



NATIONAL DAIRY COUNCIL®

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July 27, 2009

Ms. Carole Davis
Co-Executive Secretary of the Dietary Guidelines Advisory Committee
Center for Nutrition Policy and Promotion
U.S. Department of Agriculture
3101 Park Center Drive, Room 1034
Alexandria, VA 22302

Dear Ms. Davis:

The National Dairy Council wishes to provide information that may be helpful to the committee on issues and opportunities related to food based approaches to reducing sodium intake in the U.S. diet. Specifically, the information addresses areas of opportunities related to the role of dairy foods in a healthy diet, while reducing sodium intake.

The National Dairy Council applauds the Committees goals of reviewing this highly complex area and developing effective food-based recommendations for building a nutrient rich diet while reducing the sodium intake of Americans.

COMMENTS

Beyond Sodium --Prevention of High Blood Pressure Involves Multiple Lifestyle Modifications

The 2005 Dietary Guidelines Advisory Committee (DGAC) recommended that nutrient rich foods should be the foundation of a healthy diet. In this dietary approach, they also recommend a daily sodium intake of less than 2,300 mg for the general public and no more than 1,500 mg for individuals with hypertension, blacks, and middle-aged and older adults¹.

Although limiting sodium intake is recommended for the prevention and management of hypertension, the 'Dietary Approaches to Stop Hypertension' [DASH] eating plan, which also includes achieving adequate intakes of nutrients such as potassium, has consistently been shown effective in reducing blood pressure². Lifestyle factors such as moderating alcohol intake, adequate physical activity and achieving a healthy weight also play an important role in reducing hypertension risk². The DASH eating plan, a total diet approach, together with multiple lifestyle modifications offer the best opportunity to reduce the prevalence of hypertension in the U.S.

Nutrients Beneficial to Blood Pressure and the Role of Dairy Foods

Milk and milk products are primary dietary sources of potassium, calcium and magnesium, and increased consumption of these minerals, especially potassium, has been linked to lower blood pressure³. The Institute

of Medicine (2004) recommended a daily potassium intake of at least 4,700 mg for ages 14 yrs and older based on evidence that diets rich in potassium can lower blood pressure and lessen the adverse effects of sodium on blood pressure⁴. The 2005 Dietary Guidelines for Americans recommended that in addition to consuming less than 2,300 mg of sodium per day, potassium-rich foods should be consumed, and individuals with hypertension, blacks, and middle-aged and older adults should meet the potassium recommendation of 4,700 mg/day with food.

Importantly, in order to approach the higher recommended potassium intake levels, the 2005 Dietary Guidelines Advisory Committee determined that adjustments to the USDA Food Guide were needed that included increasing milk and milk products to 3 cups or the equivalent/d as well as increased intakes of fruits and vegetables¹. Three servings of low-fat milk provide 28% of the adequate intake (AI) for potassium as well as 87% of the AI for calcium and 25% of the RDA for magnesium¹. Three servings per day of low fat and fat free milk for individuals >9 years of age were included in the 2005 Dietary Guidelines for Americans recommendations as “Food Groups to Encourage” along with recommended intakes of whole grains, fruits and vegetables.

Numerous observational and randomized controlled trials exist regarding the effects of dairy food consumption and calcium supplementation on blood pressure and the risk of hypertension⁵. Although clinical evidence for an independent blood pressure-lowering effect of dairy products is limited, associations between dairy food consumption and blood pressure control have been consistently shown in the Dietary Approaches to Stop Hypertension (DASH) studies⁶⁻⁸. The National Heart, Lung and Blood Institute *DASH Eating Plan* is a translation of the research on the DASH Diet into an eating plan for implementation broadly by the general public⁹. Dairy foods are an integral part of the *DASH Eating Plan*, which is an example of a dietary pattern that follows the Dietary Guidelines for Americans recommendations and allows for three servings of low-fat dairy products that includes reduced-fat cheese on 6 out of 7 days of the week⁹.

Evidence also indicates that the *DASH Eating Plan* can be successfully incorporated into a weight loss plan¹⁰¹¹. In this study, overweight and obese men and women were randomized into a 6 month weight loss program that included the DASH Eating Plan and was led by a trained interventionist¹⁰. Those who lost at least 4 kg were subsequently enrolled into a 30 month trial that continued the *DASH Eating Plan* and examined strategies for sustaining weight loss¹¹. The majority of those who successfully lost weight in the initial phase maintained a weight below their initial weights 2½ years later. While this study did not examine markers of hypertension, the group that was ‘self directed’ in the second phase was able to maintain a weight loss similar to those who continued to receive personal counseling or an internet based reinforcement program. This study demonstrated that the DASH eating plan with an estimated sodium intake of 2,400 mg/day is an attainable target in the general population for modest sustained weight loss. We are not aware of similar research with a dietary regimen containing 1,500 mg/day sodium.

