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藏香猪源纤维素分解菌的分离鉴定及酶学特性分析

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Isolation, Identification and Enzymatic Characteristics Analysis of Cellulolytic Bacterium from Tibetan Pigs

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摘要 本试验旨在从藏香猪盲肠内容物中分离筛选能够高效分解纤维素的菌株, 并对该菌株进行鉴定和酶学特性分析。采用羧甲基纤维素平板法初筛和摇瓶发酵法复筛, 从藏香猪盲肠内容物中分离筛选出1株能够高效降解纤维素的纤维素分解菌; 结合该菌株的形态学特征、生理生化特性以及16S rRNA基因序列的同源性对其进行分类鉴定; 根据该菌株不同时间的生长特性和产酶特性评定其产酶能力; 从其所产羧甲基纤维素酶反应的适宜pH、温度和时间来研究该菌株的酶学特性。结果表明: 从藏香猪盲肠内容物中分离到了1株能够高效降解纤维素的菌株, 经鉴定将其命名为枯草芽孢杆菌BY-2, 该菌株为好氧的革兰氏阳性菌, 有芽孢, 且生长速率快、产酶早、产酶时间长。酶学特性分析表明: 枯草芽孢杆菌BY-2产羧甲基纤维素酶的最适反应条件为pH 5.5、65℃下反应5 min, 且其在pH 3~8的范围内具有强的酸碱稳定性。

关键词: 藏香猪 纤维素分解菌 分离鉴定 生长特性 酶学特性

Abstract: This experiment aimed to isolate, screen and identify a highly cellulose-decomposing bacterium isolated from the cecal contents of Tibetan pigs, and the enzymatic characteristics were also analysed. A cellulolytic bacterium which could highly decompose cellulose was screened by using carboxymethylcellulose (CMC) plate method (primary screening) and shake-flask fermentation method (secondary screening). Combined the morphological characteristics, physiological and biochemical characteristics and 16S rRNA gene sequence homology analysis, the bacterial strain was identified. Enzyme-producing ability of the bacterial strain was evaluated based on the growth characteristics and enzyme-producing characteristics at different times. Furthermore, the enzymatic characteristics of the bacterial strain were studied based on the suitable reaction pH, temperature and time of carboxymethyl cellulose (CMCase) produced by the bacterial strain. The results showed that a highly cellulose-decomposing bacterium was newly isolated from the cecal contents of Tibetan pigs and identified as *Bacillus subtilis* BY-2. The strain of *Bacillus subtilis* BY-2 was found to be a spore-forming, gram-positive and aerobic bacterium with efficient growth rate, earlier and longtime producing enzyme. The result of enzymatic characteristics analysis showed that the suitable reaction condition of CMCase produced by *Bacillus subtilis* BY-2 was pH 5.5 and 65℃ with a reaction time of 5 min. Besides, the CMCase had a stronger acidic and basic stability when pH range was 3 to 8.

Keywords: Tibetan pig, cellulolytic bacterium, isolation and identification, growth characteristics, enzymatic characteristics

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