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Use of conjugated linoleic acid (CLA) producing bacteria to develop sustainable goat milk product in Thailand

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Abstract

Conjugated linoleic acid (CLA) is a beneficial fatty acid for consumer health. It has properties that help reduce body weight and fat, promote muscle mass development, and maintain normal blood sugar and insulin levels. CLA can be found naturally in small amounts in the milk and tissues of ruminant animals. It is biosynthesized by rumen bacteria during the biohydrogenation process, where lactic acid bacteria isomerize long-chain unsaturated fatty acids (C18) into CLA isomers. Additionally, the free alkyl radicals in milk proteins help protect CLA from oxidation and prevent its conversion to unhealthy trans isomers. This study aimed to determine optimal conditions for CLA production by lactic acid bacteria in goat milk and develop a high-CLA goat milk product. Rumen-isolated strains were used along with other cultures to produce yogurt. Variables tested included fermentation temperature 44 °C, incubation time (5–9 hours), inoculum concentration (105–109 $^{\mathrm{CFU}}/_{\mathrm{mL}}$), and milk fat content (normal vs high-fat). The results showed that yogurt produced from starter cultures of Lactobacillus plantarum TISTR 2265, Lactobacillus bulgaricus TISTR 451, and Streptococcus thermophilus TISTR 894, incubated at 44°C for 9 hours, yielded a high-CLA product containing 35.59 ± 0.60 to 51.47 ± 1.01 mg per 100g sample, depending on the goat milk fat content of 3 to 7 %, respectively. The products passed sensory evaluation with scores of 3.64–4.34 on a 5-point hedonic scale across various sensory attributes. The results and knowledge gained from this study can be applied to sustainable farmer and industrial processing of high-CLA products, creating a unique identity and product perception.

Keywords: Conjugated Linoleic Acid, Fatty acid, Goat Milk, Goat Milk Product, Sustainable Product

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