Estimates of blood pressure reductions from a ‘healthy weight reducing diet’ and from dietary sodium reduction have been reported by the Food Standards Agency, Medical Research Council, U.K. [2006]¹². The report states that a ‘healthy weight reducing diet’ could lead to a reduction in systolic blood pressure of 10 mm Hg or more in 40% of adults. By comparison, salt reduction to a maximum of 6 g per day (2,400 mg sodium per day) could lead similarly to a 10% reduction in systolic blood pressure of 10 mm Hg or more in 25% of adults.

The potential health benefits and medical cost savings from calorie, sodium and saturated fat reductions in the American diet has recently been examined¹³. These analyses found that potential savings from modest calorie reduction (100 kcal/d) for weight loss far exceeded the potential savings from sodium reductions of

1,100 mg/d (annual savings of 58 billion vs 5.5 billion dollars, respectively). A greater public health impact on blood pressure reduction and risk of hypertension may be realized with creative initiatives to increase public awareness of lifestyle changes, such as health benefits of the DASH diet and weight reduction, to help manage blood pressure.

Consumer Acceptance is a Key Factor in Accomplishing Population-Wide Sodium Intake Reductions **Choice**

Sodium intake in America is higher than recommended by the 2005 DGAC. The most current estimates of sodium intakes and the contribution of foods and food groups are based on an analysis of NHANES 2003-2004¹⁴. In an analysis of sources of sodium in the U.S. food supply involving 7,966 subjects aged 2 years and older, the mean daily sodium intake was 3,400 mg/day. Discretionary salt usage, grain products, and meat, poultry and fish accounted for 60% of the sodium intake (i.e. 22.72%, 21.45%, and 15.67%, respectively), whereas dairy foods contributed 11.13% of which cheese accounted for 7.83%¹⁴.

Salt and other sodium-containing ingredients are commonly added to processed foods and during food preparation. The majority of salt in the diet is already in the food that we buy, such as bread, breakfast cereals, cheese, meat products, ready meals, soups, sauces, baked beans and convenience foods such as ready meals, savory snacks, cakes and pastries. Although enhancing flavor is a key role of salt, other functional roles of sodium in food are much broader.

Technological Challenges to Reduce Sodium in Foods

Sodium is also important in preserving perishable refrigerated products such as processed meats and cheese. Modest reductions in the salt content of various cheeses, for example, can impact both the safety and quality. Reducing the sodium chloride content of cheese presents particular challenges to cheese makers since salt has many roles in cheese.

Salt is used to maintain expected flavor, body, texture, and shelf life of cheese by controlling the activities of enzymes and microorganisms. Other functions of salt in cheese include food safety, quality, and functionality. As such, reducing the sodium content of both natural and processed cheese presents significant challenges to cheese manufacturers. For both natural and processed cheeses, the best current option is to replace sodium salts with sodium/potassium blends. However, use of potassium salts is limited by the development of metallic, bitter, and other off-flavors. A comprehensive review of the technological challenges and progress of research to develop cheeses with low-sodium that meet with consumer acceptance has recently become available (*Reduction of Sodium and Fat Levels in Natural and Processed Cheeses: Scientific and Technological Aspects* 2009; <http://eOffprint.aptaracorp.com/cgi-bin/offal?aid=31810vw5929PLYs4407xA>). Although there has been progress on sodium reduction in natural and processed cheese through dairy research programs, more research is needed to achieve sodium reduction that maintains expected flavor, body, texture and shelf life and importantly meets with consumer acceptance.

Consumer Acceptance.

Over the past 20 years, taste is consistently identified as the number one factor influencing food and beverage purchasing decisions^{15,16}. In a survey of 597 U.S. shoppers each year from 1991 to 1996 taste ranked highest in importance (89–91%) for food selection compared with other factors including nutrition, product safety, and price¹⁶. This is consistent with results of a survey of 1,000 U.S consumers who indicated that taste was the number one factor for food purchasing decisions each year from 2006 to 2008 (84 – 89%). Convenience, healthfulness, and price ranked lower¹⁵. Consumers expect good taste, and simply lowering sodium in food

products may not meet consumer expectations. For example, when the sodium content of soup products were reportedly reduced from 480 mg to 360 mg/serving, sales dropped roughly 75% from 1999 to 2003 (Fig. 1)¹⁷. Collectively, these data illustrate the value of maintaining consumer taste expectations to achieve population-wide reductions in dietary sodium.

The fact that consumers prefer the quality of cheeses with the higher levels of salt is suggested by the lack of market success of low sodium versions of conventional cheese products. For example, low sodium natural cheddar has existed in the U.S. market for decades, albeit very few products, accounting for a trivial percentage of total retail sales of cheddar cheese. Taste remains the major factor in consumer purchase decisions.

The FDA recognized that without consumer acceptance of reduced sodium foods, the public health goals of reducing dietary sodium will not be met. In 2005, the FDA amended its regulations concerning the maximum sodium level permitted for foods that bear the implied nutrient content claim "healthy"¹⁸. The agency ruled to retain the original higher sodium level requirements of 480 mg/reference amount customarily consumed as one of the qualifying criteria for all food categories including individual foods and dropped the more restrictive sodium level requirements of 360 mg/reference amount.

