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Nutritional interventions to limit ruminal biohydrogenation of unsaturated fatty acids

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Dietary esterified fatty acids are metabolised by ruminal microbial communities by lipolysis and later on biohydrogenation of free unsaturated fatty acids. The major intermediates include an array of trans-C18:1 and conjugated linoleic acid (CLA) isomers. However, the complete biohydrogenation of unsaturated fatty acids to saturated fatty acid leads to increase in saturated fatty acid content in milk and animal fat. Therefore, the objective of our research was to inhibit the complete biohydrogenation of unsaturated fatty acids via technologically treated unsaturated fatty acid rich products using batch 24h in vitro rumen simulation. Furthermore, postruminal bio-availability was evaluated through in vitro simulation of small intestine digestion. The extent of biohydrogenation of PUFA was calculated based on the proportional loss of these fatty acids after incubation and the protection efficacy for each protected product was assessed relative to biohydrogenation of its unprotected product. Postruminal bio-availability was assessed from the release of free fatty acids. Intestinal digestibility was assumed to equal 100% when 2/3 (66.7%) of the fatty acids were released from the triglyceride, as monoglycerides might be absorbed through the small intestine. Technological treatments included: non enzymatic browning of soybean and linseed, extrusion of linseed, formaldehyde treatment of rolled linseed and salmon oil, amide protection of Camelina oil and encapsulation of microalgae. Formaldehyde treated rolled linseed product showed the highest protection (40%) in an in vitro rumen simulation experiment without impairment of intestinal digestibility. The latter was slightly reduced for formaldehyde treated salmon oil.

Biography

Gunjan Goel has completed his Ph.D in Dairy Microbiology from National Dairy Research Institute, India and postdoctoral studies from University of Hohenheim, Germany and University of Ghent, Belgium. He has been working in the area of ruminal microbial metabolism, plant secondary metabolites and rumen fermentation from more than a decade. He has published more than 20 papers in reputed journals and serving as an editorial board member of journals of repute.

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