COMPARISON OF THE PERFORMANCE OF *LACTOBACILLUS DELBRECUKII* IN FED-BATCH AND REPEATED BATCH PROCESSES

A. Senthuran, Vasanthy Arasaratnam and K. Baiasubramaniam
Department of Biochemistry, Faculty of Medicine, University of Jaffna, Shri Lanka

Lactic acid production by *L. delbrueckii*, was studied in fed-batch and repeated batch processes. In both cases the bacteria was grown in whey supplemented with glucose or glucose and nitrogen sources, at room temperature in static culture while maintaining the pH between 5.0 and 6.5. In fed-batch process, where the control had only whey containing $30gl^{-1}$ total sugar, lactic acid production reached a maximum of $15.5gl^{-1}$ at 48h When whey medium was supplemented with yeast extract ($20gl^{-1}$) or $(NH_4)_2SO_4$ ($10gl^{-1}$) lactic acid production reached a maximum of $24.5gl^{-1}$ at 48h and $23gl^{-1}$ at 60h respectively. When the above fermentation medium was supplemented with a total of $40gl^{-1}$ glucose being added equally in two instalments at 36h and 96h of fermentation, the lactic acid production further increased to $35gl^{-1}$ (120h) in $(NH_4)_2SO_4$ containing medium and $56gl^{-1}$ (168h) in yest extract containing medium. In the above experiment instead of glucose supplementation at 36 and 96h, supplementation of glucose and nitrogen sources at 36, 84 and 144h further increased the lactic acid production to $74gl^{-1}$ in $(NH_4)_2SO_4$ containing medium and $80gl^{-1}$ in yeast extract containing medium at 196h. In the repeated batch process whey medium contained $30gl^{-1}$ total sugar and was supplemented with either $(NH_4)_2SO_4$ ($10gl^{-1}$) or a combination of yeast extract ($5gl^{-1}$) and $(NH_4)_2SO_4$ ($7.5gl^{-1}$). As fermentation progressed and when the total sugar decreased to $10gl^{-1}$, 50% of the spent medium was removed and replaced with their respective media containing either total sugar ($50gl^{-1}$) and $(NH_4)_2SO_4$ ($13.0gl^{-1}$) or total sugar ($50gl^{-1}$ and a combination of yeast extract ($6.6gl^{-1}$) and $(NH_4)_2SO_4$ ($9.8gl^{-1}$ to maintain total sugar at $30gl^{-1}$ and elemantal nitrogen level at 0.31% (w/v). The medium supplemented with $(NH_4)_2SO_4$ was repleased thrice at 36, 96 and 144h and lactic acid content in ths spent medium was 18, 23 and $35gl^{-1}$. Similar results were obtained in the whey medium supplemented with a combination of yeast extract and $(NH_4)_2SO_4$. The total lactic acid produced in fed-batch process at 196h was 14.8g in 200ml spent medium ($74gl^{-1}$) and in the repeated batch process at 196h was 11.6g in 500ml spent medium ($23.2gl^{-1}$). These results show that lactic acid production in fed-batch process was better than that of repeated batch process under these experimental conditions.