Isolation of lactic acid bacteria strains suitable for producing high quality silage in Thailand

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Objectives

Silage feeding is an effective and easily adaptable technique despite its limited application in Thailand. The use of high quality silage is a highly dependable means of increasing and stabilizing the quality of raw milk production (Ohmomo et al, 2002); however, successful results are not always ensured if ensilage depends on natural fermentation. In order to address this problem, lactic acid bacteria (LAB) strains suitable for silage making in Thailand were screened.

Results

Previously, 13 LAB strains having culture filtrate pH levels less than 4.0 at 45℃ were selected out of 215 strains isolated from 14 silage samples prepared in Thailand. Each strain was carefully monitored for silage fermentation inoculants, using the modified pouch method to simulate a tropical environment (Ohmomo et al, 2004a). The various profiles of lactate production in the four isolates, CS 1–8, CS 5–5, KS 1–9 and SP 1–3, were confirmed. The time courses of lactate production in the cultures using the modified pouch method with various inoculum sizes are shown in Fig. 1. The most important property of LAB strains in terms of silage making is their high ability to produce lactate during the silage fermentation process, which is a type of solid-mixed, non-sterilized fermentation. This property becomes further apparent when using the modified pouch method. Strain SP 1–3 isolated from corn silage and tentatively assigned to *Lactobacillus plantarum* exhibited an inherent tolerance for high incubation temperatures and lactate. Strains CS 5–5 and KS 1–9, isolated from corn silage and tentatively assigned to *Pediococcus* sp., also exhibited similar properties to strain SP 1–3, but they showed weaker lactate tolerance than that of strain SP 1–3. Strain CS 1–8, isolated from TMR silage and tentatively assigned to *Pediococcus* sp., displayed steady growth during the early stages of silage fermentation, but did not accumulate much lactate by the end of the long-term fermentation (Ohmomo et al, 2004b).

Based on these results, laboratory-scale silage of Napiergrass inoculated with strain SP 1–3 and/or CS 1–8 was prepared. The fermentation quality of silage inoculated with LAB strains significantly increased the quantity of lactate produced (close to double the amount) and reduced counts of coliform bacteria and yeast. From these results, both SP 1–3 and CS 1–8 were considered to be suitable strains for use as silage fermentation inoculants in tropical regions.

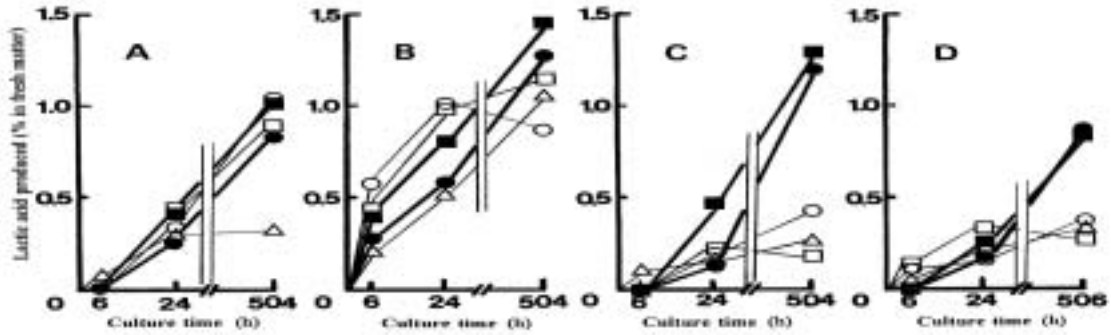

Fig. 1. Time course of lactate production by typical isolates using various modified inoculum sizes. Inoculum size (cfu/ml): A (LAB 10^2, CFB 10^2, Yeast 10^2); B (LAB 10^5, CFB 10^2, Yeast 10^2); C (LAB 10^2, CFB^5, Yeast 10^2); and D (LAB 10^2, CFB 10^2, Yeast 10^5). Symbols: ■ (strain SP 1–3); ● (strain CS 5–5); ○ (strain CS 1–8); △ (strain LS 2–38); and □ (strain KS 1–9).

References

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