



Development of Manufacturing Technology for Viable Bifidobacteria Powder and Products That Use It

Culturing bifidobacteria for functional research
 Photo: Morinaga Milk Industry Co.,Ltd

Bifidobacteria are essential for the health of everyone from newborn infants to the elderly. Until very recently, however, possibilities for their application have been limited, since it is difficult for the bacteria to survive long in a powder form at room temperature. Now, researchers for a Japanese company have developed technology capable of manufacturing bifidobacteria powder with a high concentration of live bacteria. In addition to enabling stable long-term storage, this expands the range of potential applications for the bacteria. Here, we give an overview of this technology and its achievement.

Fukuda Mitsuhiro

Bifidobacteria help protect healthy newborn infants' intestines. Also, breast milk is rich in components that promote the growth of these bacteria in their intestines. Bifidobacteria produce acetic acid in intestines that helps prevent the growth of harmful bacteria. They can be considered beneficial, or "friendly," bacteria with a range of positive effects for maintaining health throughout the body. This includes reportedly helping to ease allergy symptoms by regulating immune functions and helping support cognitive (brain) functions. However, bifidobacteria cannot survive long in a powder form at room temperature. This meant that until recently the only way to consume them was

in the form of beverages and foods, including yogurt, with short expiration dates.

Now, researchers from Morinaga Milk Industry Co., Ltd. have made a breakthrough that changes this situation, developing new technology for manufacturing viable bifidobacteria powder. For over 100 years, the company has been involved in the production of breast milk substitutes and powdered milk formulas for infants. Original forms of such powdered formulas were closer in composition to cow milk than to human breast milk, and research has revealed considerable differences between breast-fed and formula-fed

infants' states of health. Investigation of the cause for this difference led to the discovery that breast-fed infants' intestines contained more bifidobacteria and that their health considerably



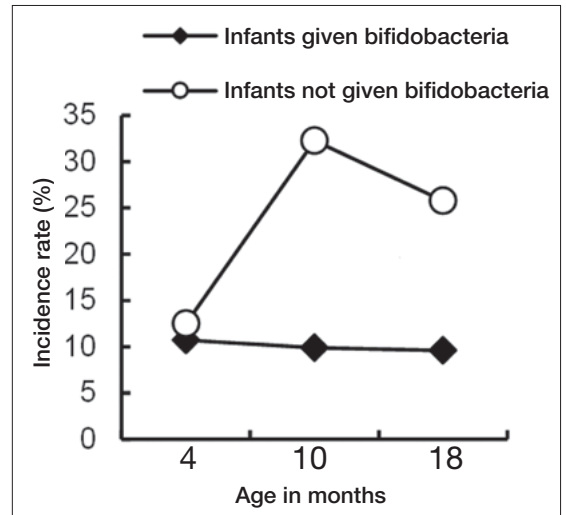
Bifidobacteria-culturing equipment

Photo: Morinaga Milk Industry Co.,Ltd



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One type of bifidobacteria



Graph showing preventive effects of bifidobacteria against eczematous/atopic dermatitis (skin rashes) in infants (Created based upon data from Enomoto et al. Allergol Int. 2014; 63(4): 575-85.)



Bifidobacteria in cold storage

Photo: Morinaga Milk Industry Co.,Ltd

benefited from these bacteria. This was the starting point for the Morinaga researchers' current research work.

The biggest challenge in creating powdered infant formula containing bifidobacteria was the fact that the bacteria cannot survive long in a powder form at room temperature as described above. Research on ways to overcome this problem and produce a powder with live bifidobacteria began in the early 1990s. Producing such a powder would require technologies for both cultivating and drying bacteria. After a process of repeated trial

and error, in the late 1990s, the company succeeded at developing technology for manufacturing a powder with a high concentration of over 50 billion bifidobacteria cells per gram, which was shelf-stable at room temperature for a long period of time, and it was made available commercially.

This manufacturing technology has also enabled the establishment of technologies for using the powder in a range of products. Examples include infant formula and supplements for adults containing live bifidobacteria. The development of shelf-stable

bifidobacteria powder has also led to more progress in functional research, including clinical trials providing evidence of the bacteria's protective effects on the health of infants and young children. In addition, it has encouraged the healthy growth of low-birth-weight infants. For these contributions, three researchers from Morinaga Milk Industry Co., Ltd. were recognized with the Award for Science and Technology of the 2023 Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology for their development of manufacturing technology for viable bifidobacteria powder and applied products.

Morinaga currently supplies viable bifidobacteria powders to more than 150 neonatal intensive care unit (NICU) facilities in Japan and around the world to support the healthy growth of very low birth weight infants, where they are used under the supervision of physicians. Also, new research is underway to develop products that utilize the benefits of bifidobacteria on improving people's overall health. Furthermore, the company plans to continue developing new products that contribute to the health of people of all ages. It is certain that bifidobacteria will continue to be widely utilized.