

## THIS ISSUE

- 1 An Update on the Nutritional Benefits of Cheese
- 2 Expert Review: Health Benefits of Dairy and Cheese – Time to Think Again?
- 4 Key Points  
New Resources  
Contact us

## An Update on the Nutritional Benefits of Cheese



Presently, the 'food matrix' or 'food synergy' concept is receiving significant attention. This concept recognises the overall package of nutrients and constituents within a food, and how these interact or act together to influence health. Furthermore, the overall pattern of the diet is pertinent when considering the impact of food on health. However, contrary to these proposals, there can be a tendency to over-focus on single specific nutrients provided by a food, thereby failing to recognise the overall nutritional value and health effect of the food as part of a balanced diet. This is often the case for cheese.

Cheese is a nutritious food – with one portion of cheddar cheese (25g) providing a source of calcium, phosphorus, vitamin B12 and protein using criteria set out in the EU Nutrition and Health Claims Regulation. In addition, cheese is also an important contributor to the intake of other nutrients, e.g. vitamin A and zinc.

The fact that cheese contains saturated fat and salt cannot be ignored, and it is these points that are the cause of concern for some people. However, the contribution of cheese to these dietary components should be considered in relation to the portion size consumed and the frequency of consumption. Additionally, as indicated above, the overall package of nutrients provided by cheese should not be ignored. It

is also important to highlight the significant reformulation, innovation and new product development by the industry aimed at addressing such concerns. To mention one specific example, one research programme within Food for Health Ireland (FHI) aims to establish the health benefits associated with the consumption of cheese as well as develop the expertise and technical requirements to facilitate innovation in this area.

Indeed, interesting findings regarding the health effects of cheese are being reported in the scientific literature, many of which are perhaps contrary to some more traditional views. The Expert Review (pages 2-3) summarises such findings, clearly demonstrating a beneficial role for cheese in relation to a number of health parameters and outcomes. Such observations may be, at least partially, explained by the 'food matrix' effect. "Cheese has been a natural component of our diet for over 8,000 years. It is a highly nutritious food that contributes positively towards a number of important health benefits," says Jens Bleiel, CEO, FHI. "Working in collaboration with our industry partners, FHI's research programme will help demonstrate the health benefits associated with cheese consumption. We will also develop the technical capacity to enhance the health-promoting traits of cheese."



## EDITORIAL

It is safe to say that cheese falls among the most misunderstood foods. Media coverage and personal perceptions about this food are mixed, to say the least. In this issue of *DN Forum*, we aim to set out some well-established facts, as well as present findings from recent scientific research regarding cheese.

The Expert Review – by Dr Emma Feeney and Dr Anne Nugent, Food for Health Ireland (FHI), University College Dublin – highlights the nutritional contribution of cheese in the Irish diet, with a particular focus on the older population. In addition, this Expert Review clearly summarises emerging trends regarding the health impact of cheese.

New resources are featured on page 4: the first two booklets from the National Dairy Council's (NDC) Nutrition & You series and the new FHI website ([www.fhi.ie](http://www.fhi.ie)) which was launched earlier this year. The NDC booklets are free-of-charge and can be downloaded from the NDC website ([www.ndc.ie](http://www.ndc.ie)) or a limited number of hard copies are available by contacting the NDC directly ([info@ndc.ie](mailto:info@ndc.ie)).

Contact details for both the NDC and FHI are also given on page 4. As always, we welcome any feedback and suggestions.

*Catherine Logan*

Dr Catherine Logan  
Nutrition Manager,  
The National Dairy Council (NDC)

Expert Review

# Health Benefits of Dairy and Cheese – Time to Think Again?

Dr Emma Feeney and Dr Anne Nugent, Food for Health Ireland, University College Dublin



Dr Emma Feeney



Dr Anne Nugent

## Introduction

Dairy foods have been an important part of the diet and have been consumed in Europe for over 8,000 years. Recently, carbon dating on crockery found at early Neolithic sites in northern Europe suggests that Europeans have been producing and eating cheese since at least the sixth millennium BC<sup>1</sup>. Today, dairy foods remain an important source of nutrients for the Irish population, consumed by >98% of Irish adults aged 18-90 years<sup>2</sup>. Dairy foods contribute to approximately 10% of mean daily energy intakes in Irish adults. They are also important contributors to a range of dietary nutrients, providing approximately 40% of daily calcium and iodine intakes and one-third of B12 and retinol intakes<sup>2</sup>. Despite their nutritional value, dairy foods, and particularly cheese, can sometimes be perceived as unhealthy.

