

Title: Bioprocess development for high cell mass production of the probiotic yeast-*Kluyveromyces lactis*

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Abstract: In the present study, the key industrial strain of *Kluyveromyces lactis* NRRL Y-110 was used to develop an industrial process for probiotic cell mass production. Therefore, the biomass production process of *K. lactis* was developed via the optimization of different medium and process parameters in shake flask and bioreactor levels. In the first part of the work, the effect of medium composition on the production of biomass was investigated in shake flask culture. Among different production media studied, the medium composed of lactose, ammonium sulphate, magnesium sulphate, potassium dihydrogen phosphate and yeast extract yielded the highest volumetric high cell mass production of 4.34 g.L⁻¹ after 24 hours cultivation. Furthermore, the optimization involved different key nutrients (carbon sources, nitrogen sources and mineral sources). The results obtained are helpful for the overproduction of highest cell mass by submerged culture of *K. lactis* on a semi-industrial scale. During bioreactor cultivation under controlled and uncontrolled pH, results showed that, high cell biomass yield of 15.1 g.L⁻¹ was produced under controlled pH conditions compared to uncontrolled pH. This value was almost 48.30% higher than those obtained in controlled pH submerged shake flask culture.