Molecular characterization of an unauthorized genetically modified Bacillus subtilis production strain identified in a vitamin B2 feed additive

Abstract:
Many food and feed additives result from fermentation of genetically modified (GM) microorganisms. For vitamin B2 (riboflavin), GM Bacillus subtilis production strains have been developed and are often used. The presence of neither the GM strain nor its recombinant DNA is allowed for fermentation products placed on the EU market as food or feed additive. A vitamin B2 product (80% feed grade) imported from China was analysed. Viable B. subtilis cells were identified and DNAs of two bacterial isolates (LHL and LGL) were subjected to three whole genome sequencing (WGS) runs with different devices (MiSeq, 454 or HiSeq system). WGS data revealed the integration of a chloramphenicol resistance gene, the deletion of the endogenous riboflavin (rib) operon and presence of four putative plasmids harbouring rib operons. Event- and construct-specific real-time PCR methods for detection of the GM strain and its putative plasmids in food and feed products have been developed.

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