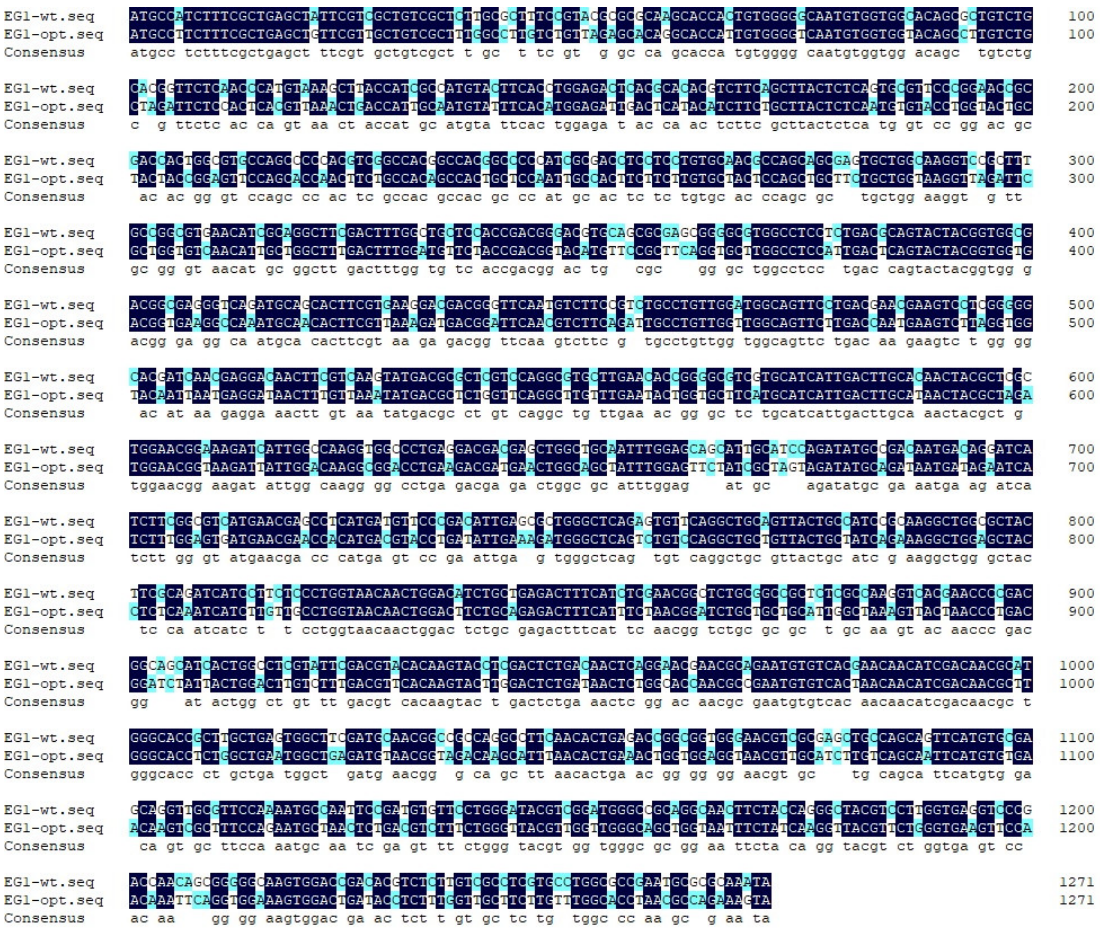

Figure S1. Alignment of wild type EG1 gene (EG1-wt) sequence and optimized type EG1 gene (EG1-opt) sequence.

