University of Reading

RESET | 2016

Leading New Directions in Dairy Foods and Health

Thursday 1 September 2016

WELCOME

A warm welcome from the University of Reading to the fourth of our one day events related to dairy products and human health.

This event is supported by our Medical Research Council funded RESET study which is examining the effects of replacing a proportion of the saturated fatty acids in milk fat with monounsaturated fatty acids by manipulation of the cow's diet on markers of risk for cardiometabolic diseases.

The event also features some of our other work on dairy and health including the Whey2Go study investigating the effects of milk proteins on vascular health and another study on modelling dietary patterns with varying amounts of dairy products and their association with environmental, nutritional and financial costs.

We are, however, very aware that we need to probe the association between dairy products and health much deeper to understand the mechanisms involved and how they are controlled. It is therefore with great pleasure that we bring together contributions from leading world experts which will highlight data from recent meta-analyses on dairy and risk of cardiometabolic disease risk, a new view on effects of different saturated fatty acids on cardiovascular risk, the influence of the food matrix and the potential of 'omics' technology.

We trust that we will enjoy the day and we look forward to hearing any feedback you may have.

Professor Julie Lovegrove

Professor of Human Nutrition, with research interests in the impact of dietary fats and phytochemicals on cardiometabolic health, with focus on nutrient-gene interactions.

Professor Ian Givens

Professor of Food Chain Nutrition, with research interests that focus on the relationship between consumption of animal-derived foods, nutrient supply and chronic disease outcome.

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PROGRAMME

RESET | 2016
LEADING NEW DIRECTIONS IN DAIRY FOODS AND HEALTH

9.00 am	Registration, Tea & Coffee, Light Refreshments	
10.00 am	Welcome	**Professor Christine Williams** Director of Food, Agriculture and Health, University of Reading
10.10 am	Scene setting	**Professor Julie Lovegrove** Professor of Human Nutrition **Professor Ian Givens** Professor of Food Chain Nutrition

MORNING SESSION | DAIRY FOODS, FATTY ACIDS AND CARDIOMETABOLIC HEALTH

10.20 am	Dairy and cardiometabolic disease: Current evidence from prospective studies	**Dr Sabita S. Soedamah-Muthu** Assistant Professor, Wageningen University
10.50 am	Saturated fatty acids: Are they all equal?	**Dr Albert Koulman** Senior Scientist Biological Mass Spectrometry, MRC, Human Nutrition Research in Cambridge
11.20 am	Tea & Coffee, Light Refreshments	
11.40 am	RESET study: Modified dairy food production, composition and sensory characteristics	**Dr Colette Fagan** Associate Professor at the University of Reading
12.05 pm	RESET study: Intervention and early findings	**Dr Oonagh Markey** Postdoctoral Research Fellow at the University of Reading's Hugh Sinclair Unit of Human Nutrition
12.30 pm	Lunch	

AFTERNOON SESSION | DAIRY MATRIX, PROTEINS AND DIETARY PATTERNS

1.30 pm	The dairy food matrix: Its implications for cardiometabolic disease	**Prof. Arne Astrup** Head of the Department of Nutrition, Exercise and Sports, University of Copenhagen, Denmark
2.00 pm	What can metabolomics tell us about the impact of dairy on cardiometabolic disease risk?	**Dr Trine Kastrup Dalsgaard** Associate Professor at Department of Food Science at Aarhus University
2.30 pm	Tea & Coffee, Light Refreshments	
2.50 pm	Whey2Go study: Milk proteins and vascular health	**Dr Ági Fekete** Post-Doctoral Researcher, University of Reading
3.15 pm	Dairy foods and dietary patterns: What does this tell us?	**Dr Ditte Hobbs** Post-doctoral Research Fellow in the Department of Food and Nutritional Sciences at the University of Reading
3.40 pm	Discussion & Closing Remarks	
4.00 pm	Close	

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NINETY YEARS OF EXCELLENCE

HUGH SINCLAIR Unit of Human Nutrition

Professor Christine Williams

Professor Christine Williams is Director of Food, Agriculture and Health and previously Pro-Vice Chancellor at the University of Reading.

