Chronic consumption of conventional and saturated-fat reduced dairy products have differential effects on low-density lipoprotein cholesterol levels in adults at moderate cardiovascular disease risk

D. Vasilopoulou[1,2], O. Markey[1,2], C.C. Fagan[1], K.E. Kliem[2], D.J. Humphries[2], K.G. Jackson[1], S. Todd[3], D.I. Givens[2] and J.A. Lovegrove[1]

[1]*Hugh Sinclair Unit of Human Nutrition and Institute of Cardiovascular and Metabolic Research, Department of Food and Nutritional Sciences,* [2]*Food Production and Quality Division, School of Agriculture, Policy and Development and* [3]*Department of Mathematics and Statistics, University of Reading, Reading, RG6 6AP, UK*

Reducing the intake of dietary saturated fatty acids (SFA) to ⩽10 % of total energy intake is a key public health strategy aimed at lowering current cardiovascular disease (CVD) incidence. Consumption of dairy products (including butter) represents approximately 35 % of total dietary SFA intake[1]. Supplementation of the bovine diet with oleic acid-rich plant oil has been reported to depress SFA and increase *cis*-monounsaturated fatty acids levels in milk, providing a strategy to lower total dietary SFA intake [2]. This human intervention study aimed to investigate whether consumption of SFA-reduced, compared with conventional dairy products, would impact on the fasting lipid profile, glucose and insulin concentrations of adults at moderate CVD risk.

Fifty-four adults (mean age 53 (SD 13) years, BMI 26 (SD 3) kg/m^2), completed a double blind, randomised, controlled 12-week cross-over study with an 8-week washout period between treatment arms. Participants replaced habitual dairy foods/snacks with SFA-reduced or conventional UHT milk, Cheddar cheese and butter (fatty acid (FA) composition of SFA-reduced *vs.* conventional dairy products: total SFA: -7·0 g/d, C18:1*cis*: 3·0 g/d, C18:1*trans*: 2·4 g/d), achieving an isoenergetic daily dietary exchange (41 g/d total fat). At the beginning and end of each treatment period, fasting blood samples were collected for biochemical analysis. LDL-C was estimated using the Friedewald formula. The homeostatic model assessment of insulin resistance (HOMA-IR) was calculated using the glucose and insulin data.

Fasting parameters	Diet A				Diet B				
	Baseline		Δ		Baseline		Δ		
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	P
Total Cholesterol (mmol/L)	5·54	0·13	0·12	0·07	5·47	0·12	0·29	0·06	0·08
LDL-C (mmol/L)	3·47	0·11	0·03	0·06	3·43	0·1	0·19	0·05	0·03
HDL-C (mmol/L)	1·51	0·04	0·04	0·02	1·5	0·04	0·07	0·02	0·55
Triacylglycerol (mmol/L)	1·24	0·07	−0·48	0·16	1·18	0·06	−0·74	0·14	0·32
Glucose (mmol/L)	5·38	0·1	−0·06	0·07	5·4	0·1	0·04	0·09	0·34
Insulin (pmol/L)	41·3	3·2	−1·9	1·9	39·8	3·5	7·5	4·5	0·09
HOMA-IR	1·66	0·13	−0·11	0·08	1·59	0·14	0·04	0·12	0·08

Values are mean ± SE. Due to ongoing blinding, treatments are referred to as Diet A and B. HDL-C, high density lipoprotein cholesterol; LDL-C, low density lipoprotein cholesterol; Δ, change from baseline (wk12-wk0).

Preliminary results using mixed model analyses indicate that from baseline, only LDL-C concentrations were influenced by the FA composition of the dairy products, with the observed increase in LDL-C concentrations with Diet B shown to be significantly attenuated following Diet A. These preliminary findings are part of the RESET intervention trial (NCT02089035), which will also investigate the impact of consumption of SFA-reduced dairy products on inflammatory markers and vascular function.

1. Dept. of Health (2014) NDNS: Headline results from Y1-4 (combined) of the rolling programme 2008/9–2011/12.
2. Kliem KE *et al.* (2013) *J Dairy Sci* **96** (5), 3211–3221.