



Properties of fermented milk added with unripe *Rubus coreanus* extracts using different extraction methods

National Institute of
Animal Science

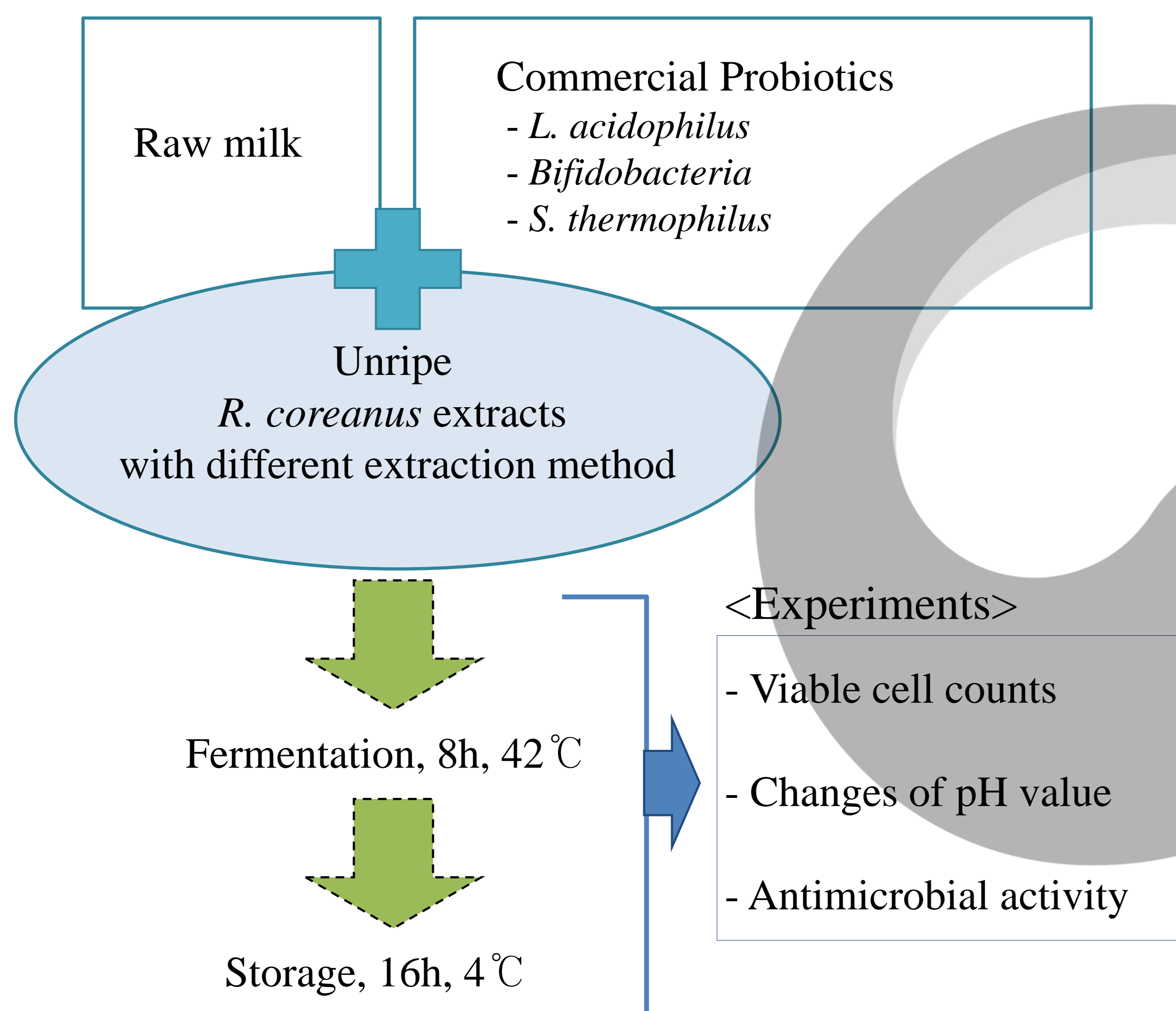
Bu Min Kim*, Jong-Hui Kim, Jun-sang Ham, Mi-Hwa Oh
National Institute of Animal Science, Rural development Administration

