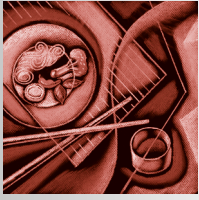


## Nutrition Update



# Beyond Calcium

## The Protective Attributes of Dairy Products and Their Constituents

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**Functional foods are gaining in popularity as consumers are living longer and are seeking to reduce disease and optimize their health through diet. Dairy products and their components are one category of foods under investigation for their functional attributes. Recent research suggests the health benefits of consuming dairy foods may extend well beyond bone health to enhancing the immune system, reducing risks of some chronic diseases, and regulating body weight. This article examines the associated components of dairy foods and the evidence for these putative health benefits.**

More and more consumers are turning to functional foods—foods or ingredients that provide a health benefit beyond the nutrients they contain—in an attempt to alleviate specific health problems or reduce their risk of disease. Interest in functional foods is driven, in part, by increasing healthcare costs, the growing acceptance of complementary medicine, and emerging scientific evidence linking diet to health and disease. This movement was first manifest in the late 1980s when epidemiologic data linked diets high in fruits and vegetables with a lower risk of heart disease and cancer. Since then, scientific research has expanded to include other foods beyond fruits, vegetables, and their phytochemicals—the components considered the “active ingredient” in fruits and vegetables. The focus has also shifted from disease prevention to attaining optimal health—living longer, healthier, and more active lives.

Although dairy foods were not included in initial discussions and research on functional foods, dairy prod-

ucts and their components have recently been receiving attention for their functional attributes. Initially recognized only for their nutrients—specifically calcium, high-quality protein, and vitamins A and D—it wasn't until the early 1980s that other components in dairy foods were identified as being capable of promoting or enhancing health. A compilation of in vitro studies, animal investigations, and human studies now suggest that dairy products and/or their components may be involved in a large number of biologic functions in the body beyond their well-established role in bone health. These include improving blood pressure, reducing risks of certain types of cancer, enhancing immunity and preventing disease, improving intestinal health, preventing kidney stone formation, enhancing nutrient absorption, and even a newly identified role that consumption of dairy products may play in body weight regulation.

*Increasing healthcare costs, growing acceptance of complementary medicine, and scientific evidence of diet-disease links are all drivers of interest in functional foods.*

Confirmation of preliminary results in many of these areas awaits results from human clinical trials. Table 1 summarizes the putative health benefits of certain components of dairy foods. The following review examines the evidence for such claims, with an emphasis on recent research demonstrating the functionality of dairy foods.

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**Table 1. Putative Health Benefits of Dairy Food Components**

<b>Component</b>	<b>Effect</b>	<b>Primary Dairy Food Source</b>	<b>References</b>
Butyric acid, milk proteins*	Reduces cancer risk (colon)	All dairy	19, 20
Calcium	Reduce risk of hypertension Help reduce risk of weight gain and obesity May help reduce colon cancer risk May reduce risk of kidney stones	All dairy	5, 14, 16, 46, 47, 51
Conjugated linoleic acid	Modulate immune function Reduce risk of cancer (breast, colon, prostate, and stomach)	Regular-fat dairy products	10-13, 31, 32
Cluster of calcium, phosphorus, fluoride, protein, vitamin K, and magnesium	Optimize bone health	All dairy	1, 2
Probiotics	Modulate immune function May reduce risk of cancer (breast) Alleviate symptoms of lactose intolerance Preserve intestinal integrity Reduce symptoms of intestinal disease (eg, diarrhea, inflammatory bowel disease, colitis, and constipation)	Yogurt and other dairy products to which probiotics have been added	23, 33, 36-44
Sphingolipids*	May reduce risk of cancer (colon)	Regular and reduced-fat dairy	14-18
Stearic acid	May modulate blood lipids to reduce risk of cardiovascular and heart disease	Regular-fat dairy products	58
Triglycerides	May enhance long-chain fatty acid and calcium absorption	Regular-fat dairy products	49
Unknown	Enhances vitamin E absorption	Vitamin E-fortified dairy foods	50
Whey protein*	May modulate immune response Decreases hypertension May reduce risk of cancer Assists with nutrient transport and absorption Reduce heart disease risk	All dairy except cheese	21, 22, 34, 35

\*Research to date has been in animal and cell-culture studies. Clinical trials are needed to confirm these results in humans.

