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National Student Conference
on Food Science and Technology

Celebrating Food Diversity :

From Ideas to Innovation

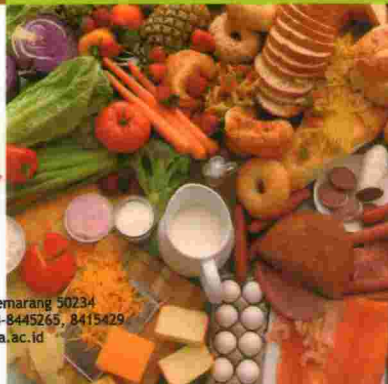
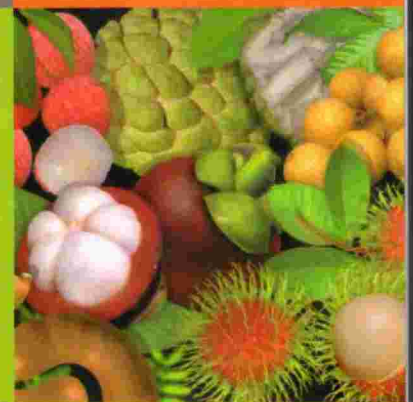
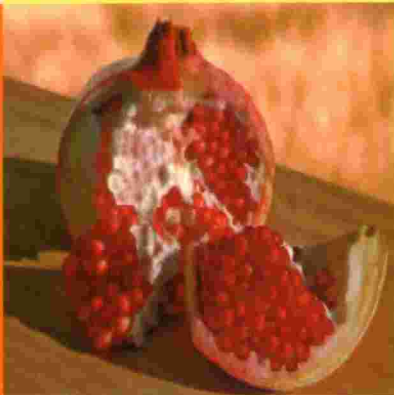
PROCEEDINGS

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P R E F A C E

Food diversity nowadays is not only associated with the abundant varieties of food resources but also become an important factor in food product development. One of the main challenge in food science and technology is how to generate creative ideas which in turn will be developed into innovative products. Realizing the importance of food diversity in food product innovation, Department of Food Technology, Faculty of Agricultural Technology, Soegijapranata Catholic University organized the 9th National Student Conference on Food Science and Technology, held on October 21st, 2009, with the main theme “Celebrating Food Diversity: From Ideas to Innovation”.

The 9th NSC set a platform for idea exchanges in the field of innovation for food diversity. The conference also becomes a medium for students, especially of food science and technology and other related fields to share their research findings, experiences and knowledge in a scientific setting. This proceeding brings together papers of plenary presentation and platform presentations which covered following topics: Food Innovation and Diversity; Food Quality and Safety; Functional Food; Food for Lifestyle; and Food Marketing and Business.

The Committee of 9th National Student Conference in Food Science and Technology is grateful to all honorable speakers, participants and sponsors, for joining this conference and for their valuable contribution on the conference.

Semarang, October 2009

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EXTENDING THE SHELF LIFE OF "AREM-AREM" USING VACUUM PACKAGING AND STEAM PASTEURIZATION

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ABSTRACT

One of the disadvantages of traditional food is having short shelf life because the food is made in traditional manner that poor in sanitation. Locally called "Arem-arem", is a traditional rice cake, made from rice, cooked with coconut milk and salt, filled with cooked chicken meat and wrapped with banana leaf then is steamed for about 1 hour. Field observation found that the shelf life of "arem-arem" is less than 24 hours. Some factors that influencing the spoilage are microbial growth and chemical reactions. A study was carried out to extend the shelf life of the "arem-arem" by vacuum packaged using nylon LLDPE plastic, combined with steam pasteurization ($\pm 97^{\circ}\text{C}$) for 9 minutes. The evaluation of the shelf life was run in two ways; physical (sensory) and microbiology evaluations (TPC). Microbial growth was observed every 12 hours for 5 days. The result shows that the spoilage characteristic of the "arem-arem" showed in the 5th day of the storage, compared to the control which was 1 day; means that the treatment extended the shelf life for 4 days. The vacuum packaged was likely effective to decrease the number of initial microorganism.