## Saturated fat from dairy and public perception of CVD risk

Cheese is also a concentrated source of saturated fatty acids (SFA). Historically, SFA have been associated with cardiovascular disease (CVD) risk, since SFA are known to increase blood cholesterol levels<sup>3</sup>. More recently, this view has been challenged as studies have begun to question the link between dairy saturated fat consumption and CVD<sup>4</sup>. Saturated fat is often used as a blanket term, but individual SFA vary considerably in their biological effects<sup>5,6</sup>, and different food sources are associated with different health outcomes. SFA from meat have been associated with increased risk of CVD while dairy (milk, cheese and yogurt) SFA actually appear to be beneficial for health<sup>7</sup>. High dairy (milk, cheese, yogurt, but not butter) intakes have been associated with reduced markers of arterial stiffness<sup>8</sup>, and lower incidence of CVD<sup>7,9,10</sup>. A recent meta-analysis of prospective cohort studies also shows that certain dairy foods are associated with either neutral or beneficial health outcomes, on the risk of stroke, ischaemic heart disease and type 2 diabetes<sup>11</sup>. Some of the protective effects may be due to a 'food matrix' effect, meaning that the other nutrients present in dairy products may work in conjunction with the dairy SFAs to exert their influence<sup>7</sup>. Although many of the studies are based on milk consumption, a matrix effect is also observed for cheese. A number of carefully controlled intervention studies in healthy, overweight and mildly hypercholesterolaemic cohorts, show that cheese consumption does not significantly raise LDL cholesterol levels<sup>12-15</sup>. One of these studies fed healthy male volunteers with 205g of cheese per 10MJ energy intake daily for three weeks (equating to 305g per day, on average, for the population tested), with no increase in LDL-C<sup>13</sup>. This effect may arise from the relatively high levels of calcium<sup>12,16</sup> and protein in cheese. These nutrients may counteract the cholesterol-raising properties of saturated fat<sup>13-15</sup> by binding to fat and preventing absorption, and by increasing faecal fat excretion<sup>16</sup>. The intake levels in these trials are generally much greater than current consumption levels of cheese in Ireland, where the average (mean) population intake is less than 25g per day<sup>2</sup>. It is difficult to translate these experimental results into clear messages, due to the varying nature of the methods and cohorts involved. However, the overall results suggest that cheese can be consumed as part of a calorie-controlled diet without detrimental effects on blood lipids. More, longer-term studies are needed to confirm these effects in larger cohorts.

## Dairy in the ageing population

Dairy is also an important contributor to dietary protein, providing approximately 13% of daily protein intakes in Ireland's 65+ age group. A number of recent reports have highlighted the importance of adequate protein consumption in this age group<sup>17,18</sup>. It has been suggested that people aged 50 years and over may be reducing dairy consumption to reduce fat intakes<sup>19</sup>; however, reducing cheese intake to manage blood cholesterol concentrations may inadvertently result in the removal of an important source of protein, necessary for the maintenance of muscle mass, particularly in an ageing population. Indeed, in Ireland, similar patterns are observed, whereby the percentage of people eating cheese, and the overall amounts of cheese eaten, are both lower in the 65+ age group than in the 18-64 year olds (see Figure 1). Since the ability to synthesise muscle appears to become reduced with age, evidence suggests that the best way to maintain lean muscle tissue and preserve function in the elderly is to consume protein at every meal, in conjunction with resistance exercise<sup>20</sup>. Dairy foods (milk, cheese and yogurt) represent a simple way to add protein to the diet. In addition to the maintenance of lean muscle mass, the protein and calcium content of dairy foods have been associated with reduced blood pressure<sup>21-23</sup> and reduced risk of stroke<sup>24</sup>. Fortified dairy is also a source of vitamin D; together with calcium, these nutrients are well-established in their role in bone health, another important health benefit in a maturing population. Current consumption levels of dairy in Ireland are actually lower than the recommended three servings per day, with the average Irish person aged 65 and over consuming just 1.9 mean daily servings of dairy.