### Bone Health

The benefits of consuming dairy foods to bone health have been well established and are not discussed in detail here. A variety of laboratory, population, and clinical trials have consistently provided evidence for the role that calcium plays in bone health.<sup>1</sup> Recent research shows that the benefits of consuming dairy products for bone health

extend well beyond their calcium content. The term “cluster of nutrients”—nutrients working together for a particular health benefit—was coined to emphasize the symbiotic nature of nutrients in foods. One example of how the cluster of nutrients optimizes health is the family of nutrients inherent in dairy products—calcium, vitamin D, protein, phosphorus, magnesium, vitamin A, vitamin B<sub>6</sub>, and trace elements, such as zinc<sup>1</sup>—that is

important for bone health. Preliminary research from the University of North Carolina, Chapel Hill, shows how appropriate levels of these nutrients are essential to maximize calcium absorption. In fact, calcium absorption can be negatively affected if these nutrients are not ingested at proper levels.<sup>2</sup>

## Hypertension and Heart Disease

In addition to their role in bone health, dairy products have been extensively studied in the past 20 years for their putative ability to reduce blood pressure.<sup>3,4</sup> More recently, the well-known Dietary Approaches to Stop Hypertension (DASH) study examined the effect of dietary patterns on blood pressure, finding that a diet high in fruits, vegetables, and low-fat dairy foods was as effective as some medications in reducing blood pressure in patients with mild hypertension.<sup>5</sup> The results of the DASH diet were confirmed by a more recent trial that showed the DASH diet paired with reduced sodium intake was even more beneficial in reducing blood pressure than the DASH diet alone.<sup>6</sup> Dairy products are recognized as being more efficacious than calcium supplements in reducing blood pressure,<sup>7</sup> another example of how the cluster of nutrients inherent in dairy products may be more efficacious than a single isolated component.

*Clusters of nutrients enhance  
bone health.*

Because hypertension is a primary risk factor for heart disease, it follows that reducing blood pressure would result in a parallel reduction in cardiovascular disease risk. Indeed, the DASH researchers estimated that if all Americans followed the DASH diet, theoretically coronary heart disease would be reduced by 15% and stroke by 27%.<sup>5</sup> Community studies are now underway to test effects in free-living populations. In addition, a recent study supported by the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) showed that the DASH diet also significantly reduces the levels of total cholesterol and of low-density lipoprotein (LDL), or “bad” cholesterol,<sup>8</sup> results independent of the hypotensive effects of this diet. Thus, following such a dietary pattern should reduce one’s risk of heart disease, as well as hypertension.

However, the effect of calcium in lowering blood pressure is not consistent across all studies. Normotensive women at the low end of dietary calcium intake who were supplemented with 1200 mg calcium per day for 16 weeks did not show any improvement in blood pressure.<sup>9</sup>

Perhaps calcium exerts a blood pressure-lowering effect only in individuals who are hypertensive, whereas in individuals who are normotensive, the effect is not as striking. Alternatively, lack of an effect in supplementation trials could indicate that there are other components in dairy foods that act synergistically with calcium in lowering blood pressure. The DASH study marks one of the first in which whole dietary patterns were studied, as opposed to individual foods or specific nutrients. The strength of such a study lies in the fact that humans do not ingest specific nutrients or foods; they consume meals in patterns as defined by their race, culture, geographic location, socioeconomic status, and myriad other factors. Studying overall food patterns and their effect on health and disease is a critical step toward making appropriate population-based guidelines and dietary recommendations.

