Additional information

Probiotic cheese definition:

Currently probiotic cheese is not legally defined[1]. But HAVENAAR and HUIS (1992) give a complete definition of probiotic "*a preparation of or a product containing viable , defined microorganisms in sufficient numbers, which alter the microflora (by implementation or colonization) in a compartment of the host and by that exert beneficial health effect in this host*". That is why the food industry sets up its own recommended level of 10^6 CFU/ g at the time of consumption of the probiotic bacteria to perform their nutritional benefits. This limit is based on scientific researches such as those done by SHAH et al (1995), SHAH, (1997) ROBINSON and SAMONA (1992) and ARROYO et al. (1994).

Currently FDA does not require premarket approval for such probiotic products to ensure that they do what they claim to do. They do not oversee the testing either. Several studies have showed that the identity and the number of incorporated species into dairy products did not always correspond to those declared on the labels. (SHAH, 2000, TERMMERMAN et al. 2002, COEURET et al. 2004).[2] But it seems that FDA is preparing to take more activist role in the regulation of functional foods after some (see FDA's letter warning to General Mills on Cheerios' heart heath claims).

Viability of commercial probiotic cheese:

Numerous Studies has been made on the viability of probiotic bacteria into dairy products. Most article on probiotic deal with lactobacilli and bifidobacteria (49% and 21% respectively) Lactobacillus and Bifidobacterium include many different species, but most studies concern a fairly small number of species. Figure below shows the most widely studied species of Lactobacilli and Bifidobacteria. (SYNDIFRAIS, 2008)

[1] More surprising, there is no definition of "functional food" that has been endorsed by the FDA. The Food and Nutrition Board of the National Academy of Sciences suggests that "functional foods" refers to "*any modified food or food ingredients that may provide a health benefit beyond the traditional nutrients its contains*"

[2] Recently, General Mills sued over its probiotic claims on its Yo plus yogurt by several Floridian citizens. (see STARLING, 2009)

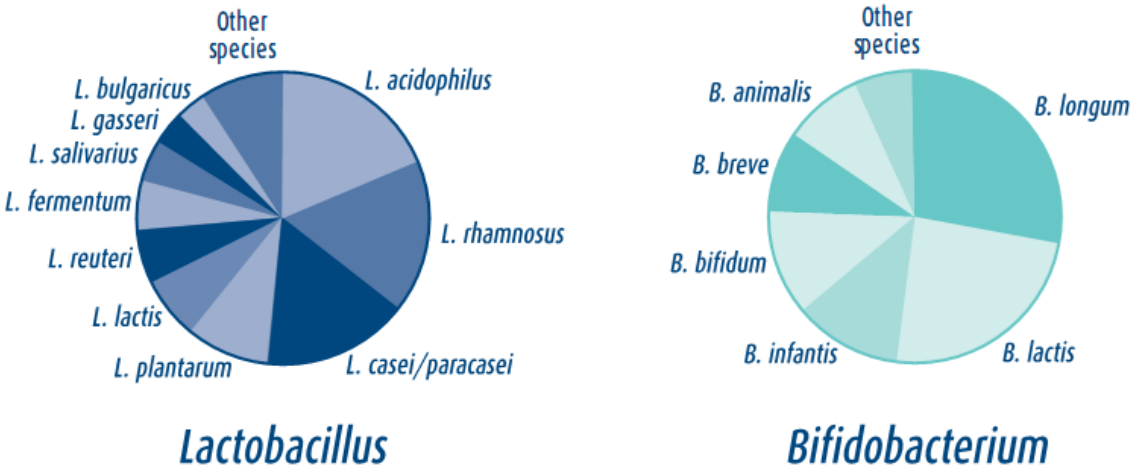

Figure 1: Most studied Lactobacillus and Bifidobacterium species (SYNDIFRAIS, 2008)

Bifidobacteria require an anaerobic environment and neutral pH to survive and maintain levels greater than 10^6 cfu g^{-1}. BOYLSTON et al. (2004) show in their study that cheese does provide an environment that would be to the long term survival of bifidobacteria. Nevertheless, effective incorporation of bifidobacteria into cheese requires that bifidobacteria maintain their viability throughout the processing without adversely altering sensory analysis. To reach this goal, BOYLSTON et al. (2004) propose several techniques:

- Selection of bifidobacteria strains with a high resistance against :
    - Lower pH: Bifidobacteria growth is inhibited below 5.0 or above 8. Cheese pH range is around 4.8-5.6 (yogurt: 3.7-4.3). Thus products environments may slow down the bifidobacteria growth. In the long term, the product may contain lower probiotic bacteria than the minimum level required to perform their probiotic activity.
    - Salt bile
    - Oxygen
- The application of mixed cultures of Bifidobacteria with selective strains of starter cultures to enhance the viability of the bifidobacteria
- Encapsulating Bifidobacteria cultures: CHANDRAMOULI (2004) proposes the microencapsulation as an alternative to improve probiotic bacteria survival.
- Modifying the cheeseprocessing to promote an environment suitable for the growth of the Bifidobacteria

If you wish learn more about probiotic cheese and how to incorporate probiotic bacteria into cheese, I encourage you to have a look on BOYLSTON et al. (2004) article.

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