

## **Fed-batch fermentation of lactic acid bacteria to improve biomass production : A theoretical approach**

### **Abstract**

Recently, fed-batch fermentation has been introduced in an increasing number of fermentation processes. Previous researches showed that fed-batch fermentation can increase the biomass yield of many strains. Improvement of the biomass yield is interested because biomass from lactic acid bacteria (LAB) fermentation is widely used in food and pharmaceutical industry. The aim of this research is to study the ability and feasibility of fed-batch fermentation to improve biomass production of LAB. Appropriate model has been selected from literature. Monod equation described the substrate limitation of LAB and the product inhibition of LAB follows a non-competitive model. Furthermore, the lactic acid production follows Luedeking and Piret model. Then the models are applied to simulate the fermentation of batch and fed-batch cultures by using MATLAB. From the results of simulation, fed-batch fermentation showed that substrate limitation and substrate inhibition can be avoided. Besides that, the variable volume fed-batch fermentation also showed that product inhibition can be eliminated by diluting the product concentration with added fresh feed. However, it was found that fed-batch fermentation is not economically feasible because large amount of substrate is required to reduce the product inhibition effect. Therefore, fed-batch fermentation plays more importance role if the fermentation strain has high  $K_s$  value or low  $K_p$  value. © 2007 Asian Network for Scientific Information.