is a processed fish that has undergone processes of weeding, boiling, bone extracting, multilevel fuming until a hard smoked fish texture is obtained, which can then be fermented into flavor enhancers [1]. The development of smoked fish processing using liquid smoke has been done as a solution to the use of direct smoked where the phenol content is lower. As it is known, phenol is a
trigger compound of prooxidants [2]. The results of sorting smoked fish that are not included in the marketing grade can be made of dried fish chilli sauce. The process of smoked fish chilli sauce includes crushing, mixing with chilli, shallots, crushed garlic, then cooked using coconut oil until cooked and then packed.

The smoked fish chilli sauce business carried out by Karya Bunda UKM has been going on for a year for local consumption in the city of Gorontalo. The passions on the chilli meet obstacles because it is not in accordance with the quality characteristics of the chilli, among others, not yet homogeneous or dispersion is still formed. So it is necessary to add suitable stabilizers. Emulsifiers, stabilizers, and thickeners (emulsifiers, stabilizers) are food additives that can help form or stabilize a homogeneous disperse system in food [3,4]. These food additives are usually added to foods that contain water and oil, such as lettuce sauce, margarine, sauce, chilli sauce, and ice cream. For this reason, research is needed on the addition of CMC as a stabilizer and the use of the type of chilli to produce smoked chilli fish sauce in accordance with the desired quality characteristics.

Carboxymethyl cellulose is a linear cellulose polymer ether and is an anion compound, which is biodegradable, colorless, odorless, non-toxic, granules or water-soluble powder but not soluble in organic solutions, has a pH range of 6.5 to 8.0, stable at pH range 2-10, reacts with heavy metal salts to form a film that is insoluble in water, transparent, and does not react with organic compounds [5]. Na-CMC will be dispersed in water, then grains of hydrophilic Na-CMC will absorb water, and swellings occur. Water that was previously outside the granule and is free to move cannot move any more freely so that the state of the solution is more stable and an increase in viscosity. This will cause the particles to be trapped in the system and slow down the deposition process due to the influence of gravity [6].

2. Materials and Methods

This study was conducted at the Faculty of Marine Science and Fisheries, Universitas Negeri Gorontalo, in Gorontalo, Indonesia, and lasted for two months. They were produced at the Faculty of Marine Science and Fisheries. The Vitamin C and total solid properties were tested at the Testing center for the utilization of quality and diversification of fishery products (BP2MDPP) Gorontalo Province. The materials used to produce the smoked fish chilli sauce were smoked fish, cayenne chilli, curly chilli, tomato, sallot, salt, CMC, coconut oil. The materials used for vitamin c and dissolved solid tests were distilled water, iod liquid 0.01 N, kanji liquid 1%. The tools used were titration standing, volume puppet, balance analitic, porcelain mortal, tanur, filter water, desiccator, blender, centrifugation, air bath, oven vacuum.

The formula smoked fish chilli sauce was smoked fish, A type of chilli namely A1 ceyenne chilli, A2 cayenne and curly chilli, A3 curly chilli; B concentration of CMC namely B1 CMC 0.5%, B2 CMC 1%, sallot, salt, and coconut oil. The materials chilli sort and sallot smooth homogenized and added salt cooked with coconut oil on pasteurization process 80°C until 20 minutes and added CMC. Packing in bottle and sterilization 100°C. The parameters analyzed were vitamin C used titration method and dissolved solid used gravimetry method. The data were analyzed with the ANOVA test.

2.1. Testing of Vitamin C Procedure

Testing of Vitamin C used titration method [7]. The purpose of this test is to determine vitamin C levels from smoked fish chilli sauce samples. The method used is iodometric titration, namely titration of oxidation of vitamin C by a solution of iodine (I₂).

2.2. Dissolved Solid total test procedure

Testing of dissolved solid total used gravimetry method [8]. Principle, The amount of dissolved solids, is the difference between the total solids and insoluble solids.
3. Results
The results are shown in Figure 1 and Figure 2.

![Vitamin C Smoked Fish Chili Sauce](image)

**Figure 1.** Vitamin C smoked fish chilli sauce.

The result showed that treatment chilli combination significantly influences to increased Vitamin C compared without a combination of chilli. Vitamin C A2B1 2.38% and A2B2 2.46%. Concentration is different in CMC concentration non-significant to Vitamin C.

![Dissolved Solid Smoked Fish Chili Sauce](image)

**Figure 2.** Dissolved solid smoked fish chilli sauce.

Type chilli and concentration CMC non-significant influence on dissolved solids. The all treatment value of dissolved solid > 40 as the standard of chilli. The Standar Nasional Indonesia chili sauce ICS 67.080.20 Badan Standardisasi Nasional total solid % b/b min 20.
4. Discussion
Figure 1 showed that all treatment values of total solid > 40 as the standard of chilli. According to [3], emulsifiers, stabilizers and thickeners (emulsifiers, stabilizers) are food additives which can help form or stabilize a homogeneous disperse system in food. These food additives are usually added to foods that contain water and oil, such as lettuce sauce, margarine, sauce, chilli sauce, and ice cream. For this reason, research is needed on the addition of CMC as a stabilizer and the use of the type of chilli to produce smoked chilli fish sauce in accordance with the desired quality characteristics.

5. Conclusion
Treatment chilli combination significant influence on increased Vitamin C compared without combination. The concentration of CMC non-significant to Vitamin C. Type chilli and concentration CMC non-significant influence to total solid. Type combination of cayenne, curly chilli, and CMC 1% could be used as good formula smoked fish chilli sauce to increased vitamin C and dissolved solids.

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