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Professor Christine Williams was appointed the first Hugh Sinclair Professor of Nutrition at the university in 1995.

Her research is primarily concerned with understanding the impact of dietary fats on human health, particularly in relation to cardiovascular disease and insulin resistance. Between 1998-2001 she was the President of the UK Nutrition Society, she chaired the BBSRC Agri-Food Committee, 2003-2006, currently chairs the BBSRC Agriculture and Food Security Strategy Panel, is a Governor of the Quadram Institute Norwich and Governor and Chair of the Board of Trustees of the British Nutrition Foundation.

In 2013 she was awarded an OBE in the UK Queen's Honours list for her services to higher education and nutrition sciences.

Dr Sabita S. Soedamah-Muthu

Board member for BSc and MSc on Health and Society, Board member of the programme committee for the annual Netherlands Nutrition conference, Board member of the Dutch Academy of Nutritional Sciences (NAV), Chair (NVDO/NDESG) Dutch Diabetes Organization, European Association for the Study of Diabetes (EASD) study group member: European Diabetic Nephropathy Study Group (EDNSG), European Diabetes Epidemiology Group (EDEG), EASD study group on Diabetes and Cardiovascular diseases, Member of the Netherlands Epidemiological Society.

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Abstract:

Dairy and cardio metabolic disease: current evidence from prospective studies

Background

The consumption of dairy products may influence the risk of type 2 diabetes, hypertension and cardiovascular diseases (CVD) and total mortality, but findings have been conflicting.

Design

We conducted several meta-analyses to study the association between dairy products and:

1. risk of type 2 diabetes
2. hypertension
3. fatal and non-fatal CVD, CHD, strokes and updates on all-cause mortality

We systematically searched the literature using MEDLINE, EMBASE and Scopus. Random-effects meta-analyses were performed with generalized least squares for trend estimation of summarized dose-response data. Presence of publication bias was formally assessed. Heterogeneity was explored including by quality assessment of the studies.

Results

The diabetes meta-analysis included 22 cohort studies, with 579,832 individuals and 43,118 diabetes cases. Total dairy was inversely associated with diabetes risk (RR=0.97 per 200 g/d increment; 95%CI 0.95, 1.00; P=0.04; I2=66%), with a suggestive but similar linear inverse association noted for low-fat dairy (RR=0.96 per 200 g/d; 95%CI 0.92, 1.00; P=0.072; I2=68%). Non-linear inverse associations were found for yogurt intake (at 80 g/d RR=0.86 vs. 0 g/d ; 95%CI 0.83, 0.90; P<0.001; I2=73%) and ice-cream intake (at ~10 g/d RR=0.81; 95%CI 0.78, 0.85; P<0.001; I2=86%), but no added incremental benefit were found at higher intakes. Other dairy types were not associated with diabetes.

The hypertension meta-analysis included 9 prospective cohort studies comprising 57,256 individuals with 15,367 incident hypertension cases accrued during a follow-up time of 2-15 years. We found inverse associations for total dairy, low-fat dairy and milk intake and incident hypertension. Intake of milk (6 studies) was inversely and linearly associated with a lower risk of hypertension (up to intake of ~600 ml per day for milk). The pooled relative risk (RR) for intake per 200 ml per day was 0.96 (95% CI: 0.93-0.99) for milk, without statistical heterogeneity.

The meta-analysis on cardiovascular outcomes included 17 prospective cohort studies, with 2,283 CVD, 4,391 CHD, 15,554 stroke and 23,949 mortality cases. A modest inverse association was found between milk intake and risk of overall CVD (4 studies; RR=0.94 per glass/day (200 ml/d), 95%CI: 0.89-0.99). Milk intake was not significantly associated with risk of coronary heart disease (6 studies, RR per glass/day=1.00, 95%CI: 0.96-1.04), stroke (6 studies; RR=0.87, 0.72-1.05) and total mortality (8 studies; RR per glass/day= 0.99, 0.95-1.03). Last year we updated results for cardiovascular, coronary heart disease, stroke, and all-cause mortality. We will show latest results from this work.