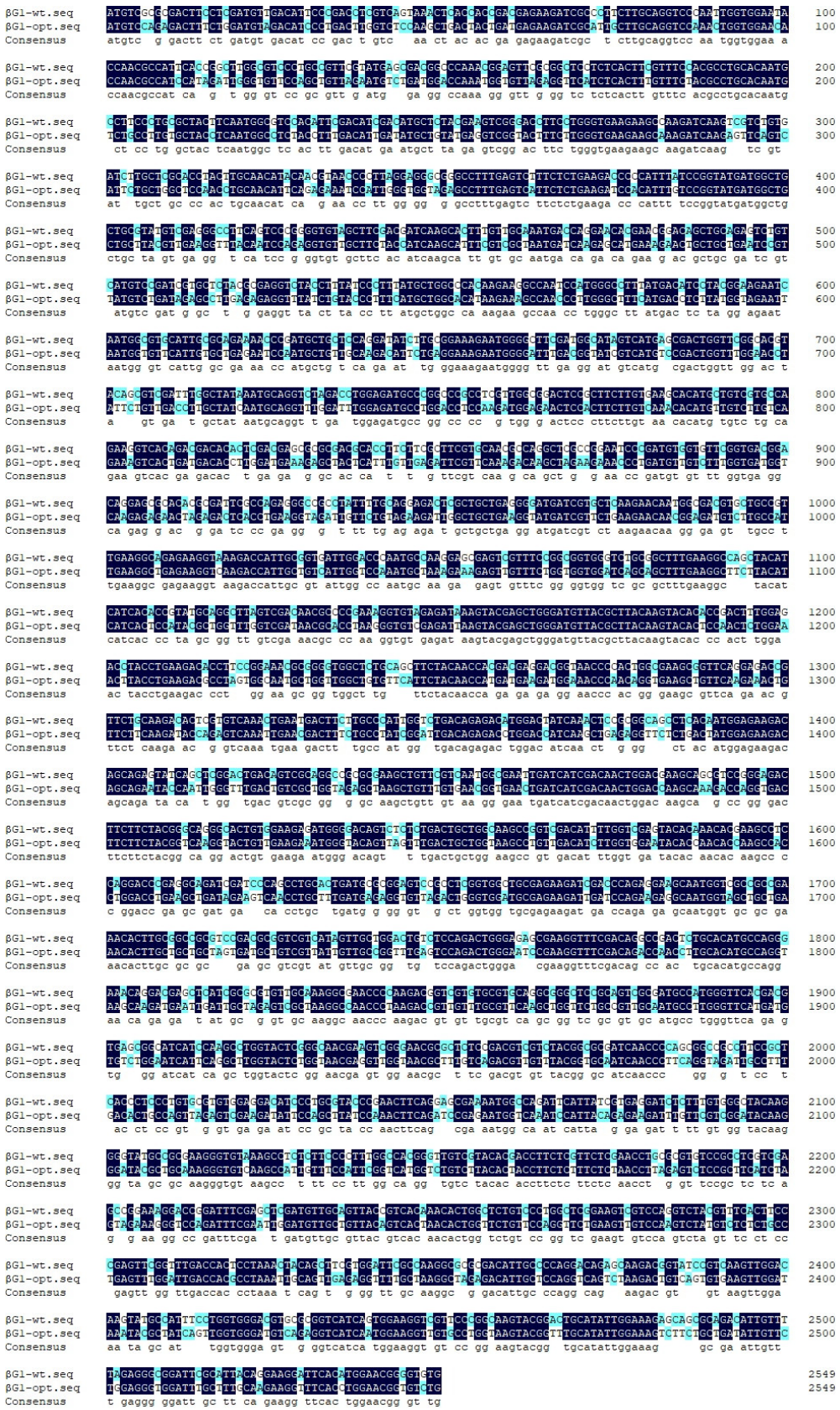

Figure S2. Alignment of wild type β G1 gene (βG1-wt) sequence and optimized type EG1 gene (βG1-opt) sequence.

