**Study of the lyoprotective and stabilising effect of Spirulina (*Arthrospira platensis*) protein isolate on *Lactocaseibacillus rhamnosus* GG**

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Anhydrobiotics, i.e. structurally engineered xero-carriers conveying living cells are extensively used in the production of probiotic supplements1. As a mimimum requirement, the probiotic xero-carriers should preserve the biological activity of the living cells under common physicochemical stressors such as low pH, high temperature and ionic strength, exposure to water vapour and oxygen, bile salts, etc, encountered during processing, storage and gastrointestinal transit2. Milk proteins are considered as the golden standard for preserving the biological activity of a broad range of probiotic bacteria including Lactobacilli and Bifidobacteria3. Due to dietary, socio-cultural and ecological constraints, i.e., like allergenicity, high carbon footprint or the exclusion of specific consumer groups, the demand of plant-based protein sources is growing. An excellent alternative for milk proteins is microalgal proteins, e.g. derived from Spirulina or Chlorella, due to their high protein (60-70 %) and phytochemicals content (e.g. phycocyanins, carotenoids, polyphenols, chlorophylls etc.), biological value, sustainable and eco-friendly character4.

In the present work the impact of spirulina protein isolate on the survival rate of *Lactocaseibacillus rhamnosus* GG (LGG) during lyophilization, storage and in vitro digestion was investigated. Different approaches in structuring the xero-carrier precursor i.e., solution or hydrogel prepared via direct or indirect acidification, were assessed. As a comparison, pea and whey protein isolate were used. The microstructural, physicochemical and thermal properties of the lyophilizates were determined. Accelerated storage trials at different temperature (T = 4, 20, 37 °C) and water activity (aw = 0.11 and 0.54) conditions were conducted for modelling the LGG cell inactivation kinetics. Finally, the biological activity of LGG as associated to the colloidal changes of the delivery systems were analysed under simulated in-vitro digestion conditions (INFOGEST 2.0).

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