

Effect of using Cha-muang (*Garciniacowa*Roxb.) Leaf on Chemical and Microbiological Quality of Pork Nham

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ABSTRACT

The objective of this research was to investigate the effect of Cha-muang leaf on chemical and microbiological quality of pork Nham product. The experiment consisted of five treatments including control (Nham without Cha-muang leaf) and Nham with Cha-muang leaf at different levels (0, 1, 2, 3 and 4%). Each treatment was fermented at 30°C for 3 days. The pH values, lactic acid content and lactic acid bacteria (LAB) count were determined every day during fermentation. The results showed that control had the highest pH value and lowest lactic acid content. The highest lactic acid content was obtained from Nham with 4% of Cha-muang leaf at day 1 and 2 of fermentation ($p < 0.05$). Nham with Cha-muang leaf at different level also had lactic acid bacteria more than control ($p < 0.05$).

Key Words: Cha-muang leaf, Pork Nham, pH value, Lactic acid content, Lactic acid bacteria

INTRODUCTION

Pork Nham is a well known Thai fermented pork sausage. Fermentation process could prolong Nham shelf-life and improve flavor and nutrition quality. Nham is normally made of minced pork, shredded cooked pork rind, cooked rice, garlic and NaCl. After mixing all ingredients together, Nham was wrapped tightly in banana leaves or plastic bags and kept at room temperature (30°C) for 3-5 days. Lactic acid bacteria (LAB) play important roles during Nham fermentation because it can produce organic acids from carbohydrates and lead to pH drop. The pH of Nham should be lower than 4.6 for preventing the growth of pathogenic bacteria (Visessanguan et al. 2004) and safe for the consumers. Nham has been found to be contaminated with pathogenic bacteria such as *Salmonella* spp., *Staphylococcus aureus* and *Listeria monocytogenes* (Paukatong and Kunawasen, 2001). *Garciniacowa* Roxb. (Guttiferae, Clusiaceae) is known as Cha-muang in Thailand. The fruits and leaves of Cha-muang are used for the improvement of blood circulation, as an expectorant and a laxative (Poomipamorn and Kumkong, 1997). Cha-muang extracts can be used to inhibit pathogenic bacteria and yeast. There are many researches about Nham but there did not have any report about an application of Cha-muang leaf in pork Nham. Therefore, this study was mainly focus on the effect of adding Cha-muang leaf to pork Nham on chemical and microbiological quality.

MATERIALS AND METHODS

Fresh Cha-muang leaves were cleaned with water, airing and chop into small pieces. Nham (6 kg) was prepared by mixing ground pork 4.2 kg and cooked pork skin 1.8 kg with the following ingredients: garlic 480 g, sodium nitrite 108 g, trisodium polyphosphate 24 g, monosodium glutamate 12 g, sugar 24 g and sticky rice 480 g. Nham samples were divided into 5 groups including control (Nham without Cha-muang leaf) and Nham with Cha-muang leaf at different levels (0, 1, 2, 3 and 4%). After mixing with Cha-muang leaf, 60 g of Nham samples was wrapped with plastic bags and incubated at 30°C for 3 days. Repeat 3 times.

Nham was withdrawn everyday to determine pH values (Mettler Toledo AG-8063, Switzerland) and lactic acid content by the method of Friendrich (2001). Lactic acid bacteria (LAB) count was carried out according to AOAC (2006), incubated at 37°C for 48 hours.

The experimental design was a Completely Randomized Design (CRD). Analysis of variance (ANOVA) was used to estimate the degree of variation and significance of difference.

RESULTS AND DISCUSSION

Effect of using Cha-muang leaf on pH and lactic acid content of pork Nham

It was showed that the addition level of Cha-muang leaf affected pH value in pork Nham (Table 1) throughout fermentation period ($p < 0.05$). The pH values of Nham with Cha-muang leaf were lower than control. Cha-muang leaf has sour taste that resulted in low pH in Nham consistent with report of Visessanguan et al. (2004 and 2006). They recommended that pH value of Nham should be lower than 4.6 for preventing the growth of pathogenic bacteria such as *Salmonella* spp., *S. aureus* and *L. monocytogenes*. As showed in Table 1, all Nham with Cha-muang leaf exhibited decrease in pH to be lower than 4.6 during the first day of fermentation. The pH of Nham continued to decrease until reach the final values of 4.08 to 4.22 which indicated that it was safe for consumption.