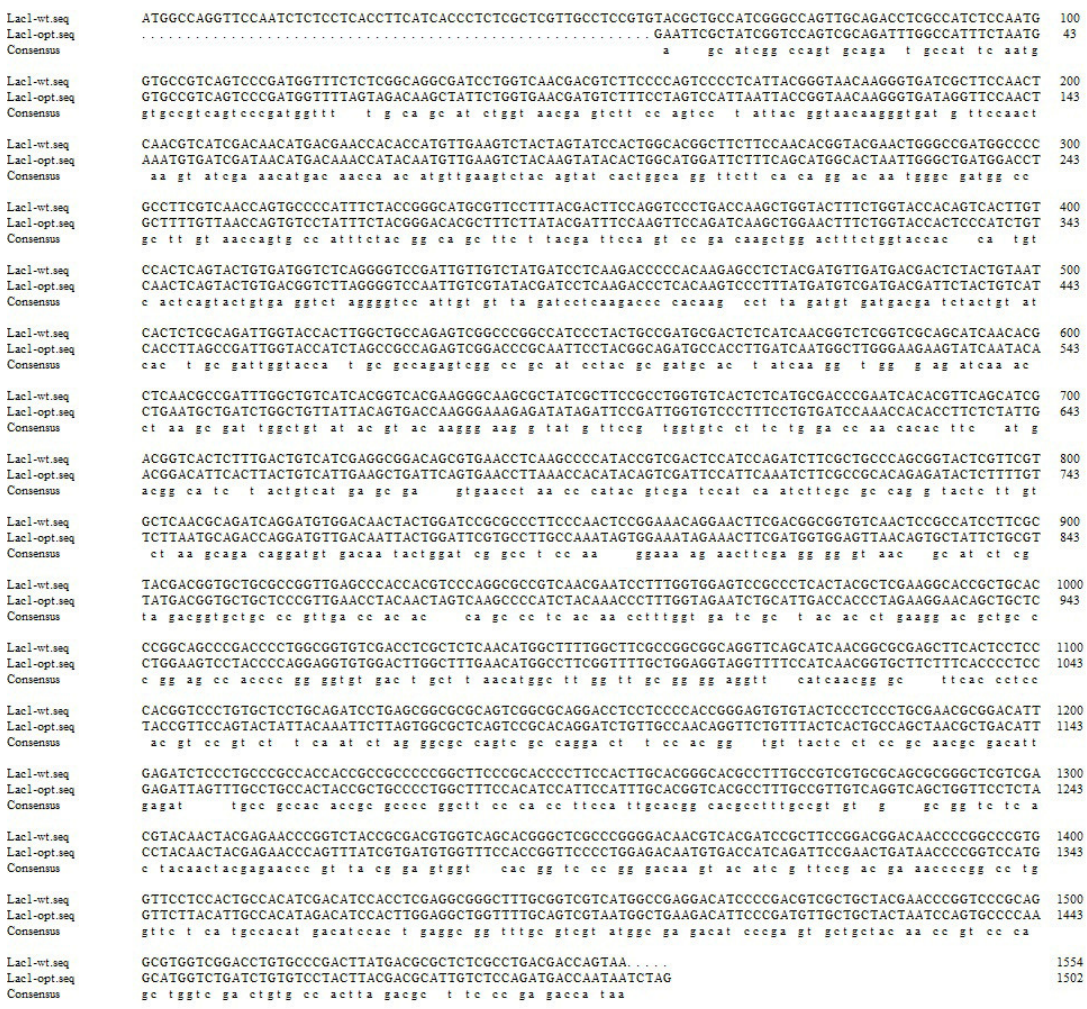

Figure S3. Alignment of wild type *Lac1* gene (*Lac1*-wt) sequence and optimized type *Lac1* gene (*Lac1*-opt) sequence

