The Role of Antibacterial and Aromatic Materials to the Preservation of Milk

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To avoid spoilage of milk at refrigerated milk due to the growth of psychotrophic bacteria, especially Pseudomonas spp., the role of materials containing antibacterial and aromatic materials to the preservation of milk were investigated. The materials used in this study were honey, materials containing aromatic compounds produced in Indonesia, and Japanese materials containing aromatic substances.

The effect of honey on bacterial growth, protein degradation, and volatile compounds of skim milk and whole milk at storage is summarized. Bacterial growth, protein degradation and flavor compounds were detected by plate counts method, formol titration and GCMS, respectively. The results show that bacterial growth and protein degradations in milk with honey were lower than that without honey. Bacterial growth and protein degradations in whole milk with honey were lower than that in skim milk, respectively ($P<0.05$). At 10 days after the expiry date, the percentages of volatile compounds in whole milk with honey were higher than that without honey, while that in skim milk with honey vice verca. Honey led suppression of bacterial growth and protein degradation, and contributing volatile compounds of stored milk, and whole milk with honey were more acceptable than skim milk with honey.

Antibacterial effects of materials containing aromatic compounds produced in Indonesia on the preservation of skim milk and whole milk at refrigerated storage is summarized. Organoleptic evaluation, bacterial growth, protease activities, lipase activities, protein degradation and acidities of milk with addition of 10% materials containing aromatic compounds were assessed by panelists, total counts, azocasein method, modified dole extraction,

formol and base-acid titrations, respectively. At 5 days, after the expiry date, 19 of the 28 milk containing aromatic compounds were more acceptable than control, and 10 of these were more acceptable than the others, while the whole milk containing aromatic compounds were shown to be more acceptable than the skim. These 10 were the ones with the additions of honey, cinnamon, ginger, turmeric, zingiber, wild ginger, nutmeg, pepper, garlic and galangale.

Utilization of Japanese materials containing aromatic substances for milk preservation as estimated by vapor contact method is summarized. The effects of materials containing aromatic compounds were generated using the "vapor contact method" and bacterial growth was measured by the luminol chemiluminesence method. Wasabi (*Wasabia japonica*) and mustard (*Brassica nigra L.*) were found to be more effective than garlic (*Allium sativum L.*), ginger (*Zingiber officinale Roscoe*), sansho (*Zanthoxylum piperitum*) and peppermint (*Mentha piperita*). In addition to these materials, four types of commercially available food preservation sheets were tested for antibacterial activity. Sheets containing mustard extracts showed stronger antibacterial activities. Eucalyptus extract-treated sheets showed a moderate effect.

These results help the Indonesian dairy Industry in preservation of pasteurized milk at storage, by using materials containing antibacterial and aromatic compounds, for maintaining the quality and increasing the shelf life of the milk. And these suggests the possibility to utilize aromatic substances and food preservation sheets produced in Japan for a long milk in consumer refrigerator.