Conclusions

These dose-response meta-analyses of prospective studies indicate that with increasing milk intake per glass a day there is a borderline significantly inverse association with incident hypertension and total CVD (which included stroke), but not with coronary heart disease. In addition, there was an inverse association between yogurt and incident diabetes. We did not find associations between dairy products and all-cause mortality.

Dr Albert Koulman

Dr Albert Koulman is senior scientist biological mass spectrometry in the Lipid Profiling and Signalling group of the Medical Research Council Human Nutrition Research in Cambridge, UK. He received his PhD at the University of Groningen.

He joined the MRC in 2007 to set up a lipidomics lab. He currently works on development of high throughput lipid and metabolite profiling strategies that can be applied on very large epidemiological sample sets.

These strategies make use of conventional FAME based GC analysis or/and orbitrap based high resolution mass spectrometry techniques. His main research interests are the metabolism of lipids through the life course and nutritional biomarkers. He leads the "Validation of markers of metabolic efficacy in infant nutrition" project. He is also managing one of the more advanced academic mass spectrometry laboratories for metabolite analysis in the UK. He has published over 50 peer reviewed papers on metabolomics, mass spectrometric analysis and natural products.

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Abstract:

Large scale fatty acid analysis provides objective information on fat metabolism, but what does it mean?

Plasma fatty acids are often thought to be biomarkers of dietary fat. We have used a high throughput method to profile the fatty acids of the plasma phospholipid fraction in over 50,000 people

This work, as well as other studies from our group and the literature, have shown that the relation of each individual fatty acid to diet, metabolism and health is unique.

I will specifically go into the details of three saturated fatty acids (C15:0, C16:0 & C17:0). These three fatty acids have very different origins (diet and metabolism), and all are strongly associated with type II diabetes through very different mechanisms. This work will clearly expose our limited understanding of lipid metabolism and show that we need to be very restrained in public health messages around dietary fat.

Dr Colette Fagan

Dr Colette Fagan is an Associate Professor in Food Processing at the University of Reading. She holds a BSc (Hons) in Industrial Microbiology from University College Dublin as well as an MSc (Agr) (Engineering Technology) and PhD (Biosystems Engineering) from the same institution. Following a period as a Research Fellow in the USA and Ireland she joined the University of Reading in 2011.

Her research strategy is to develop new food processing approaches and analytical tools to ensure production of sustainable food products. Adoption of such new methodologies and tools can be used to optimise processing to enhance efficiency within the food industry, with a focus on food quality, safety and nutrition.

She has published 35 peer-reviewed journal papers, 13 book chapters, and edited one book. She is acting as guest editor for Current Opinion in Food Science and is a member of the Publications Committee of the Society of Dairy Technology.

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Abstract:

Processing of SFA-Reduced dairy Products: Composition and Sensory Characteristics

It is important to reduce modifiable risk factors for CVD, including a high dietary intake in saturated fatty acids (SFA). Therefore, it is necessary to find effective, novel approaches for reducing SFA intake at a population level. Modification of the fatty acid (FA) profile of milk, through plant oil supplementation of the dairy cow diet, is one method of producing SFA-reduced dairy products.

In this study, the habitual total mixed diet of multiparous Holstein-Friesian cows was supplemented with high oleic sunflower oil (1kg/cow/d) for more than 21 days to produce SFA-reduced milk. Subsequently butter, Cheddar cheese and UHT milk were manufactured to support a 24 month human intervention study i.e. RESET.

Products were manufactured in a 16 month period with manufacturing trials carried out at our time points. The fatty acid profiles of the products were determined by GC-FID and consumer acceptance was evaluated in a blinded manner. The SFA-reduced products were compared to product controls and two comparators.