## Cancer Risk

### Animal/In Vitro Studies

Dairy foods contain numerous components that may play a role in reducing cancer risk. Conjugated linoleic acid (CLA), which is found primarily in dairy products and ruminant meat, has perhaps received the most attention to date. Although there are several different CLA isomers, each with specific biologic effects, almost all of the CLA found in milk and dairy products appears from recent studies to be the isomer demonstrating anticarcinogenic activity. CLA has a potent anticancer agent in both experimental animals and in vitro studies of human malignant breast and colon cancer cell lines.<sup>10-12</sup> Animal studies have similarly indicated that CLA consumption may inhibit the growth and spread of mammary tumors.<sup>11,12</sup> A dose-response relationship was observed in these cancer-prevention studies up to a CLA supplementation level of 1%, after which no further protection was evident. It is not clear from these in vitro and animal studies what level of CLA is needed in humans to provide similar benefits. Studies are currently underway to determine the level needed to reduce cancer risk in humans and to examine whether vaccenic acid, the primary trans fatty acid in dairy, is a precursor to CLA, thus increasing the combined effective anticarcinogenic activity.

Although human dietary intake of CLA from natural foods may not be sufficient to achieve the biologic effects observed in these studies, there is evidence that the naturally occurring levels in dairy foods can be increased to effective concentrations. CLA concentrations in cow’s milk vary by season, nutrition, and other herd practices, effectively altering the resulting CLA produced by about tenfold. A recent study showed that rats that were fed butter made from milk containing increased CLA levels

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developed fewer mammary tumors than control animals.<sup>13</sup> This demonstrated for the first time that natural CLA in foods is biologically active and that the naturally occurring level in foods can be enhanced.

There is considerable evidence from animal and cell culture studies that sphingolipids, which are present in regular and reduced fat dairy products, may protect against certain types of cancer as well. Using a chemically induced colon cancer mouse model, sphingomyelin supplements reduced the number of aberrant colonic crypt foci (ACF) by 60% to 70% and aberrant crypts per focus, which some investigators believe to be early indicators of colon carcinogenesis, by 30%.<sup>14</sup> In a similar study, other sphingolipids present in milk—glucosylceramide, lactosylceramide, and ganglioside—also reduced the number of ACF by at least 40% in mice, comparable to the reduction seen by sphingomyelin.<sup>15</sup> Longer term studies demonstrate that sphingomyelin has no effect on colon tumor incidence or multiplicity but reduces adenocarcinomas by up to 70%.<sup>16</sup> In vitro studies also indicate that sphingolipids reduce the metastatic potential and growth of human cancer cell lines.<sup>17,18</sup> Together, these findings suggest that many categories of dairy-derived sphingolipids may suppress early markers of colon carcinogenesis, as well as the appearance of advanced malignant tumors. Clinical investigations are currently underway to examine whether these effects are also evident in humans. Regarding levels needed for beneficial effects, the lower dose used in the animal studies was 0.025% of the diet, which is approximately twice the amount in the average American diet.

*The DASH diet is promising for reducing blood pressure.*

Other components, such as butyric acid, milk protein, and lactic acid bacteria, in cultured and culture-containing dairy foods also play an anticarcinogenic role. Butyrate inhibits the growth of a variety of animal and human breast and colon cancer cell lines.<sup>19,20</sup> Cell culture and animal studies indicate that milk proteins, especially those associated with whey, may reduce cancer risk.<sup>21,22</sup> Milks fermented with 1 of 5 different lactic acid bacteria strains (*Bifidobacterium infantis*, *B. bifidum*, *B. animalis*, *Lactobacillus acidophilus*, or *L. paracasei*) also inhibited the growth of human breast cancer cells.<sup>23</sup> The mechanisms by which these various components in dairy products may provide an anticarcinogenic effect is still under investigation, but 2 proposed mechanisms include inhibition of carcinogen-making enzymes and inhibition of conversion of bile acids into more carcinogenic bile

acids. Clinical studies are needed to verify these in vitro and animal investigations and to determine the levels needed to provide a potential protective effect in humans.

