Viability of potential probiotic Lactobacillus plantarum in reduced-sodium salami products

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Introduction: Probiotic bacteria have been successfully introduced into a wide range of health-promoting functional foods. Meat products have been shown to be an excellent vehicle for probiotics (Bağdatli & Kundakci, 2016). However, commercial application of probiotic bacteria in fermented meat products such as salami is not yet common (Kołożyn-Krajewska & Dolatowski, 2009; Talon & Leroy, 2014). There is currently a general concern over the level of sodium in the human diet, which has resulted in commercially-available reduced sodium formulations in several types of food product. Scientific research on meat products has also proposed low-sodium formulations of salami-type products with acceptable sensory properties (slyng et al. 2014; dos Santos et al. 2014). Low-sodium food and addition of probiotics in foods are thus two trends in food industry. This work attempts to combine the two together in fermented meat products. We describe a preliminary experiment designed to document the viability of a species of lactic acid bacteria (LAB) with known probiotic potential in a reduced-sodium salami product made under semi-commercial conditions, and its interactions with the bacteria used as starter cultures in commercial salami production.

Materials and methods: Low-sodium salamis (LSS) were produced by 50% replacement of NaCl by potassium salt, using a starter culture and a probiotic strain L.plantarum BG112 (Clerici-Sacco, Italy), which was selected for its safety, technological and probiotic properties (Behera et al., 2018; La Anh, 2015; Seddik et al. 2017). Samples of two salamis from each treatment (Control group (3%NaCl), with starters (1,5%NaCl+1,5%KCl) and with starters+ probiotic strain (1,5%NaCl+1,5%KCl)) were randomly selected during the fermentation and ripening time (0, 1, 4, 7 and 11 days) to analyze weight loss, pH, aw, moisture and viability of the probiotic strain and the starter culture. The meat starter cultures are mainly mixtures of LAB and Gram-positive, catalase-positive cocci. Thus, to perform their expected functions, L.plantarum strain must be able to grow without competition from the component species of a starter culture, and preferably could show synergistic effects with these. The competition of the probiotic strain was tested by the well diffusion method. The viability rates of LAB were determined using the plate counting method on MRS agar plates (37°C, 48h, microaerophilic conditions). The number of viable bacteria in the fermented samples (cfu/g), was obtained by counting the isolated colonies on these plates.

Results: Results demonstrate that LSS containing L.plantarum BG112 as a probiotic strain could achieve commercially- desired moisture, aw, weight loss, and pH. From these physical-chemical points of view, this probiotic can be used alone (without additional starter culture) in practical salami production. However, further studies concerning sensory properties and consumer acceptability would be necessary to evaluate the commercial viability of such a product. Also, the number of LAB in the fermented products, and thus its pH value, indicates the evolution of fermentation. All the final values of pH obtained were typical for this kind of low-acid fermented sausages (Perea-Sanz et al. 2018; Rubio et al. 2014). Under the conditions assayed, L.plantarum BG112 appears to be a suitable probiotic for use in reduced-sodium salami, achieving 9.50 cfu/g at the end of product ripening.

Conclusions. This study demonstrates that sodium reduction and addition of a probiotic strain can be successfully achieved together to fabricate fermented meat products that potentially may be healthier options.

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