

# Expression of degQ gene and its effect on lipopeptide production as well as the formation of secretory proteases in *Bacillus subtilis* strains

Lars Lilge<sup>1</sup>, Maliheh Vahidinasab<sup>2</sup>, Mareen Hoffmann<sup>2</sup>, Chantal Treinen<sup>2</sup>, Chanthiya Kuppusamy Nesamani<sup>2</sup>, Isabel Adiek<sup>2</sup>, Philipp Becker<sup>2</sup>, Marius Henkel<sup>2</sup>, and Rudolf Hausmann<sup>2</sup>

<sup>1</sup>Universität Hohenheim

<sup>2</sup>University of Hohenheim

October 6, 2021

## Abstract

*Bacillus subtilis* is described as a promising production strain for lipopeptides. In the case of *B. subtilis* strains JABs24 and DSM10T, surfactin, and plipastatin are produced. Lipopeptide formation is controlled, among others, by the DegU response regulator. The activating phospho-transfer by the DegS sensor kinase is stimulated by the pleiotropic regulator DegQ, resulting in enhanced DegU activation. In *B. subtilis* 168, a point mutation in the degQ promoter region leads to a reduction in gene expression. Corresponding reporter strains showed a 14-fold reduced expression. This effect on degQ expression and the associated impact on lipopeptide formation was examined for *B. subtilis* JABs24, a lipopeptide-producing derivative of strain 168, and *B. subtilis* wild-type strain DSM10T, which has a native degQ expression. Based on the stimulatory effects of the DegU regulator on secretory protease formation, the impact of degQ expression on extracellular protease activity was additionally investigated. To follow the impact of degQ, a deletion mutant was constructed for DSM10T, while a natively expressed degQ version was integrated into strain JABs24. This allowed strain-specific quantification of the stimulatory effect of degQ expression on plipastatin and the negative effect on surfactin production in strains JABs24 and DSM10T. While an unaffected degQ expression reduced surfactin production in JABs24 by about 25%, a 6-fold increase in plipastatin was observed. In contrast, degQ deletion in DSM10T increased surfactin titer by 3-fold but decreased plipastatin production by 5-fold. In addition, although significant differences in extracellular protease activity were detected, no decrease in plipastatin and surfactin produced during cultivation was observed.

## Hosted file

MB032021040162.pdf available at <https://authorea.com/users/439878/articles/540684-expression-of-degq-gene-and-its-effect-on-lipopeptide-production-as-well-as-the-formation-of-secretory-proteases-in-bacillus-subtilis-strains>