

A continuous process for drying, stabilization and coating of probiotic micro-organisms using the Glatt ProCell® process unit.

An analytical method to measure capsule integrity of micro encapsulated probiotic micro organisms.

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Conventional drying of micro organisms at other temperatures than sub zero have in common that the energy, required for the evaporations of the solvent, also transfers heat to the metal parts of the installation. The result is either an increased mortality of the micro organisms, or a prolongation of the process at lower gas temperatures.

1,7 liter of Biomass containing Bifidus Bifidum cells at a concentration of 12×10^9 produced app. 1 kg of a dried product containing a mixture of maltodextrin and whey powder at a cell concentration of 12×10^9 . Gas temperatures of 55 – 60 °C were used for drying. There are indications that substantially higher gas temperatures can be applied, without causing higher mortality.



Glatt ProCell® - lab unit



product example

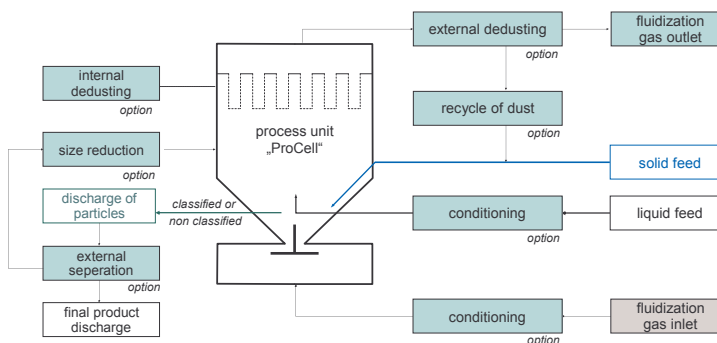
Case study : BIFIDUS BIFIDUM						
trial	Biomass CFU/ml	dried CFU/ml	4 weeks +4°C refrigerated CFU/ml	4 weeks -23°C frozen CFU/ml	8 weeks +4°C refrigerated CFU/ml	8 weeks -23°C frozen CFU/ml
1	14×10^6	13×10^7	13×10^7	17×10^7	14.10^7	25.10^7
2a	13×10^6	12×10^7	12×10^7	14×10^7	14.10^7	19.10^7
3	12×10^9	12×10^9	12×10^9	14×10^9	12.10^9	
4a	19×10^9	15×10^9	15×10^9		50.10^8	
4b		13×10^9	13×10^9		1.10^9 *	

Lab scale feasibility trials using Glatt ProCell®

* 8 weeks ambient temp.: 1.10^9

	particle structures	solid feed	liquid feed
Case 1	agglomerated or layered particles porous particles coated carrier	solid carrier (e.g. powder, crystals, granules, extrudates)	formulation containing - microorganisms - water - additives
Case 2	agglomerated particles porous particles	formulation containing - dried microorganisms (e.g. power) - carrier - additives	formulation containing - water based or molten binder - additives
Case 3	layered particles homogeneous pellets	optional : recycle of undersized or/and crushed oversized product	formulation containing - microorganisms - matrix forming material - (water) - additives

Stabilization of micro-organisms – summary of formulation options



The trials were conducted at the pilot plant facility of Glatt Ingenieurtechnik in Weimar. The microbial evaluation was done at the laboratory of MCC s.a. in Colombier. Process air was not sterilized, the apparatus was sterilized with disinfectant and 121 °C process air for 2 hours. Count-Tact GTS/TSA (bioMérieux) was used to verify sterility. The cultures were produced in MRS Broth (Oxoid C121 359), to which 0,5 gr/l L-Cystein HCL was added after sterilization.

The micro capsules were crushed in a 3 cylinder refiner at 20 – 30 m particle size before homogenization in a Stomacher with a buffer solution containing di-Sodium and di-Potassium hydrogen phosphate. The growing medium for cell count was TPY Agar (Scardovi 1986 modified). The crushing of the particles versus other disintegration techniques, has the benefit that the metabolism of the micro organisms seems not to be effected by the disintegration of the capsule allowing a rapid incubation. This is of importance with lipid coating material.

Conclusions & Discussion :

The Glatt ProCell apparatus allows drying of micro organism with much higher temperatures than conventional air drying. The carrier material used in these trials, malto dextrin and whey powder, have appeared to provide protection for shelf life. The addition of prebiotic fibers into the capsule wall could provide interesting symbiotic effects.



is a private laboratory, specialized in contract process development of micro-encapsulated components for food, feed and aquaculture.

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