

EFFECT OF AUTOCHTHONOUS STARTER CULTURE ON MICROBIOLOGICAL QUALITY OF TRADITIONAL THAI FERMENTED MEAT PRODUCT

Pussadee Tangwatcharin^{1*}, Jiraroj Nithisantawakhup¹, Supaluk Sorapukdee¹, Komkhae Pilasombut¹ and Nahathai Vijitrothai¹

¹Department of Animal Production Technology and Fisheries, Faculty of Agricultural Technology, King Mongkut's Institute of Technology Ladkrabang, Bangkok 10520, Thailand.

*Corresponding author email: putang3009@hotmail.com

Abstract – The research aims to evaluate microbiological quality of traditional Thai fermented meat production elaborated with probiotic *Lactobacillus plantarum* KL2 isolated from traditional Thai sausage as autochthonous starter culture. The result showed that the addition *L. plantarum* KL2 (4 log cfu/g) produced better quality of traditional Thai fermented meat product than control. Microbiological analysis showed high population of lactic acid bacteria in traditional Thai fermented meat product inoculated *L. plantarum* KL2 and none of yeast and mold, *Escherichia coli*, *Staphylococcus aureus* and *Salmonella* spp. was detected. Preference test revealed that traditional Thai fermented meat product with the addition of *L. plantarum* KL2 is the most preferable product.

Key Words – *Lactobacillus plantarum*, traditional Thai fermented meat, pathogen.

I. INTRODUCTION

Traditional Thai fermented meat product involves the participation of main lactic acid bacteria (LAB). The fermented meat products are manufactured with traditional technologies without adding starter cultures. This process favours the growth of autochthonous microflora, which influences the flavour, texture, nutritional qualities, safety, and other characteristics of fermented meat. However, the use of starter cultures for fermented sausage production would guarantee obtaining products with repeatable hygienic and organoleptic qualities in a shorter ripening time. It is considered that non-autochthonous starter cultures could have a negative impact on the sensory properties of the product, and their use often results in losses of desirable sensory characteristics [1]. In an attempt to investigate the feasibility of using autochthonous selected starter culture, *L. plantarum* KL2, for the production of fermented meat, the present study evaluated the effect of autochthonous starter culture on the microbiological quality of traditional Thai fermented meat product.

II. MATERIALS AND METHODS

Strain and growth condition of starter culture: The strain *L. plantarum* KL2 was previously isolated from traditional Thai fermented meat product as autochthonous starter culture. This starter culture had already screened and assessed preliminary probiotic property in previous study [2]. The starter culture was stored in MRS broth at -20 °C.

Preparation of traditional Thai fermented meat product: The traditional Thai fermented meat product was prepared three batches of 2 kg: control (without starter cultures) and autochthonous starter culture (inoculated 1×10^4 cfu/g of *L. plantarum* KL2 strain). After mixing, the mixtures were stuffed into 30 mm diameter and approximately 24 cm length polyethylene casing. The products were fermented at 30°C for 3 days. Samples (2 fermented meats of each batch) were taken at 0, 1, 2 and 3 days of fermentation process, and each microbiological and pH value analysis was performed in triplicate.

Microbiological analysis: For the microbial counts, LAB were counted on MRS agar modified method from Axelsson (2004) [3], incubated at 35°C for 48 h under 5% CO₂. Yeast and mold were determined on potato dextrose agar after incubated at 30°C for 5 days. For the pathogen analysis, *Escherichia coli*, *Staphylococcus aureus* and *Salmonella* spp. were analyzed according to BAM [4].

Statistical analysis: Data were presented as means and standard deviations. All statistical computations were performed to determine significant differences ($p < 0.05$) by ANOVA followed by Duncan's new multiple range test.

III. RESULTS AND DISCUSSION

The count of LAB was higher in the inoculated batches than in the control batch during three days of the fermentation process ($p < 0.05$) (Table 1). At the end of the fermentation process, the counts of LAB were higher than 9 and 10 log cfu/g in control and added autochthonous starter culture batches, respectively. It is demonstrate their ability to compete with the natural back ground microbiota at the end of the fermentation process. *L. plantarum* KL2 drives the fermentation process and may enhance the production of acidic compounds during fermentation. The pH value is implications of sugar metabolism by LAB, in which the sugar is converted into lactic acid, thus lowering pH values [5]. With respect to the effect of added autochthonous starter culture on other microbial groups, the counts of yeast and *S. aureus* did presented relevant differences between the added autochthonous starter culture batch and the control batch during the fermentation process. These counts in adding autochthonous starter culture batch showed a decrease during the first 2 days of processing until the final product at lower than 1 log cfu/g. On the other hand, these counts in control batch showed an increase during the first 1 days of fermentation process and then remained constant until the final product at levels of 3.35 and 3.80 log cfu/g, respectively. *L. plantarum* has growth inhibitory property against *S. aureus* [6]. Additionally, the counts of mold, *E. coli* and *Salmonella* spp. were similar in the control and added autochthonous starter culture batches, showing at lower than 1 log cfu/g, < 3 MPN/g and not detectable in 25 g, respectively, during the fermentation process (Table 1).

Table 1. Evolution of the counts of LAB, yeast, *S. aureus* and pH value in the traditional Thai fermented meat product for 3 days of ripening process

Ripening days	LAB (log cfu/g)		Yeast (log cfu/g)		<i>S. aureus</i> (log cfu/g)		pH value	
	Control	Starter culture	Control	Starter culture	Control	Starter culture	Control	Starter culture
0	3.96±0.17A	4.34±0.19A	2.60±0.01A	2.39±0.12A	2.65±0.07A	2.35±0.19A	6.14±0.13A	6.12±0.02A
1	7.23±0.19A	8.82±0.02B	2.91±0.19A	2.15±0.21B	3.69±0.32A	2.39±0.12B	5.58±0.08A	5.05±0.05B
2	8.15±0.16A	8.96±0.34B	3.02±0.09	<1.00	3.58±0.29	<1.00	4.95±0.05A	4.53±0.07B
3	9.45±0.12A	10.25±0.08B	3.35±0.20	<1.00	3.80±0.08	<1.00	4.68±0.02A	4.26±0.01A

A-B Treatments followed by different letters in same row of each parameter were significant different ($p < 0.05$).

IV. CONCLUSION

The results obtained in this study indicate that *L. plantarum* KL2 can be used as autochthonous starter culture of traditional Thai fermented meat product. The microbiological quality and pH value of traditional Thai fermented meat product with the addition of *L. plantarum* KL2 were better than that of control.

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