The impact of nutritional information provision on acceptability of the trial cheese was also assessed. Consumers (n = 115) rated samples for overall liking, modalities of liking (appearance, flavour, texture) using 9-point hedonic scales. It was determined that supplementation of the bovine diet led to production of milk that was 25% lower in SFA and 33% higher in cis-monounsaturated FA concentrations. Furthermore SFA-reduced products had similar FA profiles across manufacturing time points. Analysis found that in the SFA-reduced products 53.5 ± 1.3 % of the FA were SFA, 42.7 ± 0.9 % of the FA were MUFA and 3.7 ± 0.3 % were PUFA. No significant differences in liking were evident between milk samples ($P > 0.05$). Significant differences in overall liking, appearance, flavour and texture liking ($P = 0.001$-0.016) were evident between the cheese samples, with the trial cheese being significantly less liked than a commercial alternative. When presented with health information, overall liking of the trial cheese significantly increased ($P = 0.04$). There were significant differences between the butter samples for overall liking and modalities of liking, with all of the samples being significantly more liked than a commercial butter/sunflower oil blend ($P < 0.0001$).

In conclusion, this work highlights the potential of using plant oil supplementation in the diet of dairy cows as part of a strategy to reduce the SFA content of dairy products. However further optimisation of processing is required, in conjunction with education of consumers, to improve consumer acceptance of SFA-reduced cheese.

This research was supported by the Medical Research Council (MR/K020218/1), with food-in-kind from Arla Foods UK and AarhusKarlshamn (AAK) UK Ltd.

Dr Oonagh Markey

Dr Oonagh Markey – has worked as a Postdoctoral Research Fellow at the University of Reading's Hugh Sinclair Unit of Human Nutrition since 2012. Her research focuses primarily on the impact of dietary components on cardiovascular disease (CVD) risk.

She is currently postdoctoral lead on the three year Medical Research Council-funded RESET (REplacement of SaturatEd fat in dairy on Total cholesterol) study, which is examining the effect of reducing saturated fatty acid entry into the food chain on important biomarkers of CVD, without limiting dairy product consumption. Oonagh is a Registered Nutritionist and contributes to the work of the Association for Nutrition (AfN) as an Assessor for the UK Voluntary Register of Nutritionists.

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Abstract:

Intervention and early findings

A key recommendation for cardiovascular disease (CVD) risk reduction is to limit consumption of saturated fatty acid (SFA) intake to ≤10% of total energy (TE). The UK adult population currently exceeds the target for dietary SFA intake, at 11.9%TE.

As milk, milk products and butter contribute to approximately one third of total SFA intake within the UK, they are regularly targeted as a strategy for SFA reduction. However, restricting dairy intake could lead to inadequate dietary intakes of micronutrients and protein. Additionally, some prospective evidence suggests that high milk consumption is associated with a lower risk of cardiovascular events. Alteration of the fatty acid (FA) profile of milk is a potential sustainable means of reducing SFA intake at a population level, whilst retaining the beneficial components of milk. We have demonstrated that oleic acid-rich plant oil supplementation of the bovine diet is a feasible way of producing milk that is 25% lower and 33% higher in SFA and cis-monounsaturated FA concentrations, respectively.

In an acute-within-chronic setting, the RESET (REplacement of SaturatEd fat in dairy on Total cholesterol) study aimed to investigate, in a randomized, cross-over, double-blind controlled manner, the impact of FA-modified dairy product consumption on novel and traditional CVD risk markers, when compared to conventional dairy foods. Fifty-four adults at moderate CVD risk (31 men, 23 women; age 53 (SD 13) years; BMI 25.8 (SD 3.4) kg/m2) partook in an iso-energetic 12-week daily dietary exchange (41g/d total fat); this was achieved by replacing habitual dairy foods/snacks with regular or FA-modified UHT milk, Cheddar cheese and butter (FA composition of the FA-modified dairy products vs. conventional dairy products: Total SFA: -7.0g/d, C18:1cis: 3.0g/d, C18:1trans: 2.4g/d).

The impact of FA-modified dairy consumption on CVD biomarkers, including fasting and postprandial vascular function, lipid metabolism and inflammatory status will be discussed. The findings of this work will help to inform public health policy on optimum dietary strategies for CVD prevention.

