BATCH CULTURE STUDIES OF *BIFIDOBACTERIUM BIFIDUM*

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ABSTRACT

The growth of *Bifidobacterium bifidus* on batch culture was investigated. Growth was studied with regard to growth rates, substrate utilisation rates, biomass yields and product formation rates. The organism was cultured on a variety of substrates and at different pH values. The objective was to determine whether different sugars or different medium pH values had any effect on specific growth rates, substrate utilisation rates, biomass yields and product formation rates.

B. bifidum (Hansen's strain) from a stock culture obtained from New Zealand Dairy Research Institute (DRI) was used for this study. The organism was grown on TPY medium supplemented with L-cysteine-HCl, sodium chloride, potassium chloride, magnesium chloride, potassium di-hydrogen phosphate, di-potassium phosphate and ammonium chloride. The experiments were carried out at uncontrolled and controlled pH.

At controlled pH, maximum growth of this organism was obtained on medium containing mixed sugars (glucose and lactose) at pH 5.5. On single carbohydrate sources, glucose, maltose and raffinose were readily utilised by this organism to give high rates of growth and formation of products. Very high concentrations of lactose were growth limiting. Lactulose and cellobiose were fermented but with low specific growth and product formation rates, while xylose was not fermented at all.

Growth of *B. bifidum* was pH-dependent. The pH below which this organism did not grow was $3.5 \leq pH \prec 4.1$. Optimum growth occurred at $4.9 \geq pH \geq 6.5$. It was demonstrated

that the A: L (acetic acid to lactic acid) ratio of products was different at different pH.

Accumulation of the fermentation products, in particular, acetic acid, caused limitations on growth. It was demonstrated that this inhibition was pH-dependent. Inhibition was higher at lower pH than at higher pH, and this was a result of the degree of dissociation of the acid at the different pH values.

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