Keywords : "arem-arem", shelf-life, vacuum packaged, steam pasteurization

INTRODUCTION

"Arem-arem" is a rice cake traditional snack, made from rice, cooked with coconut milk and salt, filled with cooked chicken meat and wrapped with banana leaf then is steamed for about 1 hours (Ekawatiningsih et al., 2008). One of the disadvantages of traditional food is having short shelf life, because, the food is made in traditional manner that poor in sanitation. The spoilage caused by contamination of microorganism. Microorganism can live in everywhere

and condition (even in extreme temperature, pressure, pH, and water activity) (Winarno, 1994).

According to Winarno (1994) there are 2 factors that influence microbial growth that is internal and external factors. The internal factors are pH, water activity, oxygen pressure, nutritional content, and inhibitor substance. The external factors are temperature, growth phase of microorganism, gas availability, and radiation. Microorganism has its

minimum, maximum, and optimum pH for their growth. Most of microorganism can growth well in food that has pH about 4,6-7,5.

Chemical reaction and spoilage under storage on food is influenced by water content (Sun *et al*, 2002). The growth of microorganism and chemical reaction can inhibited by lower water content except for fat oxidation, Maillard reaction, and enzyme reaction. Most of microorganisms need oxygen for growth. If the exposure of oxygen on food is high, microorganism can growth well (Winarno, 1994).

Some treatment can be applied to inhibit microbial growth, such as: modified atmosphere packaging and high temperature. According to Welt (2003), there are 2 advantages for using Reducing Oxygen Packaging, those are improve production, handling, and distribution efficiency and extension of the shelf life. For the example of Reducing Oxygen Packaging is vacuum packaging. The inhibitory effect of vacuum packaging is influenced by initial amount of microorganism. If the initial amount of microorganism is high, the inhibitory effect will be low (Kadoya, 1990).

Heat treatment can be used to decrease the initial amount of microorganism.

Sterilization, pasteurization, and blanching are the examples of heat treatment. One of the most applicable is pasteurization. There are 2 purpose of using pasteurization, the first is to kill pathogenic microorganism in dairy products and the second is to extend the shelf life of food from microbiology and enzymatic factor (Potter & Hotchkiss, 1996).

The purpose of this preliminary study is to investigate the effect of combination between vacuum packaging and pasteurization to *arem-arem*'s shelf life in sensory and microbiological aspect.

MATERIALS AND METHODS

Preparation of "*arem-arem*"

First all spices are grinded, then "*sambal goreng*" from chicken meat is made. After that, coconut milk, pandan leaf, and salt is cooked with rice until all the coconut milk is absorbed by the rice. Then banana leafs are prepared, after that the rice and "*sambal goreng*" is placed on the banana leaf, and then the leaf is rolled. Finally, the leaf containing rice and "*sambal goreng*" is steamed until it well cooked. After that, some of the "*arem-arem*" is vacuum packaged and then steam pasteurized for 9 minutes, and the rest of the "*arem-arem*" were used as a control.

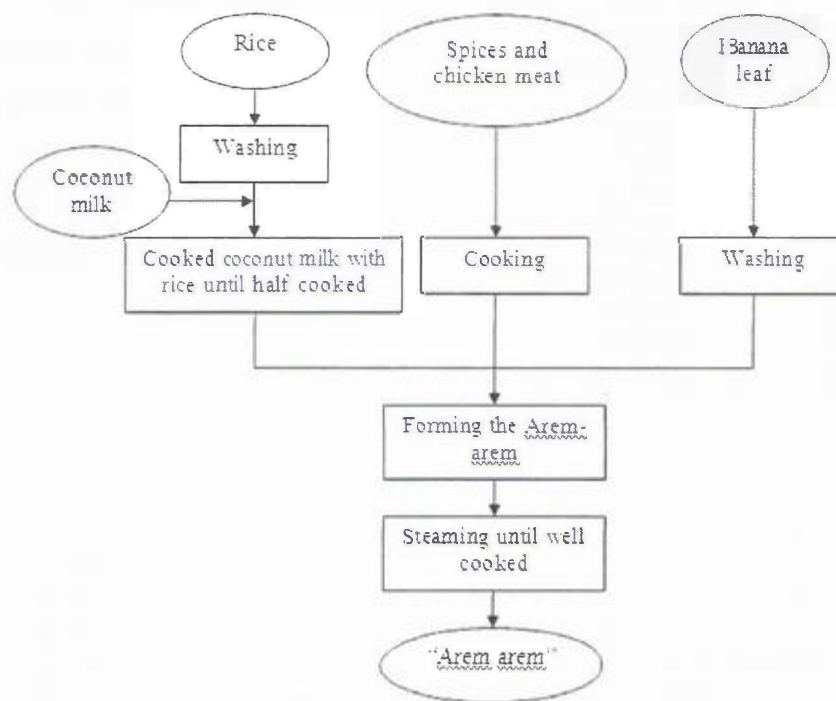


Figure 1. Flow Chart of making "arem-arem"

