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Investigation of state of water in fiber-cheese-water system by nuclear magnetic resonance relaxation technique

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NMR has emerged as important tool in food industry for R&D and quality-control. Impact of fiber-type on water-mobility was observed and compared with the control using Nuclear magnetic resonance (NMR). Considerable work has been reported on starch and its physio-chemical characterization but little information is available on the state of dietary fiber in foods. An approach was taken by enriching a 15-d aged Cheddar cheese with two different fibers i.e., inulin (soluble) and resistant starch (insoluble) at 10% (wt/wt) in 3 replicates. This was comprised of comminuting cheese, dividing the ground mass in 3 portions of 1.8-kg and admixing dietary fiber into cheese followed by low-shear mixing. The third portion was treated as control i.e., no fiber. Cheese-fiber mixture and the control cheese were placed in cheese-mold lined with cheese-cloth, and pressed for 12 hr at 60-kPa pressure. The reformed cheese blocks were stored at 4°C for 2 months before analysis. Relationship between relaxation time as observed with NMR and water-mobility in 3 different treatments was investigated. Relaxation time (T₂) was related to the mobility of water molecules, with very mobile water molecules taking longer to reach their equilibrium state, having long relaxation times. The relaxation time recorded (milliseconds) by NMR for control cheese, cheese-inulin, and cheese-resistant starch were 198, 143, and 335, respectively. This reveals that inulin enables higher mobility of water in cheese system as compared to the control and resistant starch. Further exploration is needed to compare the water-mobility on cheese functionality when added with these fibers.

Biography

Lalit K Murdia has earned PhD in Food Process Engineering from Fraunhofer Institute, Munich, West Germany in 1989. He has been working as a Professor and Head of the Department of Dairy and Food Engineering at College of Dairy and Food Science Technology, Maharana Pratap University of Agriculture and Technology, India. He has published 56 research articles in various international journals and has been actively contributing to the food science by reviewing manuscripts for several journals. In addition, he has been helping many Indian food industries in improving their processing for safe, nutritious, and cost favorable food production.

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