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Title:

Serra da Estrela PDO cheese authentication: RAPD and SCAR approaches for identification of adulterant breed's milk

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Abstract:

Serra da Estrela cheese is a Protected Denomination of Origin (PDO) product and is perceived as a unique high-quality food, being the most famous Portuguese cheese and presenting high commercial value. It is legitimately manufactured from raw milk of the autochthonous sheep breed Serra da Estrela; however, the adulteration of production with cheaper and/or lower-quality milks from non-autochthonous ovine breeds compromises the quality of the final product and undervalues the original PDO cheese. Considering that these fraudulent productions may lead to serious problems at both social and economic levels, it is urgent to develop low-cost, sensitive, fast and reliable analytical techniques that efficiently allow traceability of the breed origin of milk in Serra da Estrela PDO cheese. Here we describe a Randomly Amplified Polymorphic DNA (RAPD) method capable of efficient detection of adulterant breeds in milk mixtures, containing Serra da Estrela milk, used for fraudulent production of this cheese. Taking this into account, we suggest RAPD to be a valuable tool for identification of sheep breed in a first stage of milk authentication in dairy industry. Furthermore, considering the possible degradation of DNA during milk processing, Sequence Characterized Amplified Region (SCAR) markers were designed envisioning the detection of milk adulteration in processed dairy foods. RAPD-SCAR techniques have been here used, for the first time, to identify breed origin in milk samples, establishing its applicability for quality control on dairy industry, being capable of milk authentication in the final products. In this sense, our findings will play an important role on the valorization of not only the Serra da Estrela PDO cheese, but also on other high-quality dairy products prone to adulteration, contributing to the further development of the dairy industry.

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