Table 1. Effect of using Cha-muang leaf on the pH value in pork Nham (mean \pm SD) during fermentation time

Addition level (%)	Fermentation time (day)			
	0	1	2	3
0	5.47 \pm 0.07 ^a	4.68 \pm 0.05 ^a	4.45 \pm 0.02 ^a	4.27 \pm 0.04 ^a
1	5.41 \pm 0.05 ^a	4.54 \pm 0.03 ^b	4.29 \pm 0.03 ^b	4.22 \pm 0.01 ^b
2	5.31 \pm 0.02 ^b	4.40 \pm 0.01 ^c	4.22 \pm 0.03 ^c	4.16 \pm 0.01 ^c
3	5.26 \pm 0.09 ^{bc}	4.35 \pm 0.01 ^{cd}	4.19 \pm 0.04 ^{cd}	4.14 \pm 0.01 ^c
4	5.19 \pm 0.00 ^c	4.31 \pm 0.02 ^d	4.14 \pm 0.01 ^d	4.08 \pm 0.00 ^d

^{a,b,c,d} Means in the same column with different superscripts differ significantly ($p < 0.05$)

From Table 2, the results showed that lactic acid content in pork Nham with Cha-muang leaf increased after one day of fermentation and continued to increase until the end of fermentation ($p < 0.05$). High lactic acid content was obtained from Nham with Cha-muang leaf when the level of Cha-muang leaf increased. The highest lactic acid content was obtained from Nham with Cha-muang leaf at the level of 4% during fermentation for 3 days. It has been found that a decrease in pH, lactic acid content continuously increased as fermentation time increased. Lactic acid is found to be a major contributor to the acid aroma and taste of Nham.

Table 2. Effect of using Cha-muang leaf on the lactic acid content in pork Nham (mean \pm SD) during fermentation time

Addition level (%)	Fermentation time (day)			
	0	1	2	3
0	0.53 \pm 0.03	0.66 \pm 0.03 ^c	0.93 \pm 0.05 ^d	1.08 \pm 0.05 ^{bc}
1	0.54 \pm 0.00	0.70 \pm 0.02 ^{bc}	1.01 \pm 0.03 ^c	1.24 \pm 0.12 ^{ab}
2	0.57 \pm 0.05	0.78 \pm 0.09 ^b	1.05 \pm 0.03 ^{bc}	1.03 \pm 0.09 ^c
3	0.53 \pm 0.02	0.90 \pm 0.03 ^a	1.09 \pm 0.02 ^b	1.17 \pm 0.09 ^{bc}
4	0.57 \pm 0.00	0.92 \pm 0.05 ^a	1.15 \pm 0.02 ^a	1.35 \pm 0.11 ^a

^{a,b,c,d} Means in the same column with different superscripts differ significantly ($p < 0.05$)

Effect of using Cha-muang leaf on lactic acid bacteria of pork Nham

It has been found that LAB count increased to a maximum of 8.08 to 8.45 log cfu/g within the first day of fermentation and remained constant until the fermentation was completed (Table 3). Valyaservi et al. (2001) indicated that Lactobacilli are the major producers of lactic acid, responsible for the decrease in pH and the increase in acidity during the fermentation. The results showed that LAB count in pork Nham with Cha-muang leaf was higher than control during fermentation. This might be the LAB from Cha-muang leaf according to the results of Khieokhachee et al. (1997) that initial flora of Nham derived from

the raw materials. However, higher LAB would be an advantage for Nham fermentation process.

Table3. Effect of using Cha-muang leaf on the number of lactic acid bacteria (log cfu/g) in pork Nham(mean±SD)during fermentation time

Addition level (%)	Fermentation time (day)			
	0	1	2	3
0	6.68±0.16	8.08±0.13 ^b	8.12±0.13	8.16±0.05 ^c
1	6.71±0.19	8.28±0.15 ^a	8.26±0.14	8.42±0.09 ^a
2	6.79±0.03	8.38±0.03 ^a	8.19±0.20	8.38±0.04 ^{ab}
3	6.67±0.13	8.38±0.03 ^a	8.32±0.12	8.29±0.04 ^b
4	6.74±0.11	8.45±0.09 ^a	8.45±0.05	8.31±0.09 ^{ab}

^{a,b,c}Means in the same column with different superscripts differ significantly (p<0.05)

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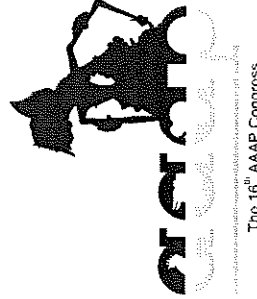


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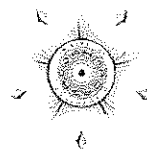
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