Rapid Determination of the Fat Content in Packaged Dairy Products by Unilateral NMR

E. Veliyulin\textsuperscript{1}, I.V. Mastikhin\textsuperscript{2}, A.E. Marble\textsuperscript{2} and B.J. Balcom\textsuperscript{2}

\textsuperscript{1} SINTEF Fisheries and Aquaculture, N-7465 Trondheim, Norway
\textsuperscript{2} MRI Centre, Department of Physics, University of New Brunswick, Fredericton, NB, Canada E3B 5A3

Abstract:
Knowledge of the fat content in dairy products is important for both industry and consumers. A new procedure for rapid and non-destructive determination of the fat content in dairy products in commercial packages using a unilateral NMR was proposed. Rapid accumulation of the NMR signal was achieved by the use of a newly developed unilateral magnet array with a well-controlled magnetic field and optimized for sensitivity\textsuperscript{1}. The sample magnetization was prepared using either $T_1$ suppression or diffusion editing and read out via a CPMG pulse sequence (Fig.1). A linear correlation between the measured NMR signal from the fat component and the declared fat content in the tested products validated both approaches as viable instrumental methods. The shortest measurement time was about 7 s.

Advantages of the unilateral NMR method, including hardware simplicity and accommodation of commercially packaged products make it attractive for routine use in industry.

Fig.1: Diffusion edited CPMG pulse sequence\textsuperscript{2} effectively suppressing the contribution of the water component in the dairy products
