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Maximising *Bifidobacterium* spp. Viability in Probiotic Yoghurt Production Through Stress Adaptation

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Abstract

Introduction: *Bifidobacterium* spp. are an essential part of the human gut microbiota of healthy individuals. They are associated with many health benefits, i.e. improved and enhanced immune response, lowered risk of developing cancers in the gut and food intolerances or allergies, lowered gut inflammation, and an improved response and management of gastrointestinal diseases. The incorporation of *Bifidobacterium* spp. as a probiotic in foods can be a sustainable approach to countering gut dysbiosis. However, due to their susceptibility to stress factors encountered during manufacturing processes, the viability of *Bifidobacterium* spp. in probiotic foods is a challenge. This study aimed to evaluate the potential of oxidative stress pre-adaptation as a strategy to improve *Bifidobacterium* spp. survival during yoghurt manufacture and storage.

Methodology: Cultures of *B. bifidum, B. breve* and *B. animalis* subsp*. animalis* were subjected to sub-lethal (0.1mM) H_2O_2 treatments followed by exposure to lethal (1mM) H_2O_2 treatments. Oxidative stress-adapted variants were isolated after exposure to lethal H_2O_2 treatments for three successive generations. The adapted variants were tested for their ability to withstand oxidative stress upon re-exposure (0.1mM H_2O_2) using flow cytometry with SYTO 9 and propidium iodide (PI) fluorescent staining to measure membrane integrity as well as CellROX green staining to assess the oxidative state.

Results and Discussion: Upon exposure to oxidative stress, the adapted variants of *B. animalis* showed the highest level of viability, as indicated by the proportion of intact cells. Variants of *B. bifidum* and *B. breve* also displayed viability, although at a lower level. The results suggest that oxidative stress adaptation in *Bifidobacterium* spp. can improve its resilience to oxidative stress during yoghurt manufacture, with the better adaptation in *B. animalis* possibly related to its genetic predisposition. During the presentation, the authors will be reporting the significant effects of oxidative stress adaptation relating to its physiological and morphological changes.

Conclusion: This study shows that oxidative stress adaptation can be a useful approach in improving *Bifidobacterium* survival in probiotic foods. The survival ability of adapted variants will be tested during the yoghurt production process and storage.