This research was supported by the Medical Research Council (MR/K020218/1), with food in-kind from Arla Foods UK and AAK (UK) Ltd.

Professor Arne Astrup, MD, DMSc

Professor, Head of the Department of Nutrition, Exercise and Sports at the University of Copenhagen, Denmark, and senior consultant at Clinical Research Unit, Herlev-Gentofte University Hospital.

Professor Astrup's principal research is on the physiology and pathophysiology of energy and substrate metabolism and appetite regulation, with special emphasis on the etiology and treatment of obesity by methods that have included the role of diet composition and of specific nutrients, lifestyle modification, very-low-calorie diets, exercise, and medication.

- He lead research that showed that GLP-1 is a satiety hormone in humans, and was instrumental for Denmark being the first country to ban industrial trans-fat in 2014. Arne Astrup has published more than 700 scientific papers, H-index: 75, and a Google Scholar H-Index: 98, and his groups have produced 32 PhD's until now.

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Abstract:

Dairy and weight management: a review of the evidence

Accumulating evidence from observational studies indicates an inverse association between dairy and body weight and body fat mass. Some randomised controlled trails (RCT) have been reported, and meta-analyses of observational studies support the role of dairy for weight control, particularly during energy restriction. However, though several of the reported RCT's show beneficial effects of dairy for body weight the mechanisms by which dairy influences energy balance are not entirely clear. However, dairy protein and calcium may play certain roles.

In the Diogenes trial, we have shown that a slight increase in total protein (~25 % of energy), a corresponding reduction in total carbohydrate, and a relative increase in low-glycaemic index carbohydrates, promotes weight control both in adults and in obese children. The reduction in carbohydrate load is particularly effective for weight reduction in insulin resistant individuals e.g. prediabetics, PCOS, metabolic syndrome.

Dairy protein has a very high quality in terms of amino acid composition, and its effects on satiety and muscle anabolism are similar or better than those from other sources. Protein has an important role for weight control, and in combination with calcium and vitamin D there is a role for a specific reduction in abdominal obesity and metabolic syndrome. In Diogenes the diet was also found to have a positive effect on blood pressure, blood lipids, and inflammatory markers.

Increased dietary calcium intake has been proposed to affect both sides of the energy equation, i.e. both energy intake and energy utilization, at least in subjects with low habitual intake. It has been shown that increased dairy calcium intake produces a decrease in fat digestibility, presumable due to formation of insoluble calcium-fatty acid soaps and binding of bile acids. Based on a meta-analysis we have estimated that an increase in dairy calcium intake of ~1200 mg/day produces an increased faecal fat excretion of 5.2 g/day.

Finally it has been suggested that low dietary calcium intake may affect appetite regulation and lead to an increased food intake, and this effect has recently been substantiated by a meta-analysis.

In conclusion, a high intake dairy is a natural part of a nutrient dense diet that provides benefits for weight control, and the prevention of type 2 diabetes and cardiovascular disease.

Dr Trine Kastrup Dalsgaard

Dr Trine Kastrup Dalsgaard is Associate Professor at Department of Food Science at Aarhus University. Her research focuses within the food science and technology where development of new mass spectrometry based methods for targeted and untargeted omics techniques lately has been in focus been. These have been used to investigate nutritional value of diets and their impact on the metabolic profile. Furthermore, she focuses on free radical- and protein chemistry taking place during food storage and processing.

Trine completed her Master in Industrial Biotechnology at Aalborg University, Denmark in 2002. In 2007, she finalized her PhD in Food Science at Aarhus University, Denmark. She did her Post Doc training at The Heart Research Institute in Sydney, Australia and at National Institute of Health in North Carolina, USA respectively, always with the close connection to The Department of Food Science at Aarhus University where she is now appointed as associate professor

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Abstract:

Metabolomics – Can it tell us about the mechanisms behind the impact of dairy fat and proteins and their effect on metabolic syndrome and cardio metabolic risk?