### Human Studies

Despite these provocative findings of components in dairy products that may protect against cancer, epidemiologic evidence is not as clear. Most epidemiologic research has examined the relationship between dairy consumption and colorectal cancer.<sup>24</sup> However, an earlier case-control study in 2 large US cohorts showed that milk consumption, intake of fermented dairy products, and total calcium intake were not associated with the risk for adenoma.<sup>25</sup> A comprehensive review of 20 case-control and cohort studies examining the link between calcium intake and colorectal cancer similarly suggested no association.<sup>26</sup> It is possible that whether dairy products (or a component in them) display a protective effect depends on the stage of carcinogenesis studied. Alternatively, some of the aforementioned components under study may provide a protective effect in higher doses than the levels naturally occurring in dairy products. Further research will yield information that will help to assess the efficacy of fortifying dairy products, or other foods, with these components in an effort to reduce cancer risk in susceptible individuals.

The majority of human studies examining breast cancer have found an inverse relationship between dairy consumption and risk of breast cancer, with evidence that milk or fermented milk products are inversely associated with breast cancer incidence<sup>27,28</sup> and that protein from poultry and dairy foods is linked to a 65%-70% increased survival rate in women who already have the disease.<sup>29</sup> A recent study cofunded by the National Cancer Institute found that women who drank milk as children and who currently drink at least 3 glasses of milk had half the rate of breast cancer compared to women who did not drink milk.<sup>30</sup> In the 6-year study, researchers followed 48,844 premenopausal women in Norway to examine the relationship between childhood and adult milk consumption and breast cancer incidence. After adjusting for age, reproductive and hormonal factors, body mass index, education, physical activity, and alcohol consumption, milk consumption was a factor in reducing the incidence of breast cancer among the women aged 34 to 39. Although this observational study does not prove a causative link between dairy and reduced breast cancer risk, it highlights an area warranting further research. Overall, the bulk of research—in vitro, animal, and human—suggests that there is some component of milk that may play a protective role in the development and/or progression of breast cancer.

## Immune Function

Numerous components in dairy foods may modulate specific or nonspecific immunity. CLA and probiotic bacteria are the 2 components that have been researched the most thoroughly. Investigations in animals that were fed CLA suggest an improvement in indices of immune status (eg, splenocyte proliferation, interleukin [IL]-2 production, and macrophage phagocytosis); however, CLA consumption was not associated with improved immune status in women.<sup>31,32</sup> In addition, the doses used in animal studies (1 g CLA per 100 g body weight) are pharmacologic doses and are not feasible to attain through dietary means in humans. Further studies will need to differentiate the effects of the various isomers of CLA, which may have different physiologic effects on the immune system, and to investigate the feasibility of fortifying specific foods with CLA to increase consumption to physiologically beneficial levels.

Dairy products containing probiotic bacteria—defined as live microbial food supplements that beneficially affect the host—may play a role in modulating immune function. Some probiotic strains enhance several components of an immune response, such as nonspecific immunity, immunoglobulin (Ig)A and cytokine production.<sup>33</sup> Although these results are promising, the ability of probiotics to influence immune function requires further investigation, especially in humans, as do the underlying mechanisms by which that may occur.

Whey protein is another dairy component recently receiving attention as a possible immune-enhancing agent. Whey protein concentrate had an antibactericidal effect against *Helicobacter pylori* activity in an in vitro study.<sup>34</sup> Animal studies have similarly shown an immunoenhancing response of whey protein, possibly resulting from its cysteine content and ability to induce glutathione levels necessary for lymphocyte proliferation.<sup>35</sup> Industrial and biomedical applications are currently being investigated for this immune-enhancing property of whey, with a focus on identifying and purifying components of whey for their specific effects.

