ABSTRACT

TRIANA SETYAWARDANI. Characterization and Utilization of Lactic Acid Bacteria from Goat Milk with Probiotic Cheese Characteristic. Under supervision of WINIATI P. RAHAYU, RARAH RATIH ADJIE MAHESWARI and NURHENI SRI PALUPI

The development of functional food products in Indonesia contributes to the increase in the utilization of lactic acid bacteria (LAB) as indigenous probiotic microorganisms. The research was conducted in 4 (four) stages, namely: (1) isolation and identification of LAB from goat milk, (2) determination of probiotic LAB in vitro (3) production of probiotic cheese and its characterization and (4) determination of functional properties of LAB. A total of 16 BAL from Peranakan Ettawa (PE) goat milk and 17 isolates from Peranakan Saanen (PESA) goat milk were successfully isolated and identified. BAL obtained from the first experiment met the general criteria as lactic acid bacteria. In vitro test on BAL showed that 18 isolates were endured to low acid (2.0, 2.5 and 3.2) with decline of viability <1.0 log cfu ml$^{-1}$, and 8 isolates were endured to bile salt (0.3%) with decline of viability 1-3 log cfu ml$^{-1}$. Isolates with code TW 2, 3 and 32 were identified as L. rhamnosus with similarity level of 99.9; 99.3 and 99.9%. Isolates with code TW 4, 10, 14, 26 and 28 were identified as L. plantarum with similarity level of 89.2; 99.9; 99.9, and 99.9%. Then, the 8 isolates were tested for their antimicrobial properties. Eight isolates were able to slow down the growth of Gram negative bacteria and 5 isolates were able to successfully make attachment on the intestinal mucosa. The use of mixed cultures of isolate L. rhamnosus TW2 and L. plantarum TW14 produced cheese with good characteristics. Other findings have also revealed that the use of probiotic in combination or mixes gave more beneficial effects on cheese properties than single culture. The use of mixed cultures produced cheese with hardness 34.73 gf and cohesiveness -10.18 gs, protein content of 33.88%, fat content of 34.42%, and The cheese possessed texture, taste and flavor similar to soft cheeses from the markets. During storage, soft cheese showed an excellent stability with number of LAB remains high after four weeks of storage for all treatments, which was in the range of $8.59 – 9.69$ log cfu g$^{-1}$. Administration of mixed probiotic isolates was effective to prevent the intervention of S. Typhimurium after 13 days of administration. The prevention function was shown from the higher number of detected LAB in ileum and caecum by the time of intervention. The ability to prevent infection that might occur was shown from the lowering number of S. Typhimurium detected at the time of intervention, which was lower than control. The recovery function was shown from the absence of S. Typhimurium after 10 days post intervention, and the evidence of higher number of LAB in the caecum than control. In conclusion, L. rhamnosus TW2, and L. plantarum TW14 isolates possesses excellent probiotic characteristics in vitro, and mixed isolates is suitable as probiotic culture for cheese production and for functional foods development due to the excellent characteristics that have been investigated.

Key Words: cheese, functional foods, goat milk, L. rhamnosus, L. plantarum, probiotic