

# MILK

Nutritious by nature

The science behind  
the health and nutritional impact  
of milk and dairy foods

# Weight control

Contrary to the popular perception that dairy foods are 'fattening', a growing body of research suggests that milk and dairy foods may have a positive role in weight control in both adults and children. A number of observational studies have reported that dairy-rich diets are associated with lower body weight, less body fat, less abdominal obesity and less fat gain over time. Overall, results from intervention studies suggest that including dairy foods in a weight-reducing diet may enhance weight loss.

Dairy's calcium and protein are likely to be involved in its effects on energy balance, including through influences on appetite and satiety, fat absorption and energy use. From the available evidence it seems likely that for those trying to lose weight, avoiding dairy or having a low dairy intake may be counterproductive.



## Observational studies

**Scientific evidence is accumulating to suggest that milk and dairy foods may have a positive role in weight control in both children and adults.** A relationship between calcium and weight was first noticed in a cross-sectional analysis more than 30 years ago<sup>1</sup>. However, it was not until the late 1990s, when a possible mechanism linking calcium and weight was proposed, that research in this area gathered pace<sup>2</sup>. Since then, a number of other cross-sectional studies have noted a similar negative relationship between calcium and/or dairy foods and weight, body fat and abdominal obesity including some in European populations<sup>3-10</sup>.

For example, in a study of early-postmenopausal Italian women, those in the highest quartile of dairy intake had a lower BMI than those who ate the least dairy foods<sup>8</sup>. Similarly, data from the 'Observation of Cardiovascular Risk Factors in Luxembourg' survey found dairy intake was associated with a reduced likelihood of both overall obesity and abdominal obesity<sup>9</sup>. A recent analysis of the National Adult Nutrition Survey in Ireland also reports that higher total dairy intake, as well as higher milk and yogurt intake, were associated with lower measures of body fatness, including waist-to-hip ratio, % body fat and waist circumference<sup>10</sup>.

Some prospective studies too suggest a modest protective effect of dairy product consumption on the amount of weight gained over time<sup>11</sup>. For example, a Swedish study which examined the association between dairy intake and weight change in 19,000 peri-menopausal women over nine years, found that regularly eating one or more servings a day of cheese or whole / fermented milk (3% fat) was associated with lower weight gains in normal weight women<sup>12</sup>. In overweight French men, milk and yogurt intake were related to lower gains in weight and waist circumference over six years<sup>13</sup>.

**A narrative review in 2011, concluded that data from observational studies, although not completely consistent, were suggestive of a protective effect of dairy consumption on the risk of overweight and obesity in adults<sup>6</sup>.** A systematic review of prospective studies in the same year reached a similar conclusion with regard to dairy and the risk of weight gain<sup>11</sup>. A more recent analysis also reports that dairy consumption was not adversely related to changes in body weight; yogurt, in particular, showed a beneficial effect, where higher intakes were associated with a reduced risk of obesity, changes in body weight and waist circumference<sup>14</sup>. Another systematic analysis, which assessed the relationship between the intake of dairy fat and high-fat dairy foods with obesity, found no evidence that dairy fat intake adversely affects weight or obesity risk<sup>15</sup>. In fact, in the majority of observational studies (11 out of 16 studies), a dietary pattern with a high-fat dairy intake was associated with lower weight and other measures of adiposity.

## Studies in children and adolescents

**For children and adolescents there are fewer observational studies available, but on the whole these too indicate either a beneficial or neutral effect of dairy consumption on body weight or body composition<sup>11,16</sup>.** In UK children, for example, higher dairy consumption during preadolescence (10 years old) was not

associated with excess fat gain during early adolescence (up to 13 years) and, in fact, appeared to have a protective effect<sup>17</sup>. A recent meta-analysis looking at the long-term association between dairy consumption and risk of childhood obesity concludes that dairy is protective<sup>18</sup>.

## Intervention studies

**Results from intervention studies strengthen the observational data.** A meta-analysis of randomised control trials in 2012 found that inclusion of dairy products in calorie-restricted diets led to a significantly greater reduction in body weight, waist circumference, and fat mass, while maintaining lean body mass, compared with low-dairy weight-loss diets<sup>19</sup>. A more recent meta-analysis in 2016 reached the same conclusion: increased dairy intake as part of energy-restricted diets resulted in greater loss of body weight and fat while helping to reduce the amount of lean mass lost<sup>20</sup>. Other meta-analyses also report dairy consumption, in the short-term, coupled with calorie-restriction, has a beneficial impact on body fat reduction<sup>21,22</sup>. Increasing dairy intake without calorie-restriction had no effect on weight<sup>19,21,22</sup>. It is an important point that, in contrast to the popular perception, extra milk and milk products did not result in weight gain, and, when coupled with calorie restriction, enhanced weight loss.

Again, there are fewer intervention studies in children and adolescents and no meta-analysis of results, however, the majority of the research indicates that the effect of milk and dairy intake on body weight and body composition in children and adolescents is beneficial or neutral<sup>16</sup>.

## Potential dairy matrix mechanisms

**Possible mechanisms to explain the effects of dairy on weight control initially centred on calcium** and particularly the hypothesis that calcium may alter fat cell function and fat oxidation: stimulating lipolysis (fat breakdown), reducing lipogenesis (fat synthesis) and increasing fat oxidation<sup>23,24</sup>. More recently it has been

suggested that calcium may also work by binding fat in the intestine and increasing its excretion from the body and so decreasing fat (and therefore calorie) absorption<sup>25</sup>. Calcium in the dairy food matrix may be more effective in this respect than other forms of calcium<sup>26</sup>. Calcium-driven effects on appetite have also been postulated: a low calcium intake may trigger hunger and impair weight loss on energy restricted diets<sup>27</sup>. These potential effects of calcium are not mutually exclusive and multiple mechanisms may be involved.

**Other components of the dairy matrix are also likely to be involved in dairy's beneficial effects<sup>28</sup>.** Studies have reported that the weight-loss effects of milk and yogurt, for example, are greater than for the equivalent calcium supplement<sup>2,29</sup>. A probable candidate is dairy's

**protein**. Several investigations indicate a role of protein in weight loss and weight maintenance including the European DIOPENES study<sup>30</sup>. Dairy protein may have positive effects on satiety, as well as benefits on 'muscle sparing' helping to maintain lean body mass during energy restriction<sup>6,31</sup>. Branched-chain amino acids, of which dairy foods, and particularly whey protein, are rich sources may be important in this respect<sup>31</sup>. Given associations between dairy fat and lower body weight, it has also been suggested that some fatty acids, principally **medium-chain fatty acids**, may have anti-obesity effects, including through lipogenesis and satiety<sup>32,33</sup>. Moreover, there is preliminary evidence that short-chain fatty acid production in the gut, which is favoured by fermented dairy foods such as cheese, may have positive effects on appetite regulation<sup>34</sup>.

**Further research will help to fully elucidate the relationship between dairy consumption and body weight including amounts and types of dairy foods and possible threshold effects. Nevertheless, from the available data, it seems likely that those trying to maintain a healthy weight, and particularly for those trying to lose weight, a low dairy intake is likely to be counterproductive. Indeed, recent guidelines on the 'Dietary Treatment of Obesity' from the Swedish Council on Health Technology Assessment, advise that a higher intake of dairy products (mainly milk) during energy restriction can lead to weight loss for both adults and children<sup>35</sup>.**



Milk nutritious by nature - nutrient richness - **an important part of European dietary guidelines** 

## **Weight control**

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