ABSTRACT

This study was carried out to evaluate the quality characteristics of fermented milk added with 1.0%, 3.0% and 5.0% unripe *Rubus coreanus* extractions. The extraction methods of unripe *Rubus coreanus* were aqueous extraction(AE), 30%-ethanol(30-E) and 70%-ethanol(70-E) extractions. The pH was decreased in all treatments during the fermentation. The number of viable cells was increased in fermented milk added extracts, but changes of lactic acid bacteria population showed slightly difference depending on addition concentration of *R. coreanus* extracts. Fermented milk with *R. coreanus* showed antimicrobial activity was increased with increasing *R. coreanus* concentration. It was effective in suppression of *Listeria monocytogenes* and *Escherichia coli*, while there was no antibacterial effect against *Salmonella enterica* and *Staphylococcus aureus*. However, there was no significant difference according to extraction methods. These results suggest that fermented milk with 1.0% concentration of *R. coreanus* could enhance antimicrobial activity as a biopreservative during fermentation.

Materials and Method

Preparation of fermented milk with unripe *R. coreanus*



Extraction method and contents

EtOH Conc. for extraction	Contents
0% EtOH (Aqueous)	1%
	3%
	5%
30% EtOH	1%
	3%
	5%
70% EtOH	1%
	3%
	5%

Indicator for antimicrobial test

- *Salmonella enterica* ATCC 27869
- *Staphylococcus aureus* ATCC 33591
- *Escherichia coli* CCARM 0238
- *Listeria monocytogenes* ATCC15313

Reference

- Ji Wung, K., Hee Kwon, L., Hee Jeon, P., & Ji Young, S. (2012). Physiological Activities of *Rubus coreanus* Miq. Extracts Using Different Extraction Methods. *KOREAN JOURNAL OF FOOD AND COOKERY SCIENCE*, 28(1), 25-32.
- do Espírito Santo, A. P., Perego, P., Converti, A., & Oliveira, M. N. (2012). Influence of milk type and addition of passion fruit peel powder on fermentation kinetics, texture profile and bacterial viability in probiotic yoghurts. *LWT - Food Science and Technology*, 47(2), 393-399

Result

Table 1. The viable cells of fermented milk with different content of unripe *R. coreanuse* extract

Changes of lactic acid bacterial population were showed during the fermentation and storage of fermented milk. At the end of fermentation, probiotic counts were about 1~2Log CFU·mL⁻¹ lower in milk fermented with the extract, regarding its control. Moreover, the addition of the extract had more influence on the counts of probiotics in generally. Interestingly, There was about 2 Log CFU·mL⁻¹ reduction of probiotic counts after 16h storage in treatment of 70%-EtOH and 5% content. There was no significant difference according the way of extraction

EtOH Conc. (%)	Content (%)	Probiotic counts (log CFU·mL ⁻¹)		
		0h	8h	24h**
Control*	-	7.13 ± 0.06	9.01 ± 0.00	8.75 ± 0.05
	1	6.43 ± 0.02	8.85 ± 0.07	8.69 ± 0.03
	3	6.29 ± 0.05	7.97 ± 0.01	8.02 ± 0.11
0	5	6.57 ± 0.15	7.33 ± 0.06	7.34 ± 0.02
	1	6.92 ± 0.16	8.72 ± 0.03	8.33 ± 0.24
	3	6.52 ± 0.01	7.91 ± 0.07	8.02 ± 0.08
30	5	6.31 ± 0.01	7.37 ± 0.05	7.48 ± 0.03
	1	6.63 ± 0.05	8.32 ± 0.03	8.10 ± 0.04
	3	6.24 ± 0.14	8.08 ± 0.05	8.17 ± 0.06
70	5	5.84 ± 0.09	8.32 ± 0.03	6.47 ± 0.00