Globally, there are more than 1 billion overweight adults, at least 300 million of them clinically obese (WHO). Obese individuals (BMI >30) often develop metabolic syndrome (MeS) and type II diabetes (T2DM), which is frequently complicated by the development of cardiovascular diseases (CVD), thus threatening the global health and economy.

Insulin resistance is considered the core phenomenon in CVD, in addition to post prandial lipaemia, and is now recognised as an independent predictor of CVD and is closely linked to MeS. Observational studies suggest that dairy food consumption may prevent the development of metabolic syndrome and its related disorders. The mechanisms behind these observations are not clear. For this purpose metabolomics techniques may be of help. Metabolomics approaches have successfully been used as a powerful tool to discriminate between different diet intakes. The question is if metabolomics also can be used to indicate effect of a specific diets effect on health aspect. This focus has been very limited within the field of metabolomics, but recently these aspects were touch upon in a human intervention study using different milk protein and different fatty acid composition.

Dairy products, having a high level of saturated fat, have been linked to an increased risk of cardiovascular diseases. Intriguingly, milk also contain high levels of medium chain fatty acids (MCFAs ~ C6-C12), which metabolism is different from the long chain saturated fatty acids, and research indicates that MCFAs may have a beneficial effect on weight loss. Furthermore, the milk whey proteins are known to stimulate insulin secretion, thus suppressing postprandial blood glucose and whey protein has been suggested to have a positive effect on lean body mass. We aimed to investigate the influence per se and the interaction of high or low levels of MCFAs, and milk proteins (whey vs. caseins) in a 12-week intervention study with respect to metabolic profile and metabolism. In the metabolic profile we both found biomarkers for insulin resistance, indication of energy expenditure and lipogenesis. Oxidation products of the MCFAs correlated well with clinical findings.

Dr Ágnes A. Fekete

Ági Fekete is a final year Doctoral Researcher at the University of Reading, UK. She graduated from the University of Debrecen, Hungary with an MSc equivalent degree in Agricultural Sciences with major in Animal Sciences. She continued her studies at the University of Reading, where she obtained an MSc degree in Nutrition and Food Science.

Her PhD work included two human dietary intervention trials, which investigated both the long and short-term effects of milk proteins on blood pressure and vascular function, as well as other important biomarkers of cardiovascular diseases (e.g. inflammatory markers, lipid metabolism and insulin resistance).

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Abstract

The effects of milk proteins on the cardiometabolic system: evidence from the Whey2Go study

Emerging epidemiological evidence shows that milk consumption does not lead to an increased cardiovascular disease risk and indeed may provide long-term benefits, particularly in relation to reducing hypertension.

Milk contains several bioactive components including calcium and high quality protein. Milk proteins (whey protein and casein) release bioactive peptides during digestion which are reported to possess a wide range of biological properties.

Limited evidence from human intervention studies suggests that both whey protein and casein may be effective in blood pressure-lowering, however there is a clear lack of well designed, suitably powered human intervention trials using gold standard techniques to assess blood pressure and cardiovascular function.

The Whey2Go study aimed to provide valuable information on the relative effects of whey protein and Ca-caseinate on 24-hour ambulatory blood pressure and vascular function compared with a control (maltodextrin) in mildly hypertensive adults in both acute and chronic settings. Furthermore, the study investigated the effects of these proteins on the markers of insulin resistance, lipid metabolism and inflammatory status.

This project directly addresses the need to develop a non-pharmacological strategy to tackle the significant public health burden of hypertension, since its high prevalence has implications not only for social and economic welfare, but for the UK's healthcare system.

Dr Ditte Hobbs

Dr Ditte Hobbs is a post-doctoral Research Fellow in the Department of Food and Nutritional Sciences at the University of Reading. She received her PhD in 2013 'investigating the effects of nitrate rich foods on blood pressure and vascular function'.

Following her PhD Ditte started working on a project funded by the Agriculture and Horticulture Development Board for Dairy (AHDB Dairy), which modelled the 'impact of varying the amounts of dairy products in UK diets on nutritional adequacy, financial and environmental impact'.

