EFFECTS OF PENERGETIC FRESH WAVE AT DIFFERENT LEVELS FOR EXTENDING THE SHELF LIFE OF SAUSAGE

Lertpatarakomol, R.[1*], Trairatpaiwan, T.[1], Sirimongkolworakul, S.[2], Jaipeng, P.[3], Paditporn, K.[3] and Mitchaothai, J.[3]

[1]Department of Animal Science and Veterinary Basic Science, Mahanakorn University of Technology, Bangkok 10530, Thailand;

[2]Department of Pre-Clinic, Mahanakorn University of Technology, Bangkok 10530, Thailand;

[3]Department of Clinic, Mahanakorn University of Technology, Bangkok 10530, Thailand;

*Corresponding author email: rachakris@gmail.com

Abstract – The objective of this study was to test the efficiency of Penergetic Fresh Wave for extend the shelf life of sausage during storage times. The experimental design was consisted of 4 treatments as a completely randomized design, which included sausage supplemented with 0.00%, 0.25%, 0.50%, and 1.00% Penergetic Fresh Wave. Samples of each treatment were taken to evaluate pH, purge loss and total bacteria count at 0, 14, 21, 28 and 35 days after processing. At about 35 days, the results showed that Penergetic Fresh Wave slightly decreased (P<0.05) pH and significantly decreased (P<0.05) purge loss and total bacteria count of sausage. Conclusion, Penergetic Fresh Wave can be extended shelf life of sausage up to 35 days of storage times.

Key Words – *Indian Basilic*, processed meat, storage life

I. INTRODUCTION

Sausages comprise the mixtures of meats, fat and spices stuffed into casing. Sausages deteriorate relatively rapidly due to both microbial spoilage and oxidative rancidity. Generally, sausages must be kept in a refrigerator at a temperature close to 0° to 4°C. Cooked sausage or ready-to-eat sausage storage life at supermarket or convenience store is usually 21 to 28 days. Preservatives are used in processed meats for food safety, shelf life and food technology properties. However, some preservatives can have adverse affects on health [1, 5].

Tulsi (*Indian Basilic*) is a plant which uses as therapeutic food ingredient for human. Fresh Tulsi has an antioxidant properties which reduce the damaging of cell. Penergetic Fresh Wave, high purity natural calcium carbonate, was contained the information of Tulsi. There have benefits on stabilize structure of the cells, stimulate oxygen for aerobic situation and slow down the degradation process of products. The objective of this study was to test the efficacy of Penergetic Fresh Wave at different levels for controlling the microbial proliferation and slow down the process of degradation or extend the shelf life of sausage during storage times.

II. MATERIALS AND METHODS

The experimental design was consisted of 4 treatments with 3 replicates per treatment as a completely randomized design (CRD). The experimental treatments were divided into 1) sausage without Penergetic Fresh Wave (0.00%), 2) sausage with 0.25% of Penergetic Fresh Wave (0.25%), 3) sausage with 0.50% of Penergetic Fresh Wave (0.50%), and 4) sausage with 1.00% of Penergetic Fresh Wave (1.00%). The ingredients of sausage were composed of 50% pork, 30% lard, 20% water, and seasoning. After processing, all samples were kept in vacuum bag and storage in the refrigerator (0-4°C) until further processes. Samples of each treatment were taken to evaluate pH, purge loss and total bacteria count at 0, 14, 21, 28 and 35 days after processing. Data were analyzed using Analysis of Variance (ANOVA).

III. RESULTS AND DISCUSSION

The results of this study were illustrated in Table 1. During storage times, Penergetic Fresh Wave affected on slightly decreased (P<0.05) pH of sausage (P<0.05). In this case, anaerobic glycolysis proceed during handling, processing and storage results in a pH decline and directly affects quality of products. The rate and extent of pH decline are major determinants of product quality. A lower pH is associated with reduced water-holding capacity [2, 4]. According to these result, the finding of this study showed that increasing in Penergetic Fresh Wave levels significantly decreased (P<0.05)

purge loss of sausage. Generally, one of the most product qualities is unacceptably high moisture loss. Unacceptably moisture loss results in economic losses in several ways including reduction in salable product weight and the loss of customers who demand high quality product with a minimum amount of purge. In addition, water-soluble nutrients are lost along with moisture [2, 3]. At about 35 days of storage time, the results showed that sausage supplemented with 0.50% and 1.00% Penergetic Fresh Wave had significantly lower ($P<0.05$) total bacteria count, while sausage without Penergetic Fresh Wave had a significantly lower total bacteria count ($P<0.05$) than sausage supplemented with 0.25% Penergetic Fresh Wave. It might be due to a pH decline in sausage without Penergetic Fresh Wave resulted in decreasing the microbial growth.

Table 1 pH, purge loss and Total bacteria count of sausage during storage times

Days	Penergetic Fresh Wave				P-value
	0.00%	0.25%	0.50%	1.00%	
	---------- Sausage pH ----------				
0	6.30	6.33	6.37	6.35	0.069
7	6.23^{c}	6.35^{b}	6.36^{b}	6.41^{a}	<0.01
14	5.95^{b}	6.42^{a}	6.40^{a}	6.46^{a}	<0.01
21	5.51^{c}	6.07^{b}	6.06^{b}	6.30^{a}	<0.01
28	5.29^{d}	5.53^{c}	5.86^{b}	6.22^{a}	<0.01
35	5.05^{d}	5.45^{c}	5.66^{b}	6.28^{a}	<0.01
	---------- Purge loss (%) ----------				
0	0.00	0.00	0.00	0.00	N/A
7	4.23	4.36	3.78	3.94	0.720
14	5.81^{a}	3.19^{b}	3.26^{b}	4.59^{ab}	0.049
21	7.18^{a}	4.95^{b}	5.46^{b}	4.33^{b}	0.015
28	8.26^{a}	8.31^{a}	6.03^{b}	5.42^{b}	0.003
35	8.30^{a}	6.06^{b}	6.92^{b}	4.81^{c}	0.019
	---------- Total bacteria count (log CFU) ----------				
0	3.59^{b}	3.45^{b}	4.40^{a}	3.58^{b}	0.038
7	4.61^{b}	5.08^{a}	5.38^{a}	3.65^{c}	<0.01
14	5.39^{a}	4.28^{b}	4.70^{b}	5.25^{a}	<0.01
21	5.48	5.26	4.94	5.03	0.382
28	4.63^{c}	3.70^{b}	5.26^{a}	3.10^{d}	<0.01
35	4.92^{b}	5.48^{a}	4.39^{c}	4.25^{c}	<0.01

^{a,b,c,d} Means within the same row with different letters are significantly difference at $P<0.05$.
N/A = Not analysed

IV. CONCLUSION

In summary, the results of this study might be concluded that sausage supplemented with 0.50% and 1.00% Penergetic Fresh Wave had an efficiency to reduce purge loss and control microbial proliferation up to 35 days of storage times.

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