Microbiology test

In this study, the microbiology test using TPC (Total Plate Count) method. First, the sample is homogenized, pick 1 gram of the sample and dilute with 9 ml sterilized aquades (10^{-1} dilution) then series of tenfold dilution is made until certain dilution (in this observation 10^{-6}). After that dilution series 10^{-2} , 10^{-4} , and 10^{-6} is taken as much as 0,1 to be spread on pre-poured plates using media Nutrient Agar. Then it is incubated at 37°C for 24 hours (Handayani et al., 2004).

RESULT AND DISCUSSION

The control "arem-arem" was spoiled after 24 hours. Some factor that caused

the spoilage is "arem-arem" is made from rice and meat chicken so it can be classified as low acid food beside that "arem-arem" has high water content. This condition can promote microbial growth very well. The smell become acidic and the texture become softer and there was some sticky liquid in the surfaces of "arem-arem", it shows that "arem-arem" has been spoilage.

In this pre-observation, "arem-arem" was treated with vacuum packaging and pasteurization. The sensory characteristic of the products which is vacuum packaged and pasteurized were not change until 92 hours. It means that vacuum packaged and pasteurization can extend the shelf life.

The vacuum packaging will cause

reduction of gas residue (oxygen) and increase amount of CO₂ which can inhibit microbial growth (Kadoya, 1990). In the microbial analysis from the vacuum packaged "arem-arem", the TPC data can be seen in the table below:

Table 1. Total colony of "arem-arem" storing in room temperature.

Storage Period(30 ⁰ C)	Total Colony
4 hours	-
8 hours	-
20 hours	5x10 ²
32 hours	5.2x10 ³
44 hours	2x10 ²
56 hours	1.3x10 ⁴
68 hours	4.6x10 ³
80 hours	1.3x10 ⁴
92 hours	4.6 x10 ⁵
104 hours	2.4x10 ⁵

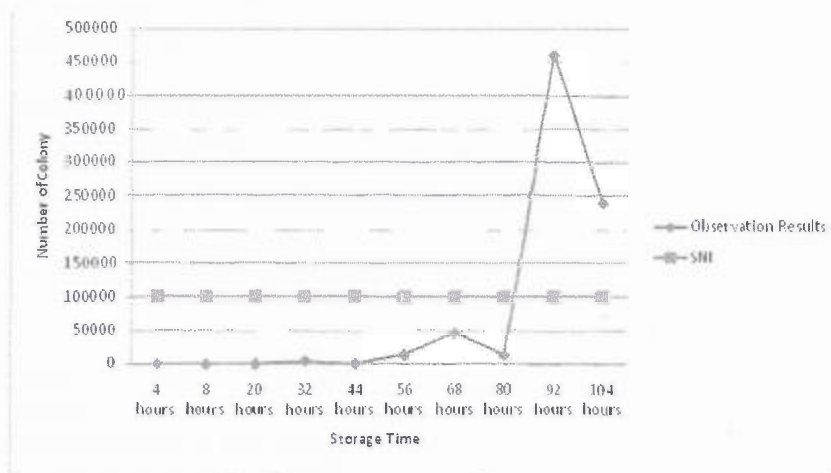


Figure 1. Growth of microorganism in "arem-arem"

Using SNI 01-6366-2000 of as the reference, the maximum TPC that can be tolerance is 10⁵. According result of this observation, it can be said that the spoilage of "arem-arem" start at 92 hours of storage.

This spoilage is caused by microorganism activity that produce enzyme such as lipase and protease. These enzymes will break lipid and protein substance and produce organic compound which is volatile or not. The volatile compound will cause off odor that can be linked to food spoilage. Beside the off odor, the

microorganism will also produce extracellular polysaccharides and it will look like sticky liquid in the food surfaces where the microorganism is (Peter & Bogh, 2003).

CONCLUSION

Combination of vacuum packaging and pasteurization can extend the shelf life of "arem-arem" about 62 hours. For further observation, correlation about vacuum packaging only and combination between vacuum packaging and pasteurization will be observed.

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