

专论

益生菌 *Lactobacillus casei* | Zhang 高密度发酵中试工艺及动力学研究

李妍[1] 高鹏飞[1] 赵文静[1] 麻士卫[2] 周琦[1] 潘向辉[1] 张和平[1]

[1]内蒙古农业大学,乳品生物技术与工程教育部重点实验室,呼和浩特010018 [2]内蒙古自治区轻工科学研究所有限责任公司,呼和浩特010051

摘要:

在益生菌L.caseiZhang高密度培养小试(3L)基础上,进行30L到150L逐级放大中试生产工艺的研究以确定规模化生产工艺。在优化的发酵工艺下,150L规模发酵菌体密度可达 $2.9 \times 10^{10}$ cfu/mL,与小试水平无差异。采用origin7.5软件在logistic equation基础上建立L.caseiZhang的生长和葡萄糖代谢动力学模型,模型与试验值拟合良好,平均误差小于10%,能够较好地反应发酵过程。初步探讨发酵后菌体的离心和冷冻干燥过程对菌体的影响,虽然发酵液经离心收集菌体后冷冻干燥可得到平均活菌数 $2.65 \times 10^{11}$ cfu/g的菌粉,能够满足益生菌制剂和发酵剂对高活菌数的要求,但冻干前后活菌得率仅49.97%。有必要针对L.casei Zhang的冻干保护剂和冻干工艺进一步优化,以提高菌体存活率得到更高菌体浓度的益生菌粉。

关键词: Lactobacillus casei Zhang 高密度发酵 中试 动力学

Pilot Plant Scale Test and Kinetic Studies on High Cell Density | Culture of Probiotics *Lactobacillus casei* Zhang

LI Yan, GAO Peng-fei, ZHAO Wen-jing, MA Shi-wei, ZHOU Qi, |PAN Xiang-hui| ZHANG He-ping

1. Key Lab of Dairy Biotechnology and Bioengineer, Ministry of Education, Inner Mongolia Agricultural |University, Hohhot 010018 |2. Inner Mongolia Autonomous Region Light Industrial |Research Institute Co. Ltd.| Hohhot 010051, China

Abstract:

Based on lab scale (3 L) experiments, the pilot plant scale test (30 L to 150 L) of the high cell density culture of L. casei Zhang was studied to get the optimal fermentation technology for industrial production. Under optimized culture conditions, the viable count of fermented liquid was  $2.9 \times 10^{10}$ cfu/mL and there was no significant different between pilot plant test and lab scale test. The kinetic models of growth and glucose consumption for L. casei Zhang were constructed using origin7.5 software based on the equations of "logistic equation" and fit well with the experimental data, with an average error of less than 10%. These models could forecast the actual fermentation process. Preliminary study was carried out on the influences of centrifugation and freeze-drying processes on cells after fermentation. Although the average viable cell count of the lyophilized powder was  $2.65 \times 10^{11}$  cfu/g, which could meet the requirements of the probiotics and starter cultures, only 49.97% of L. casei Zhang cells were survived from freeze drying. So it's necessarily to make further study on how to improve the survival rate of L. casei Zhang during freeze drying.

Keywords: Lactobacillus casei Zhang high cell density culture pilot plant test kinetics

收稿日期 2008-08-21 修回日期 2008-09-16 网络版发布日期

DOI:

基金项目:

国家863计划项目“高活性益生乳酸菌发酵剂制造核心技术”(2006AA10Z345),“益生乳酸菌高效定向筛选与产业化应用关键技术研究”(2007AA10Z353)资助。

通讯作者: 张和平, 教授, 博士生导师, 主要从事乳品加工和乳品生物技术研究。E-mail:

hepingdd@vip.sina.com2

作者简介: 李妍|博士研究生|主要从事乳品加工和乳品微生物研究。

作者Email:

参考文献:

扩展功能

本文信息

Supporting info

PDF(449KB)

[HTML全文]

参考文献[PDF]

参考文献

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

本文关键词相关文章

Lactobacillus casei Zhang 高密度发酵 中试 动力学

本文作者相关文章

PubMed

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="8577"/>