

Synbiotics growth optimization of *Bifidobacterium pseudocatenulatum* G4 with prebiotics using a statistical methodology

ABSTRACT

Aims: This study demonstrated the optimum growth of *Bifidobacterium pseudocatenulatum* G4 with prebiotics via statistical model. **Methods and Results:** Commercial prebiotics [inulin and fructooligosaccharide (FOS)], together with sorbitol, arabinan and inoculum rate, were tested by fractional factorial design to determine their impact on growth of *Bif. pseudocatenulatum* G4 in skim milk. At 48 h incubation, bacterial growth was mainly influenced by FOS and inoculum rate. Growth reduction was observed in all samples incubated for 72 h. Central composite design (CCD) was adopted using FOS and inoculum rate at 48 h incubation to develop the statistical model for optimization. The model predicted that 2.461 log CFU ml⁻¹ produced the optimum growth increase of *Bif. pseudocatenulatum* G4. The combination that produced the optimum point was 2.86% FOS (g/v) and 0.67% inoculum rate (v/v). **Conclusion:** At optimum combination of inoculum rate and FOS, validation experiments recorded 2.40 ± 10.02 log CFU ml⁻¹. The application in 1-l bioreactor for 24 h showed higher growth increase of 2.95 log CFU ml⁻¹. **Significant and Impact of the Study:** Response surface methodology approach is useful to develop optimum synbiotics combination for strain G4 with FOS.

Keyword: *Bifidobacterium*; Prebiotics; Response surface methodology; Synbiotic