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Functional Minas Frescal cheese with spore-forming Weizmannia coagulans GBI-30

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The effect of the addition of *Weizmannia coagulans* BC30 on the probiotic survival and tolerance in the gastrointestinal tract, the anti-pathogenic activity along the storage time (1, 7, 14 days, spot diffusion antimicrobial susceptibility test) and the generation of bioactive compounds (antioxidant, antihypertensive and antidiabetic values) considering three different dosages (6-7, 8-9, 10-11 log CFU/g, respectively, QII, QIII, QIV) was studied. For comparison, a conventional cheese was also produced without the addition of *W. coagulans* BC30 (QI). Pathogenic strains of *Escherichia coli* ATCC 25922, *Listeria monocytogenes* ATCC 19,117 and *Salmonella enterica* subsp. diarizonae ATCC 12,325, all from clinical or dairy isolates, were used to evaluate the antibacterial activity of the probiotic cheeses. The non-pathogenic strain *Listeria inoccua*, a surrogate for *Listeria monocytogenes*, was also used. *W. coagulans* showed good survival (>6 log UFC/g) and tolerance to gastrointestinal disorders throughout the storage period. The probiotic count after passing through the GIT conditions fluctuated between 6.12 and 6.71, 7.34–7.89, and 8.12–8.56 log CFU g?1 for QI, QII, and QIII, respectively, proving to be constant and proportional to the concentration of probiotics added to the samples. This observation confirms that Minas Frescal cheese is an excellent food matrix for maintaining probiotic viability and protecting against adverse conditions in the gastrointestinal tract, The antioxidant activity (DPPH), antihypertensive activity (angiotensin-converting enzyme inhibitory activity, ACEm), antidiabetic activity (?-amylase and ?-glucosidase, and proteolytic activity showed a similar behavior over the storage time of the probiotic cheeses, with higher inoculation concentrations generating a correspondingly higher bioactive and proteolytic activity ($p < 0.05$). During refrigerated storage, the concentration of bioactive peptides and proteolytic activity increased in proportion to the concentration of probiotic bacteria in the food matrix (QIII > QII > QI), while to the conventional cheese (QC), the concentration remained lower values and stable over the 14 days ($p > 0.05$). Inhibition zones < 2 mm were associated with low antagonistic activity, 2-5 mm with medium antagonistic activity, and > 5 mm with high antagonistic activity. Low antimicrobial activity was observed against *S. aureus* (0.6-1.8 mm) and *L. inoccua* (0.6-1.8 mm) strains, while moderate activity was observed against *Salmonella* (0.6-2.4 mm) and *E. coli* (0.6-3.0 mm). The antibacterial activity was enhanced as the concentration of *W. coagulans* increased along the storage time in both antagonism tests. The antibacterial activity of *W. coagulans* may be related to the production of lactic acid, bacteriocin and hydrogen peroxide. These results suggest that it is possible to add a spore-forming probiotic bacterium to a fresh cheese, with adequate survival along the gastrointestinal tract and viability in the final product throughout the storage period, capable of producing functional and antibacterial compounds

References

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