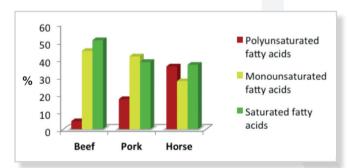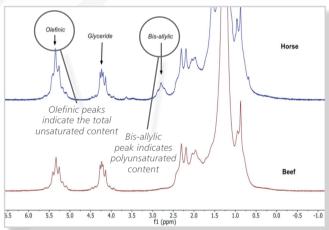# Pulsar™

Benchtop NMR for Food Authenticity Screening

Recent advances in benchtop Nuclear Magnetic Resonance (NMR) mean that it is suitable as a fast and easy technique for assessing suspected edible oil contamination/adulteration and meat speciation. The **Pulsar**™ system can be used to discriminate between different oil types and provide quantitative information for mixtures. The NMR spectra of triglycerides contain valuable information indicating what the meat species is.

Benchtop NMR for Meat Speciation*

- Meat authentication problems include:
  - Product recall; brand damage; drop in sales
  - Loss of consumer confidence

- Example:
  - Substitution of beef meat with undeclared horse meat

- The fatty acid component of triglycerides found in animal tissue is known to differ between species.

- At 60MHz, using Pulsar we can clearly "see" this difference in the ^{1}H NMR spectrum as differences in the size of the olefinic resonances (5 to 5.8 ppm), which are a measure of the total unsaturated fat content.

Typical 60 MHz NMR spectra from different meat species

Why use benchtop NMR as a screening tool?

	60MHz ^{1}H NMR	DNA test
Speed	Minutes	Up to several days
Complexity	Can be carried out by non-scientists; no need to be in lab environment	Requires sophisticated labs and experienced personnel
Cost per sample	< £20; mid-size retailer will spend <£80,000/year	£90-£500; mid-size retailer will spend £0.5-1m/year

*Patent applied for:
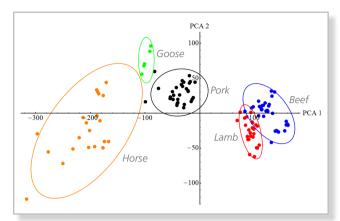United Kingdom Patent Application No. 1315962.9

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Example of data analysis

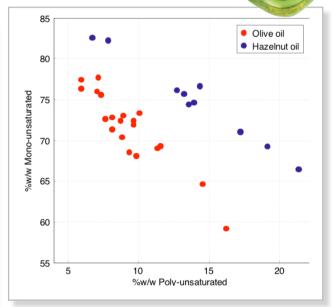Principal Component Analysis (PCA)† can be used to classify different meat types.

Benchtop NMR for Hazelnut Oil Adulteration

- Adulteration of Extra Virgin Olive oil with lower cost and poorer quality oils is a known problem.

- This is a challenge for other techniques, such as FTIR, as the olive oil and hazelnut oil spectra are extremely similar.

- However, their NMR spectra show sufficient differences to allow better levels of detection of the adulterant.

Calculated mono- and poly-unsaturated composition of a set of 30 pure olive and hazelnut oils from Pulsar NMR spectra

† PCA is not part of the standard Pulsar software package

Contact us today for a demonstration. We offer remote demonstrations or you can send us your samples.

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