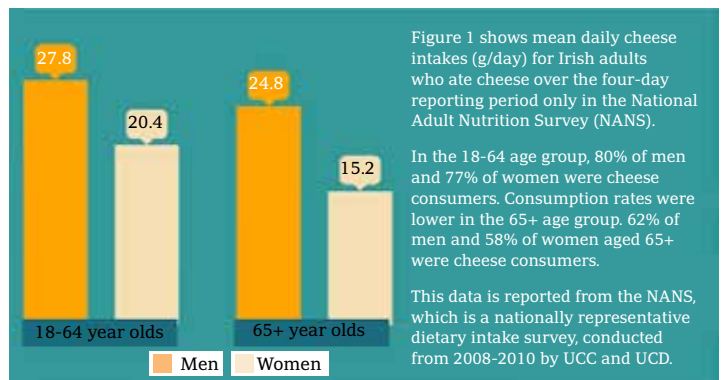


Figure 1. Mean daily cheese intakes (g/day) in Irish adults (consumers only) as part of the National Adult Nutrition Survey (NANS).

## Bioactive dairy components

In addition to nutrients, milk and dairy products naturally contain other compounds, known as bioactive peptides, that have various biological activities and are potentially beneficial for health. However, in their native form, they are not always active. In some cases, hydrolysis (such as that which occurs during cheese manufacture and ripening) breaks them down to their active form. Examples of bioactivity include ACE-inhibitory activity, immunomodulatory and glucose-lowering activities, while lactotripeptides, such as valine proline proline (VPP) and isoleucine proline proline (IPP), appear to have blood pressure lowering activity<sup>25</sup>.

At the forefront of improving health, wellness and quality of life through world-class food innovation, Food for Health Ireland (FHI) began its second term of funding in September 2013. The purpose of FHI is to identify novel ingredients, including bioactives coming from milk, to develop functional food ingredients that will offer health benefits to consumers.

Bioactives are also present in cheese. Various research groups within the Healthy Cheese work package in FHI are examining the health benefits of cheese. The current research will use existing data on food intake collected by researchers in UCC and UCD between 2008-2010, as part of the National Adult Nutrition Survey (NANS)<sup>2</sup>. In this national food consumption survey, a representative sample of 1,500 participants across Ireland, aged 18-90 years, recorded details of all food and beverages consumed over a four-day period. The survey, which was seasonally balanced, contains detailed brand level information on foods consumed, including what, when, where and how much. Detailed nutrient information for each food in the database allows researchers to characterise patterns of intake of a wide variety of nutrients, and contributory food sources. Additionally, a comprehensive suite of information was gathered in relation to anthropometry, lifestyle and health indicators, while blood and urine samples were collected for analysis of nutritional status, metabolic indicators and 'omic' technologies such as metabolomics and genomics.

Work is currently underway to analyse this data to fully detail dairy food consumption in Ireland, with particular reference to cheese. This information will allow us to expand the emerging evidence on cheese and health and to design intervention studies investigating the effects of cheese consumption on various biological parameters.

### Acknowledgements

The National Adult Nutrition Survey was initially funded by the Department of Agriculture, Fisheries and Food (DAFF) and the Health Research Board. The current cheese consumption analyses are funded under Food for Health Ireland.

