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Title:

Spectroscopic methodologies for fresh food authentication

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The increasing occurrence of fraud in foodstuffs points to the need to the identification of species as a part of authentication. Particularly, meat and fish can be targets of adulteration, such as the substitution or removal of ingredients, addition of proteins from various origins and the addition of food additives, contributing to increased financial profits [1].
Researchers have applied various analytical techniques for the detection of fraud in foodstuffs. The protein, DNA and PCR based techniques have become increasingly important. However, these methods are laborious, expensive, destructive and require sophisticated laboratory procedures. Moreover, they are not suitable for real-time applications.
Nondestructive technologies for authentication and traceability of foodstuffs, including nuclear magnetic resonance (NMR) imaging, fluorescence (FS), near infrared (NIR), mid infrared (MIR) and Raman (RS) spectroscopy coupled with Fourier transform (FT) and multispectral (MS) and hyperspectral (HIS) imaging, are emerging technologies [2]. Combined with multivariate statistical methods, NIR, MIR, RAMAN are well established techniques that were largely applied in the authentication of foodstuffs. These technologies are simple, non-invasive, low cost, allow real time analysis, require small samples and no further sample preparation is necessary.
The MS, HIS and spatial multispectral analysis convenient for food inspection. They are able to analyzed larger number of samples simultaneously. However, the high initial costs and difficulties in data acquisition have limited the use of this real-time technology.
In this work a revision of the state of the art on spectroscopic methods for food authentication will be presented as well as the experimental results obtained in the study of adulteration of fallow deer (*Dama dama*) with goat (*Capra aegagrus hircus*).

1. Ballin, N.Z., Meat Science, 2010. **86**(3) p. 577.
2. Lohumi, S., et al., Trends in Food Science & Technology, 2015. 46(1) p. 85.