

NITROGEN SUPPLEMENTATION OF WHEY IN LACTIC ACID PRODUCTION BY *LACTOPACILLUS DELBRUECKII*

A. Senthuran, Vasanthy Arasaratnam and K. Balasubramaniam

*Department of Biochemistry, Faculty of Medicine,
University of Jaffna, Jaffna*

The objective of this study was to evaluate the supplementation of whey with different nitrogen sources on lactic acid production. *L. delbrueckii* was grown at room temperature in static culture. When whey containing 30g l^{-1} total sugar was supplemented with 0.0, 10.0, 20.0 and 30.0g l^{-1} of yeast extract, lactic acid produced at 48h was 12.0, 22.5, 23.0 and 22.5g l^{-1} respectively and the sugar utilized was 55.0%, 86.6%, 90.0% and 90.0% respectively. The time of harvesting lactic acid in future experiments is based on the 90% utilization of the carbohydrate source. To increase the lactic acid production, glucose (20g l^{-1}) was added at 36h to the whey medium which was supplemented with different concentrations of yeast extract (as in the above experiment) and the lactic acid produced at 84h was 27.5, 35.0, 40.0 and 41.0g l^{-1} respectively and substrate utilization was 71.0%, 80%, 92% and 94.0% respectively. Based on these results, 20g l^{-1} yeast extract was selected for supplementation and it contained 0.31% (w/v) elemental nitrogen. At the above elemental nitrogen concentration (0.31%, w/v), different nitrogen sources such as yeast extract, peptone, soya flour and $(\text{NH}_4)_2\text{SO}_4$ were supplemented to whey and the amount of lactic acid produced at 48h was 24.5, 22.5, 23.0 and 20.0g l^{-1} respectively and the substrate utilization was 92.0%, 85.7%, 90.0% and 83.0% respectively. The rate of lactic acid production at 3h was highest ($0.57\text{g l}^{-1}\text{h}^{-1}$) in whey supplemented with yeast extract. In the above experiment, containing different nitrogen sources, addition of glucose (20g l^{-1}) at 36h further increased the amount of lactic acid production at 84h to 40.5, 35.0, 36.5 and 39.5g l^{-1} substrate utilization was 92.0%, 88.0%, 90.0% and 80%. Since the best performance of *L. delbrueckii* in whey supplemented with yeast extract could be due to its vitamin B content, whey was supplemented with different nitrogen sources and vitamin B and no significant improvement in lactic acid production was observed. As yeast extract supplementation was not economically attractive, it was decided to use a combination of yeast extract and $(\text{NH}_4)_2\text{SO}_4$. When the elemental nitrogen ratio of yeast extract to $(\text{NH}_4)_2\text{SO}_4$ was 1:3, the substrate utilization was 90.0% with 84.0% efficiency of lactic acid production which is same as in whey medium supplemented with 20g l^{-1} yeast extract. These results show that the whey obtained as by product during cheese preparation from milk, can profitably be used for the production of lactic acid.