### References

- Salque M *et al.* Earliest evidence for cheese making in the sixth millennium bc in northern Europe. *Nature* 2013; 493: 522-525.
- IUNA. 2011; National Adult Nutrition Survey. Available: [www.iuna.net](http://www.iuna.net) Accessed August, 2014.
- Kris-Etherton PM & Yu S. Individual fatty acid effects on plasma lipids and lipoproteins: human studies. *Am J Clin Nutr*. 1997; 65: 1628S-1644S.
- German JB *et al.* A reappraisal of the impact of dairy foods and milk fat on cardiovascular disease risk. *Eur J Nutr*. 2009; 48: 191-203.
- Astrup A *et al.* The role of reducing intakes of saturated fat in the prevention of cardiovascular disease: where does the evidence stand in 2010? *Am J Clin Nutr*. 2011; 93: 684-688.
- Legrand P & Rioux V. The complex and important cellular and metabolic functions of saturated fatty acids. *Lipids* 2010; 45: 941-946.
- de Oliveira Otto MC *et al.* Dietary intake of saturated fat by food source and incident cardiovascular disease: the Multi-Ethnic Study of Atherosclerosis. *Am J Clin Nutr*. 2012; 96: 397-404.
- Livingstone KM *et al.* Does dairy food intake predict arterial stiffness and blood pressure in men?: Evidence from the Caerphilly Prospective Study. *Hypertension* 2013; 61: 42-47.
- Elwood PC *et al.* Milk drinking, ischaemic heart disease and ischaemic stroke II. Evidence from cohort studies. *Eur J Clin Nutr*. 2004; 58: 718-724.
- Elwood PC *et al.* Milk drinking, ischaemic heart disease and ischaemic stroke I. Evidence from the Caerphilly cohort. *Eur J Clin Nutr*. 2004; 58: 711-717.
- Elwood PC *et al.* The consumption of milk and dairy foods and the incidence of vascular disease and diabetes: an overview of the evidence. *Lipids* 2010; 45: 925-939.
- Biong AS PC *et al.* A comparison of the effects of cheese and butter on serum lipids, haemostatic variables and homocysteine. *Br J Nutr*. 2004; 92: 791-797.
- Tholstrup T *et al.* Does fat in milk, butter and cheese affect blood lipids and cholesterol differently? *J Am Coll Nutr*. 2004; 23: 169-176.
- Hjerpsted J *et al.* Cheese intake in large amounts lowers LDL-cholesterol concentrations compared with butter intake of equal fat content. *Am J Clin Nutr*. 2011; 94: 1479-1484.
- Nestel PJ *et al.* Dairy fat in cheese raises LDL cholesterol less than that in butter in mildly hypercholesterolaemic subjects. *Eur J Clin Nutr*. 2005; 59: 1059-1063.
- Soerensen KV *et al.* Effect of dairy calcium from cheese and milk on fecal fat excretion, blood lipids, and appetite in young men. *Am J Clin Nutr*. 2014; 99: 984-991.
- Tieland M *et al.* Protein supplementation improves physical performance in frail elderly people: a randomized, double-blind, placebo-controlled trial. *J Am Med Dir Assoc*. 2012; 13: 720-726.
- Evans WJ *et al.* Dietary protein needs of elderly people: protein supplementation as an effective strategy to counteract sarcopenia. *J Am Med Dir Assoc*. 2013; 14: 67-69.
- Chollet M *et al.* Short communication: Dairy consumption among middle-aged and elderly adults in Switzerland. *J Dairy Sci*. 2014; 97: 5387-5392.
- Koopman R & van Loon LJC. Aging, exercise, and muscle protein metabolism. *J Appl Physiol*. 2009; 106: 2040-2048.
- Bucher HC *et al.* Effects of dietary calcium supplementation on blood pressure - A meta-analysis of randomized controlled trials. *J Am Med Assoc*. 1996; 275: 1016-1022.
- Allender PS *et al.* Dietary calcium and blood pressure: A meta-analysis of randomized clinical trials. *Ann Int Med*. 1996; 124: 825-831.
- Appel LJ *et al.* A clinical trial of the effects of dietary patterns on blood pressure. *New Engl J Med*. 1997; 336: 1117-1124.
- Massey LK. Dairy food consumption, blood pressure and stroke. *J Nutr*. 2001; 131: 1875-1878.
- Cicero AFG *et al.* Do the lactotripeptides isoleucine-proline-proline and valine-proline-proline reduce systolic blood pressure in European subjects? A meta-analysis of randomized controlled trials. *Am J Hypertens*. 2013; 26: 442-449.

