



The missing food-matrix stable isotope reference materials

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Stable isotope analysis has been used to detect economically motivated adulteration and substitution of food products since the early 1970s. However, no chemically complex agricultural plant or animal-derived food materials have been offered as isotopic reference standards by organisations such as the International Atomic Energy Agency (IAEA) or the United States Geological Survey (USGS) specifically to underpin detection of food fraud. Accurate stable isotopic characterisation of organic samples relies heavily on the availability and proper use of reference materials (RMs). Ideally a RM should be chemically as similar as possible to the unknown food samples to avoid 'comparisons between apples and oranges'. The fundamental analytical principle of identical treatment of sample and standard advocates chemical similarity of sample and standard, and thus calls for the development of food matrix isotopic reference materials. For example, a dispute about the geographic origin of olive oil should be addressed by isotopic characterization of the olive oils in question relative to well-characterized isotopic olive oil RMs. Unfortunately, there are no such RMs available. Numerous laboratories have prepared their own food-derived 'in-house-standards', but these proprietary RMs are typically stored in air and light where slow oxidation is gradually changing the chemical and isotopic characteristics. This presentation describes work that is underway to develop an initial set of calibrated and correctly stored food matrix stable isotope reference materials including vegetable oils, honeys and cereal flours that will be made available to the growing community of scientists involved in the application of stable isotope analysis to confirm food authenticity and provenance.