Identifying the geographical origin of Serra da Estrela PDO cheeses using fatty acids profiles

Luísa Fontes[1*], M.J. Reis Lima[1,2], Hamdi Bahri[3], Jorge Sá Morais[3], Ana C.A. Veloso[4,5], Edite T. Lemos[1,2], António M. Peres[3,6]

[1]Department of Food Industries, Agrarian School, Polytechnic Institute of Viseu, Portugal
[2]CI&DETS and CERNAS Research Centers, Polytechnic Institute of Viseu, Portugal
[3]CIMO, Polytechnic Institute of Bragança, Portugal
[4]DEQB, Polytechnic Institute of Coimbra, ISEC, Coimbra, Portugal
[5]CEB, University of Minho, Braga, Portugal
[6]LSRE-LCM Associate Laboratory, ESA, Polytechnic Institute of Bragança, Portugal
** luisamdcfontes@gmail.com*

Serra da Estrela is a traditional Portuguese cheese with a Protected Designation of Origin (PDO) certification. This cheese is produced from raw ewe's milk from "Churra Mondegueira" and "Bordaleira" Portuguese autochthonous breeds and coagulated using wild thistle flower (*Cynara cardunculus* L.), and its production is geographically limited. Serra da Estrela is the most known and popular Portuguese cheese and is appreciated worldwide, being preferentially consumed as a soft cheese, with an average maturation of 30-45 days, although some consumers prefer to consume it as a hard cheese after at least 6 months of storage [1]. Due to its social and agroeconomic relevance, Serra da Estrela cheese is prone to geographical origin adulterations. The present work aims to verify if the fatty acids (FA) profile could be used as a geographical origin biomarker. The results showed that, although a similar FA profile (23 individual fatty acids identified, being the most abundant ones: $C_{4:0}$, $C_{6:0}$, $C_{8:0}$, $C_{10:0}$, $C_{12:0}$, $C_{14:0}$, $C_{16:0}$, $C_{18:0}$, $C_{18:1n9c}$, $C_{18:2n6t}$, $C_{18:2n6c}$ and $C_{18:3n3}$) could be established for all cheeses, regardless the producer, geographical origin and production date, the overall profile could be used for discriminating the cheeses according to their geographical origin (5 municipalities within the PDO region). A linear discriminant analysis (LDA) with the simulated annealing (SA) algorithm enabled establishing a classification model that was able to correctly classify 96% of the original grouped samples (**Fig.1**) and had a predictive sensitivity of 88% (leave-one-out cross-validation). So, FA profile could be used as a geographical origin authentication tool, providing the consumer a guarantee regarding this high-value and appreciated food.

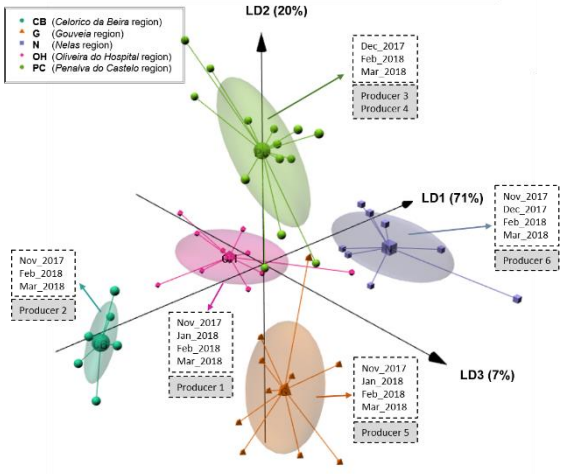

Fig.1. LDA-SA discrimination of Serra da Estrela PDO cheeses by geographical origin.

Acknowledgments: This research was financially supported by Associate Laboratory LSRE-LCM-UID/EQU/50020/2019, strategic funding UID/BIO/04469/2019-CEB and BioTecNorte operation (NORTE-01-0145-FEDER-000004), strategic project PEst-OE/AGR/UI0690/2014–CIMO and by Project 02/SAICT/2016/23290-QCLASSE, funded by national funds through POCI-01-0145-FEDER-023290.

References:

[1] M. Carocho, J.C.M. Barreira, A.L. Antonio, A. Bento, P. Morales, I.C.F.R. Ferreira, European Journal of Lipid Science and Technology, 117 (2015) 1607.