### EVIDENCE TO PRACTICE

This research has a range of applications:

#### A. INDUSTRY

This work may provide solid evidence to demonstrate the role of cheese in a healthy balanced diet. It will also provide up-to-date information on current consumption patterns, which may be used to inform product development and marketing campaigns. The NANS database contains the most recent and detailed, nationally representative food consumption data in Ireland. This database has the potential to be mined for a wide variety of different research or industry-related food consumption questions.

#### B. HEALTH PROFESSIONALS

This analysis will provide a comprehensive dataset on patterns of cheese consumption by Irish adults, and the contribution of cheese to nutrient intake. It will provide up-to-date information on the relationship between cheese consumption and objective markers of metabolic health in the Irish population. In the long run, research of this nature can be used to inform policy-makers and health professionals in the development of food-based dietary guidelines for cheese consumption.

#### C. THE PUBLIC

This type of research may help to reassure all members of the public that cheese can be consumed as part of a balanced diet.

## Key Points

- Cheese has been enjoyed in Europe for generations and remains an important part of our diet to this day. Results from the National Adult Nutrition Survey (NANS) by the Irish Universities Nutrition Alliance (IUNA) demonstrate the nutritional value of cheese and dairy in the Irish adult diet. By way of example, healthy ageing is of significant interest and relevance at present due to the increasing global older/elderly population – dairy provides a source of nutrients that are associated with specific benefits for this age group such as protein, which is important with regards to muscle mass maintenance, and calcium, which plays a central role in bone health.
- Despite its nutritional value, mixed or misunderstood messages exist regarding cheese, particularly in relation to saturated fat. However, results from recent prospective analyses do not support a harmful relationship between milk, yogurt and cheese and CVD risk. The majority of such studies indicated either no associations or a potential beneficial effect.
- These protective effects may be, at least partially, a result of the 'food matrix'. This concept proposes that the overall nutritional value of a food should be recognised and how these nutrients and components interact to impact health. For example, in the case of cheese, studies show that cheese consumption does not appear to raise cholesterol, despite the saturated fat content. This phenomenon is attributed to the specific food matrix of cheese (the combination of calcium and cheese proteins).
- A specific FHI work package is focusing on cheese: establishing the impact of cheese consumption on health, using data collected as part of the IUNA NANS, with the longer-term view to implementing intervention studies investigating the effects of cheese consumption on various biological parameters. In addition, new product development and reformulation is also a key feature of this work package.

## New Resources

### Nutrition & You

The NDC has recently launched the first two booklets from the Nutrition & You series: *Adults* and *Children aged 5 years and up*.



These publications, which are endorsed by the Irish Nutrition & Dietetic Institute, are designed to help the general public follow a balanced diet and healthy lifestyle. Copies may be downloaded from [www.ndc.ie](http://www.ndc.ie) or a limited number of copies may be ordered by contacting [info@ndc.ie](mailto:info@ndc.ie)

### FHI website



This summer, FHI launched its new website, [www.fhi.ie](http://www.fhi.ie). The new site reflects its focus on commercialising the research outputs from FHI to the global food industry.

## Contact us....

### THE NATIONAL DAIRY COUNCIL (NDC)

The National Dairy Council  
Innovation House  
3 Arkle Road, Sandyford Industrial Estate  
Dublin 18  
Tel: +353 (0)1 290 2451  
Email: [info@ndc.ie](mailto:info@ndc.ie)  
Web: [www.ndc.ie](http://www.ndc.ie)



 NDCIreland  @NDC\_ie

**Mission:** To deliver real and unique value to Irish dairy farmers by protecting and promoting the image, quality, taste and nutritional credentials of Irish dairy produce to a wide variety of audiences in a clearly defined, focused, unique and effective manner.

### FOOD FOR HEALTH IRELAND (FHI)

Food for Health Ireland  
Science Centre South  
University College Dublin  
Tel: + 353 (0)1 716 2391  
Email: [fhi@ucd.ie](mailto:fhi@ucd.ie)  
Web: [www.fhi.ie](http://www.fhi.ie)



 @fhi\_phase2  Food for Health

**Mission:** To leverage the world-class capabilities of the Irish academic partners, with the market expertise of the industry partners, into a pipeline of innovative, nutritional functional ingredients/products for the global food industry.