## Improved Intestinal Health

There is significant research to date supporting the role of probiotics in maintaining and improving intestinal health. Probiotics, which are found primarily in dairy products such as yogurts, kefir, and culture-containing milks, are primarily bacteria from the genera *Lactobacillus* or *Bifidobacterium*, and these are the species that have been the most thoroughly studied.

Certain types of probiotic bacteria preserve intestinal integrity and decrease the incidence and duration of numerous intestinal diseases, such as rotavirus diarrhea

in infants,<sup>36</sup> antibiotic-associated diarrhea,<sup>37</sup> pediatric diarrhea,<sup>38</sup> and travelers' diarrhea,<sup>39</sup> as well as inflammatory bowel disease<sup>40</sup> and colitis.<sup>41</sup> Certain lactic acid bacteria may also improve intestinal motility and relieve constipation.<sup>42,43</sup> Finally, certain strains of lactic acid bacteria in adequate amounts may alleviate symptoms of lactose intolerance,<sup>44</sup> which is estimated to affect up to 25% of American adults.<sup>45</sup> It is not clear how probiotics exert

*CLA and sphingolipids are being studied for cancer risk reduction—so are butyric acid and lactic acid bacteria.*

their beneficial effects on the intestinal tract. They may work through improving mucosal barrier function, inhibition of pathogens by production of organic acids and other inhibitors, enhancing mucin production of colonic epithelial cells, or enhancing immune response to pathogens.

Probiotics offer an intriguing opportunity to provide consumers a layer of protection to help reduce risk or improve the symptoms of numerous intestinal ailments. In addition, with the efficacy of antibiotics in treating infection currently under question, probiotics may well provide a noninvasive dietary strategy to protect against ingested and environmental pathogens. Research is currently underway to identify effective strains, level of consumption, and duration and frequency of exposure necessary for beneficial effects.

## Kidney Stones

Contrary to the traditional advice to avoid dairy products for those at risk of kidney stones, recent studies have also provided evidence for a protective role of calcium against stone formation.<sup>46,47</sup> In a prospective study involving more than 45,000 men with no history of kidney stones, those with the highest dietary calcium intakes (1336 mg/day) had a 44% lower incidence rate of kidney stones during a 4-year period, as compared with those with the lowest intakes (516 mg/day).<sup>46</sup> Similarly, data from the Nurses' Health Study showed that women with the highest intakes of dietary calcium (>1098 mg/day) were 35% less likely to develop stones than those with the lowest intakes (<500 mg/day).<sup>47</sup> Interestingly, women who took supplemental calcium had a 20% *higher* risk of stone formation compared to those who did not take supplements. The researchers hypothesize this effect may result from the timing of calcium ingestion relative to the amount of

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oxalate consumed. Calcium consumed in foods with a meal containing oxalate-rich foods is able to bind the oxalate, making it unavailable for absorption. On the other hand, when supplemental calcium is taken between meals, the calcium may be ineffective in binding oxalate consumed at the previous or subsequent meal.

### Nutrient Absorption

The primary purpose of milk has always been to provide nourishment to the rapidly growing newborn and infant mammal. Thus, it makes sense that milk not only contains a multitude of nutrients needed for optimal growth and development but also factors that aid in delivering those nutrients from the gut to the tissues where they are used. This cluster of nutrients and other factors present in milk that enhance nutrient absorption and delivery can be considered analogous to the family of compounds present in plant foods that work together to help reduce risk of certain cancers.<sup>48</sup>

*CLA and some probiotic bacteria may preserve gut integrity and are associated with decreased risks of certain intestinal diseases.*