She then went on to research the 'role of yoghurt consumption the diets of British children', which was funded by Danone Nutricia Research and is about to start a new project funded by Nexus Communications looking at 'red meat consumption in the UK and associations with nutrient intakes and status in children and adults living in the UK'.

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Abstract:

Dairy foods and dietary patterns: what does this tell us?

Dietary pattern analysis is a useful tool for analysing an entire eating pattern. In this talk Dr Ditte Hobbs will present the findings of two studies looking at the dietary patterns associated with total dairy intake in British adults as well as the dietary patterns associated with yoghurt intake in British children.

Both of these studies are based on data from years 1-4 of the National Diet and Nutrition Survey (NDNS). Overall adults and children consuming diets with the highest total dairy or yoghurt intakes have higher nutrient intakes, particularly for calcium, vitamin B12, riboflavin and iodine, and have a better overall diet quality compared with adults and children consuming diets with the lowest total dairy or yoghurt intakes.

SOME OF OUR DAIRY AND HEALTH PROJECTS

The RESET (REplacement of SaturatEd fat in dairy on Total cholesterol) study

The UK intake of saturated fats is still higher than the government recommendation and dairy foods are a key contributor.

RESET is a food chain based study involving the production of milk with a modified fatty acid content (lower saturated and higher monounsaturated fat), which is processed into UHT milk, cheese and butter. These foods are compared with conventional products in a long term intervention study with adults at moderate CVD risk in both acute and chronic settings.

This project is a follow-on from our earlier BBSRC DRINC study which evaluated different approaches for changing the diet of the dairy cow to replace saturated fatty acids in milk with mainly monounsaturated fatty acids. The RESET study goes beyond measuring just total cholesterol (an important CVD risk marker) with further assessments including lipid profile, glucose and insulin, and measures of vascular function and inflammation.

This study is funded by the Medical Research Council with industrial support from Arla Foods and AarhusKarlshamn (AAK).

The Whey2Go study

Evidence from human intervention studies suggests that both whey and casein may be effective in blood pressure-lowering, although there are very few data on the impact of milk proteins on vascular function (a holistic CVD risk biomarker).

The current novel project aims to compare the potential impacts of the two main milk proteins (whey and casein) compared with control (maltodextrin) on vascular reactivity, blood pressure, markers of insulin resistance, lipid metabolism and inflammatory status in moderately hypertensive free-living individuals in both acute and chronic settings.

This study is funded by BBSRC with industrial support from Volac Dairy and Lifestyle Ingredients.

The effects of dairy products in the UK diet on nutritional adequacy, environmental impact and financial cost

Milk and dairy products are important nutritional components of the British diet, providing essential nutrients such as protein, calcium, phosphorus, iodine and vitamin B12. The UK food system is responsible for around 20% of all green-house gas emissions (GHGEs), with meat and dairy products the largest individual contributors.

The aim of this study was to determine the role of dairy products in sustainable diets by modelling nutritional adequacy, financial cost and GHGEs of the UK dietary patterns containing varying amounts of dairy products (milk, cheese, yogurt and ice cream).

This is a modelling study funded by AHDB Dairy and The Dairy Council.

Dairy foods as dietary vehicles to increase vitamin D intake

There is strong evidence that sub-optimal vitamin D status is common throughout the EU and that vitamin D has important health related functions beyond its traditional roles in mineral absorption and bone strength.

Therefore it is crucial that strategies to enhancing vitamin D status at a population level are identified.

The sub-optimal status is strongly related to low sun exposure and therefore increasing dietary vitamin D intake is a priority.

We are investigating to role of milk/dairy products as vehicles for increasing vitamin D intake coupled with examining the relative effects of dietary vitamin D3 and 25(OH)D3 for increasing plasma 25(OH) D3 concentration, the key marker of status and on CVD risk biomarkers. This has involved studies with dairy cows to see how amounts and forms of vitamin D in the diet influences their concentration in milk and an acute human intervention study with milk fortified with either vitamin D3 or 25(OH)D3.

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LEADING NEW DIRECTIONS IN DAIRY FOODS AND HEALTH

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