*Control: fermented milk without unripe *R. coreanus* extraction

**24h: Storage for 16h at 4°C after fermentation

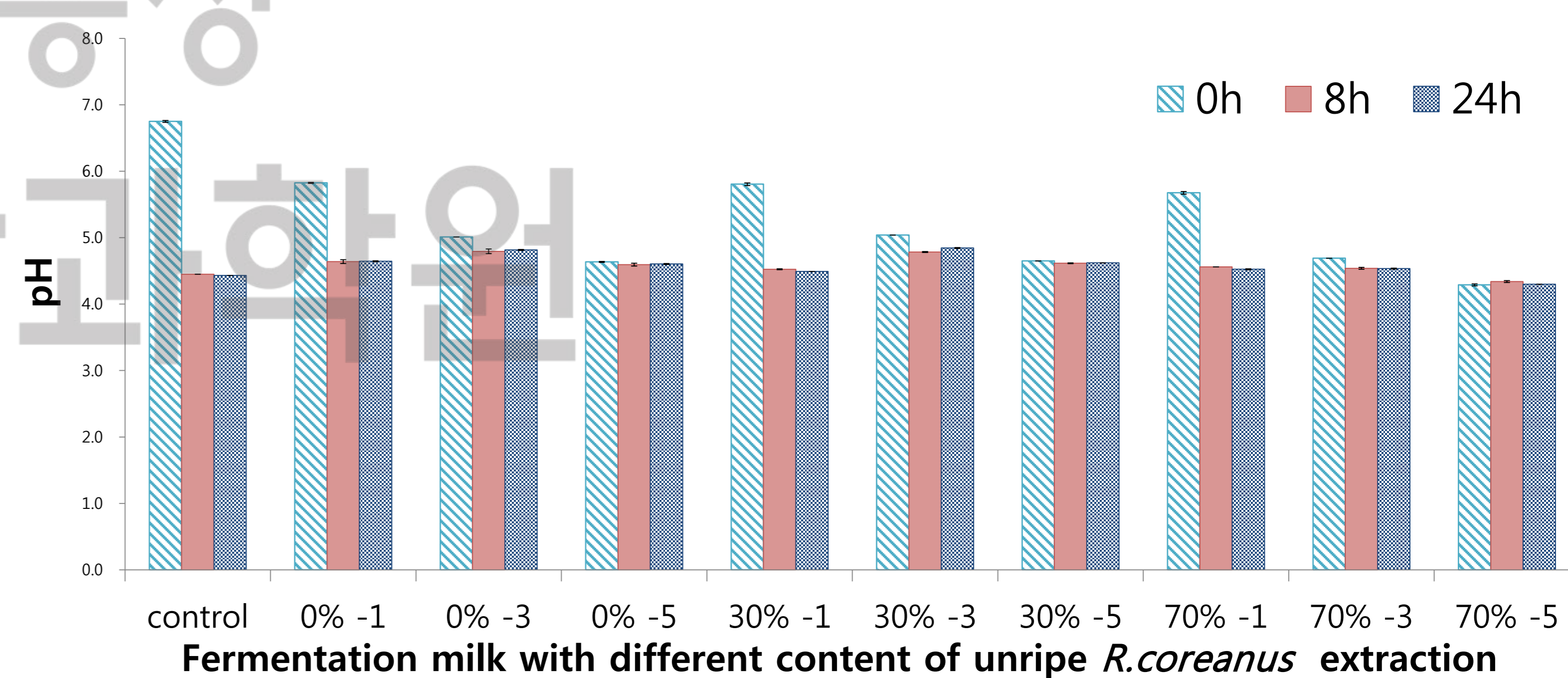


Figure 1. Changes in pH during the preparation of fermented products with different content of unripe *R. coreanuse* extract

The pH was decreased in all the treatment during fermentation, while there was little change of pH value during refrigerated storage time, The lower content of the supplement showed the higher reduction of pH value. Moreover, there was no changes of pH according to EtOH concentration for extraction

Table 2. Antimicrobial activity

Fermented milk with unripe *R. coreanuse* showed antibacterial activities against three strains; *S. aureus*, *E. coli*, *L. monocytogenes*.

EtOH Conc. (%)	Content (%)	Inhibition zone (mm)			
		<i>S. enterica</i>	<i>S. aureus</i>	<i>E. coli</i>	<i>L. monocytogenes</i>
control	-	ND	ND	11	11
	1	ND	10	12	12
	3	ND	11	14	13
0	5	ND	11	15	14
	1	ND	10	12	12
	3	ND	11	14	13
30	5	ND	11	15	14
	1	ND	10	12	12
	3	ND	11	14	13
70	5	ND	9	15	14