One of the factors responsible for efficient nutrient delivery in milk is simply in the triglyceride structure carrying the fatty acids of milk. Milk contains a high concentration of long-chain fatty acids (LCFAs) and calcium, which, when mixed together, would normally form insoluble calcium compounds and be unavailable for absorption. However, the LCFAs in milk are predominantly on the sn-2 position of the triacylglycerol backbone, where they resist hydrolysis by pancreatic lipase and subsequent precipitation with calcium. The result is that both the calcium and the LCFAs in milk are available for absorption and use by the body. A recent clinical trial showed that infants who were fed triglycerides with palmitate, the most common LCFA in milk, in the sn-2 position had greater bone density than those fed standard formula, evidence that positioning the LCFA on the sn-2 position enhances calcium absorption.<sup>49</sup>

Lactoferrin is a factor in milk that may be responsible for enhancing iron absorption. Although milk per se is not inherently a good source of iron, the lactoferrin in milk not only increases absorption of the iron that is present but also ensures that the iron is in a stable nontoxic form.

Finally, recent research suggests that some factors present in milk may enhance vitamin E absorption. Preliminary research from Brandeis University on humans showed that vitamin E absorption from fortified dairy products is far superior to that provided by dietary supplements or other fortified foods.<sup>50</sup> This provocative research indicates that milk not only functions as a nutrient carrier but also facilitates nutrient absorption, consistent with its original purpose in providing optimal nourishment to the mammal.

Future research will undoubtedly reveal more factors intrinsic to milk that are involved in enhancing the bioavailability of nutrients and start to identify how consumers can best benefit from these. If this research follows in the path of recent discoveries on protective factors in plants, one would anticipate that consuming individual factors isolated from milk will not provide the same benefit as consuming the complete package, or cluster, of nutrients and factors inherent to the whole food.

### Weight Management

A variety of studies—epidemiologic, animal, and cell culture investigations, as well as a recent clinical study—provide evidence that dairy products, specifically their calcium, play a role in controlling body weight and body composition. Research at Purdue University showed that in a group of 54 women who consumed less than 1,876 calories per day, total calcium and dairy calcium intakes predicted changes in body weight and fat mass for a 2-year period.<sup>51</sup> Epidemiologic data from NHANES III similarly indicate a strong negative association between dietary calcium intakes and body weight.<sup>52</sup> One interpretation of these studies is that higher calcium intakes are a marker for a healthier diet and lifestyle. However, laboratory and animal studies provide mechanistic data that calcium has a direct effect on fat metabolism. Recent studies from the University of Tennessee on mice and on human adipocytes show that high-calcium diets may inhibit lipogenesis (fat synthesis), accelerate lipolysis (fat breakdown), increase thermogenesis (internal heat production), and suppress fat accretion and weight gain.<sup>52,53</sup> Controlled clinical studies holding dietary and lifestyle factors constant and varying the subjects' calcium intakes are needed to determine whether it is indeed the calcium responsible for this effect. One such study recently completed suggests an antiobesity effect in humans on high calcium diets, similar to that seen in cell culture, animal, and population data.<sup>54</sup>

Interestingly, these studies suggest that dairy sources of calcium exert a significantly greater antiobesity effect than supplemental sources, indicating a possible role for dairy products in the control of obesity. With obesity rates rising

rapidly and obesity-related illnesses among the leading causes of death in the United States, consuming a calcium-rich diet from low-fat dairy foods may prove to be an effective way to help control body fat and weight gain and to minimize risk for obesity-related diseases. Unfortunately, dairy is often the first food group eliminated when people adopt a weight-reduction diet. The misconception that all dairy foods are high in fat and calories often leads to a reduction in calcium intakes.<sup>55</sup> This has obvious deleterious consequences not only for bone mineral density,<sup>56</sup> but also, in keeping with this recent research, for the efficacy of weight loss. Further studies will help to define the scope and magnitude of the role that dairy calcium plays in body fat and weight regulation.

