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Physicochemical properties and sensory characteristics of Kwark cheese with *Bifidobacterium longum* KACC 91563

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Introduction

The use of probiotic lactic acid bacteria (LAB) is a current topic of interest and a growing trend in the dairy industry. Probiotic bacteria are primarily used to manufacture dairy products. Especially, cheese has been shown to be a good medium for transfer of probiotics into the intestine, as the cheese creates a buffer against the highly acidic conditions in the gastrointestinal tract (GIT) and thus creates a favorable environment for bacterial survival during gastric transit (Karimi *et al.*, 2012a, b; Ortakci *et al.*, 2012). Supplementation of cheeses with probiotic LAB adds value and provides potential health benefits (Gomes *et al.*, 2011; Minervini *et al.*, 2012). In a previous study, we isolated probiotics from fecal samples of healthy Korean neonates. We have used one of the bacteria isolated in the previous study in this study, *Bifidobacterium longum* KACC 91563, a subspecies of *B. longum*, as it is a well-known probiotic strain that exhibits positive host effects (Shanahan, 2010). In addition, *B. longum* KACC 91563 produces family 5 extracellular solute-binding protein (ESBP), which not only reduces food allergies (Kim *et al.*, 2016).
However, the combined use of functional probiotic bacteria with the Kwark cheese starter has seldom been reported. Therefore, in this study, Kwark cheese was manufactured with *B. longum* KACC 91563, and its physicochemical and sensory properties, as well as the survival of the probiotic bacteria, were evaluated.

Materials and Methods

Kwark cheese was manufactured using the method described by Davis (1976), with some modifications, as shown in Fig. 1. Kwark cheese was made using 10 L of pasteurized milk (63°C, 30 min) that was then cooled to 33℃ using a cheese vat. The milk was inoculated with starter culture (0.002% CHN-11, v/v), and then the same amount of *B. longum* KACC 91563 (approximately 10^5-10^6 CFU/g) was separately added to the milk. The control cheese was produced with starter culture alone. Rennet (100 μL/10 mL) was added and mixed thoroughly. The cheese was incubated at 33℃ until it reached pH 4.8. The resulting curd was cut into 2-cm cubes with cheese knives. The whey was removed, and the curds were cooled at low pressure, and then stored at 4℃. And then, physicochemical and microbiological properties of Kwark cheese was analyzed.

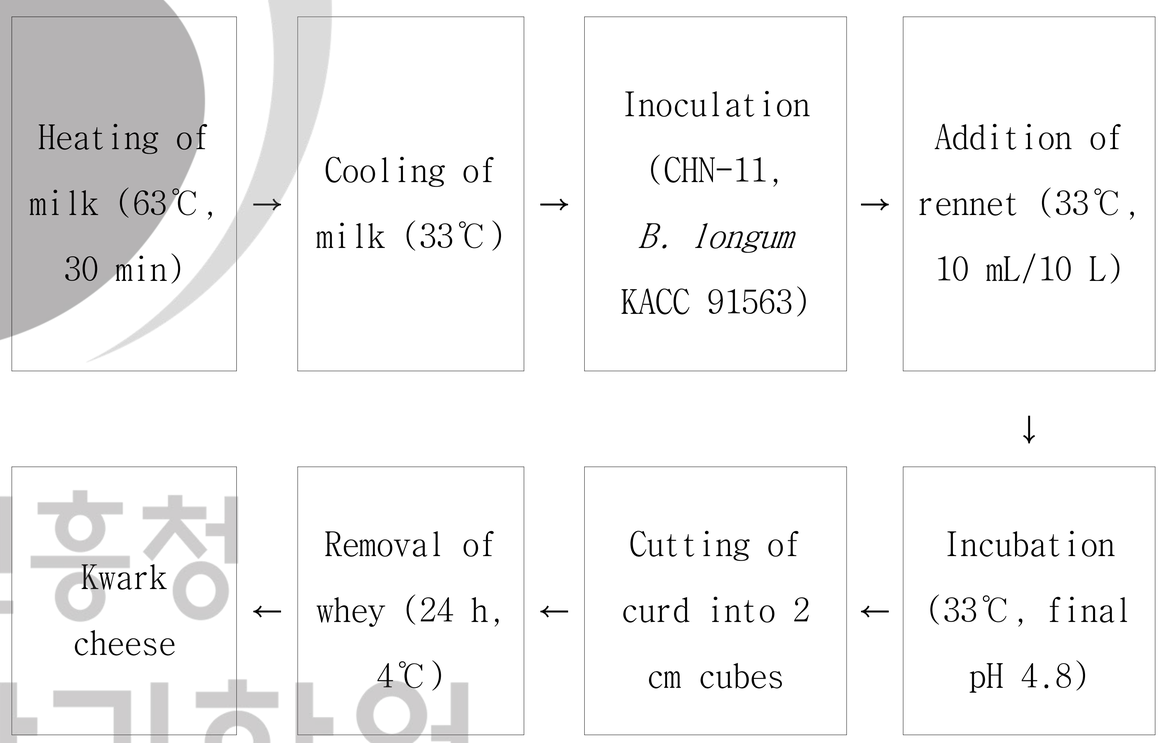

Fig. 1. Protocol for the production of Kwark cheese.

Result

Table 1. pH and chemical composition of Kwark cheese supplemented with *Bifidobacterium longum* KACC 91563

	pH	Moisture	Protein	Fat	Salt
Control	4.52±0.21^{NS}	66.27±4.73^{NS}	12.46±1.89^{NS}	17.50±2.43^{NS}	0.65±0.02^{NS}
Treatment	4.36±0.07	67.10±3.08	12.10±1.77	16.79±1.29	0.70±0.08

Table 2. Viable cell counts in Kwark cheese supplemented with *Bifidobacterium longum* KACC 91563

		MRS	TOS+mup
Kwark cheese	Control	8.26±0.44^{NS}	-
	Treatment	7.74±0.04	7.58±0.05

Table 3. Sensory evaluation of Kwark cheese supplemented with *Bifidobacterium longum* KACC 91563

	Color	Flavor	Texture	Taste	Overall acceptance
Control	7.6 ± 0.1^{NS}	6.1 ± 0.6^{NS}	5.9 ± 0.2^{NS}	5.8 ± 0.6^{NS}	6.2 ± 0.9^{NS}
Treatment	7.7 ± 0.2	6.3 ± 0.6	6.0 ± 0.3	5.8 ± 0.3	6.3 ± 0.4

Summary

- Because of remaining viable at >10^7 CFU/g in the Kwark cheese incorporating *B. longum* KACC 91563, an everyday consuming 10 g of Kwark cheese would meet the minimum probiotics requirement.
- Kwark cheese added with effective *B. longum* KACC 91563 against food allergies made in this study may be adequate products as probiotic or functional food.

References

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