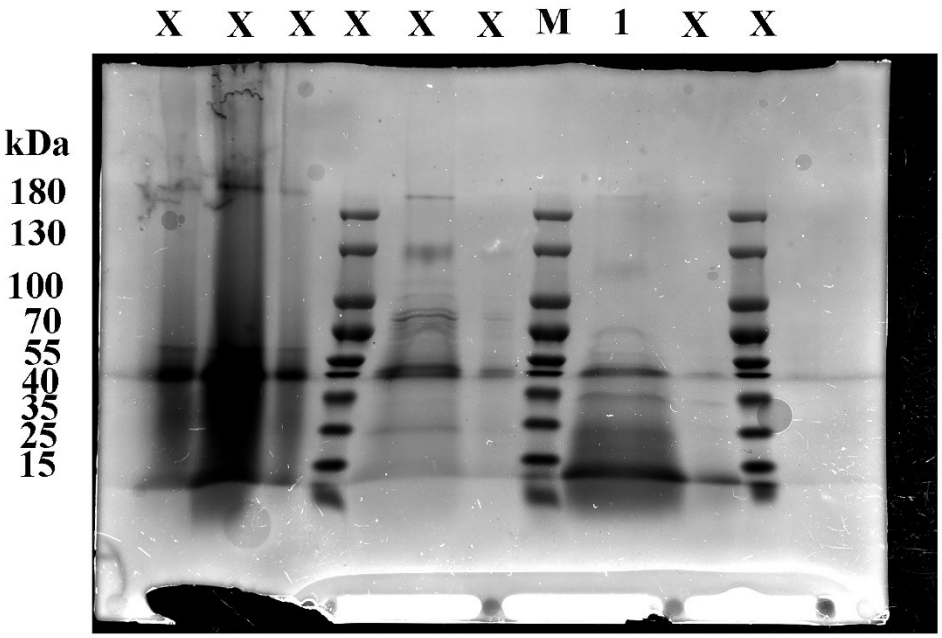

Figure S4. The original gel image of SDS-PAGE analysis for the protein expressed by the recombinant strain X-33/EG1 (Figure 5a). M: Protein molecular marker; 1. supernatant from recombinant strain X-33/EG1 in shake flasks. X: Lanes not included in the final figure.

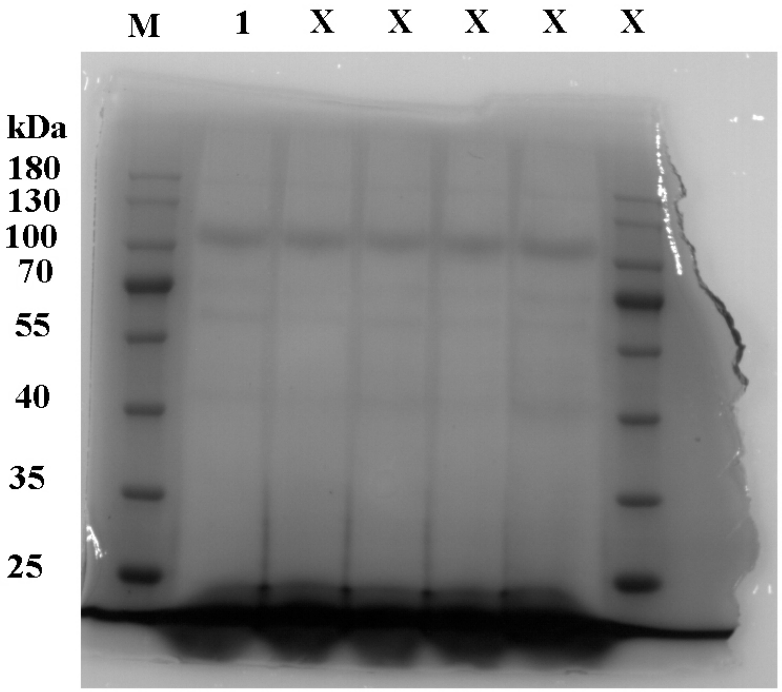

Figure S5. The original gel image of SDS-PAGE analysis for the protein expressed by the recombinant strain X-33/βG1 (Figure 5b). M: Protein molecular marker; 1. supernatant from recombinant strain X-33/βG1 in shake flasks. X: Lanes not included in the final figure.