### Dietary Fat and Dairy Fat: A Changing Landscape

Dairy foods have long been maligned for the high-fat content of some products, such as whole milk, cheese, and ice cream. In fact, national food intake data reveal that dairy foods make a relatively small contribution to total fat intake, contributing far less than that provided by fats, oils, meat, poultry, and fish. Using food consumption data, it is estimated that on average, dairy foods, excluding butter, contribute 12% of total fat and 24% of saturated fat to the typical American's diet.<sup>57</sup>

The introduction of a variety of low-fat and nonfat dairy products has given consumers the option of consuming dairy without the fat, allowing people to comply with the overriding dietary goal in the 1980s and 1990s to reduce their dietary fat intakes. It wasn't until fairly recently that research has identified some beneficial components residing in the lipid, or fat, component of dairy products. CLA, sphingolipids, and butyric acid—all found in dairy fats—have been demonstrated to have beneficial health effects as indicated. Stearic acid, which is also found in significant quantities in dairy fat, has a favorable effect on blood lipids levels, reducing LDL and total cholesterol levels when compared with diets high in other LCFA.<sup>58</sup>

It is noteworthy that dietary recommendations around total fat have relaxed somewhat with the *2000 Dietary Guidelines* changing their terminology from recommending a "low-fat" to a "moderate-fat" diet.<sup>59</sup> Likewise, the American Heart Association released a position paper recommending against very low-fat diets (defined as less than 15% of total calories).<sup>60</sup> The basis for this recommendation is the tendency of these diets to result in an increase in triglyceride and decrease in high-density lipoprotein levels, both of which may increase one's risk of heart disease.

This relaxation of dietary fat recommendations, along with the new research on health benefits of specific com-

ponents in fat, is slowly leading to less rigid consumer attitudes and behaviors relating to fat intake. Indeed, a recent survey showed that perceptions of fat consumption have already relaxed in the past 10 years, with fewer people consciously trying to consume less fat and a higher percentage believing that high-fat foods can indeed fit into a low-fat diet.<sup>61</sup> However, to adopt this new paradigm in the aftermath of years of low-fat dietary recommendations, a tremendous amount of consumer education is needed.

### Future Potential of Dairy Foods

As the beneficial components of dairy products are identified and levels of efficacy are determined, there is enormous potential for dairy products and their derivatives to have a major impact on the functional foods of the future. In the next few years, the dairy industry will undoubtedly increase the type and variety of products on market shelves, tailoring them to meet a variety of consumer demands based on individualized nutritional needs and health concerns.

In the meantime, health professionals and the food industry can proactively educate consumers to recognize and value dairy foods as the functional foods they naturally are. They can responsibly guide them in selecting from the large variety of dairy products already available, as part of an overall balanced diet, to help achieve individualized lifelong good health. In so doing, they will assist consumers to reap the benefits of what may well prove to be one of nature's most valuable foods.

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### Report Recommends More Explicit Guidelines for Assessing Safety of New Ingredients Added to Infant Formula

A new report from the Institute of Medicine of the National Academies recently laid out guidelines that recommends clarifying the types and extent of safety testing necessary for new formula ingredients, particularly unconventional substances derived from novel sources or technologies. It also called for outside experts to take a more proactive role in determining how and when such tests should be done.

Although federal regulatory processes that evaluate the safety of food ingredients have worked well for conventional substances, they were not designed to address the unique needs and vulnerabilities of infants and are insufficient to ensure the safety of new types of ingredients proposed for infant formula.

A key limitation of the current approach is the lack of explicit guidelines to help formula manufacturers and their outside expert reviewers determine what safety data are needed on a proposed ingredient and how they should be gathered. The committee recommended strengthening the current regulatory approach by ensuring balanced composition of the expert panels that often are used to evaluate the safety of new ingredients proposed for formula. In addition, they have designed a new system that will help guide manufacturers through a more thorough process, leading to specific action steps that can help determine the level and extent of safety testing needed at various stages.

A copy of the full report will be available this summer. Copies can be ordered from [http://www.nap.edu/catalog/10935.html?onpi\\_newsdoc03012004](http://www.nap.edu/catalog/10935.html?onpi_newsdoc03012004).