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A new system for animal products traceability and authentication: use of DNA analysis of natural tracers and example of application to dry cured hams

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ABSTRACT

A few DNA based approaches have been developed to trace animal products from the farm to the consumer “fork”. These approaches make use of the animal DNA that can be recovered during all steps of the production chain directly as part of the products that are obtained from them. This direct link between the animals and the products can be assessed using DNA markers like, for example, single nucleotide polymorphisms and microsatellites, for individual or population based (breed) traceability systems. However, these methods, in general, rely on the possibility to constitute banks of animal biological samples for critical/important steps of the production chain and analyse a large number of samples (individual traceability) or to identify breed/population multilocus informative markers or few specific mutations that can distinguish the breed/population of origin (breed traceability). Here we developed a new traceability and authentication system that makes use of the DNA contained in an added material to the animal originated products, establishing a link between alien DNA and the products, thus without the need to know/sample the animals that originated the products and having the possibility to operate at different levels in the production chain. The added material is of natural origin and can be or cannot be normally part of the final transformed animal products, but in all cases it does not alter the products themselves. We tested this new system in the dry-cured ham production chain using plant originated products (wheat flour) to mark/label the legs. The wheat flours, derived from unique lines (23) that were previously chosen and genetically characterized with a set of 7 specific microsatellites, were mixed to the ink commonly used to mark the green legs or to the fat preparation (whose recipe can include wheat or rice flour) used to grease the hams. The corresponding wheat DNA was identified after several months of seasoning on the hams by means of microsatellite analysis and the observed genotypes were always as expected from the wheat lines that were used to produce the tracers. This new system for product traceability and authentication revealed to be affordable and easy to apply to animal products and can be used to “label” the productions at different levels (consortium, the farm of origin of the animals, the year/month of production, etc.). Modifications of this system can be applied to several other food products. Patent pending.