

Optimization of spray-dried probiotic buttermilk powder using response surface methodology and evaluation of its shelf stability

Anu Ahlawat, Laxmi Ananthanarayan*

Department of Food Engineering and Technology, Institute of Chemical Technology,
Matunga, Mumbai – 400 019, India

Author details:

Anu Ahlawat

Email: anu00ahlawat@gmail.com

*Corresponding author

Laxmi Ananthanarayan

Email: laxmi.ananth.iyer@gmail.com

l.ananthanarayan@ictmumbai.edu.in

ABSTRACT

In the present study, double-toned milk was inoculated with *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus*, and *Bifidobacterium bifidum*, to result in a curd which was further subjected to homogenization and spray drying. Various process parameters like inlet temperature (140-160°C), the flow rate of feed (10-20 mL/min), and compressed air (2-4 kg/cm²) were varied to obtain the best operating conditions for the maximum viable count in the probiotic cultured buttermilk powder. The yields of the powder ranged between 58.4% and 71.5%. An inlet temperature of 150 °C, feed flow rate of 15 mL/min, and compressed air of 3 kg/cm² was the optimum process parameters obtained by response surface methodology for maximum survival of starter culture and probiotic bacteria *Bifidobacterium bifidum*. The powder stored at 4 ± 1°C showed superior qualities to that stored at 27 ± 1 °C. While moisture content, *a_w*, solubility and density showed an increase, hygroscopicity exhibited a decline during storage. The final moisture content, hygroscopicity, *a_w*, solubility index, and bulk density of buttermilk powder stored at 4 ± 1 °C and 27 ± 1 °C were 5.93,13.73, 0.293, 59.78, 0.71, and 6.27,12.31, 0.301, 60.12, 0.93 respectively. The viable counts of *Streptococcus thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Bifidobacterium bifidum* in BMP were 8.07±0.21, 7.68±0.17, 6.01± 0.18 at 4 ± 1°C and 5.73±0.17, 5.57±0.14, 4.14± 0.20 at 27 ± 1° C after 4 weeks of storage.