Further evidence of the role of salt in consumer acceptance is apparent in the DASH trials. The DASH-sodium controlled feeding trial with diets containing three levels of sodium (higher, intermediate, and lower) corresponding to 3,500, 2,300, and 1,200 mg/day per 2,100 kcal/day, examined consumer acceptability¹⁹. Participants on the DASH and control diets rated salt acceptability, diet liking and willingness to continue significantly higher for the 2,300 mg level of sodium compared to the 1,200 mg sodium level. The salt acceptability of the 2,300 mg level of sodium was also significantly greater than the 3,500 mg sodium level, while the overall diet acceptability was equal.

The DASH-sodium trial was a short-term (3 week) highly controlled out-patient feeding study that promoted high adherence and control of dietary intake⁷. In a longer-term (6 months) free-living trial, adherence to the DASH diet sodium intake goal of 2,300 mg sodium/day was substantially lower (i.e. 28%) but established that individuals can make multiple lifestyle changes that result in lower blood pressure⁸. The learnings from these landmark DASH trials underscore the importance of ensuring that the recommended dietary patterns and sodium intake levels have a high degree of consumer acceptance and can be easily and effectively implemented. Additional research is needed on the ability of consumers to independently implement and follow lower sodium eating patterns while maintaining adequate intakes of essential nutrients.

Taste acceptance is also an important factor in successful school meal programs. Cheese is included in school meals because of its nutrients and because it can improve the taste and enjoyment of foods. Since the majority of children >9 years of age do not meet the 2005 Dietary Guidelines recommendation for three daily servings of low-fat or fat-free dairy foods^{20, 21}, increasing children's intake of dairy foods to recommended levels is key to improving diet quality. Thus, for cheese with lower sodium, maintaining taste expectations of children may have implications for overall nutrient intake from dairy as well as other food groups.

Incremental Changes

The value of reducing sodium intake through incremental reductions has gained increased support in recent years. The IOM 2004 report on *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride and Sulfate*, states "Progress in achieving a reduced sodium intake will likely be incremental and will require changes in individual behavior towards salt consumption, replacement of high salt foods with lower salt versions,

increased collaboration of the food industry with public health officials, and a broad spectrum of additional research. The latter includes research designed to develop reduced sodium food products while maintaining flavor, texture, consumer acceptability, and low cost”⁴ [p.272]. At the public hearing on Salt and Sodium (2007), “a system that provides positive incentives for step-wise sodium reductions in an achievable and cost effective manner” was proposed²². Step-wise reductions could help to retrain the palate through gradual reductions, which are thought to be the most effective since taste remains the number one driver for food purchase¹⁵.

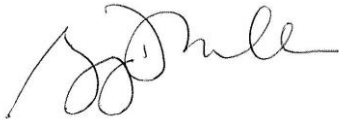
Incremental ‘moderate’ reductions in the sodium content of foods, spread across a broad range of food products, can increase the potential for a significant public health impact. In 2006, the British government’s Food Standards Agency (FSA) launched a campaign to reduce salt (sodium) intake to 6 g/day (2,400 mg sodium/day) for adults and young people over 11 years by 2010¹². In the opinion of FSA, this target represented an achievable population goal. It was based on the evidence reviewed by the UK Scientific Advisory Committee on Nutrition ‘Salt and Health’ report [2003]²³ and followed consultations with experts, policy makers, industry and consumer groups that recognized the technological challenges in salt reduction. Programs to increase public awareness were initiated, and the FSA introduced voluntary goals for the reduction of sodium for 85 categories of processed foods²⁴. The average salt (sodium) intake in the U.K. has decreased from 9.5 g/day (3,800 mg sodium/d) in 2001 to 8.6 g (3,440 mg sodium/d) in 2008. In May 2009, following a series of planned stakeholder meetings that reviewed progress (25-55% reductions in sodium across many food categories), technological and safety issues, data on current intakes, and ongoing research, the plan for 2010 was revised and an extended plan for 2012 was launched. This is expected to lead to continued reductions in salt (sodium) intake in the population.

[\[http://www.salt.gov.uk/industry_activity.html\]](http://www.salt.gov.uk/industry_activity.html)

In summary, programs to reduce the sodium content of cheese are underway, however, more research is needed to achieve sodium reductions in cheese that maintain expected flavor, body, texture and shelf life and importantly meet with consumer acceptance. A total diet approach like the DASH eating plan has the greatest likelihood of success in reducing hypertension, rather than a single nutrient avoidance approach. The DASH Plan has been shown to not only help manage hypertension but also to support sustained weight loss in a free-living population. The DASH eating plan, together with multiple lifestyle modifications may offer the best opportunity to reduce the prevalence of hypertension in the U.S.

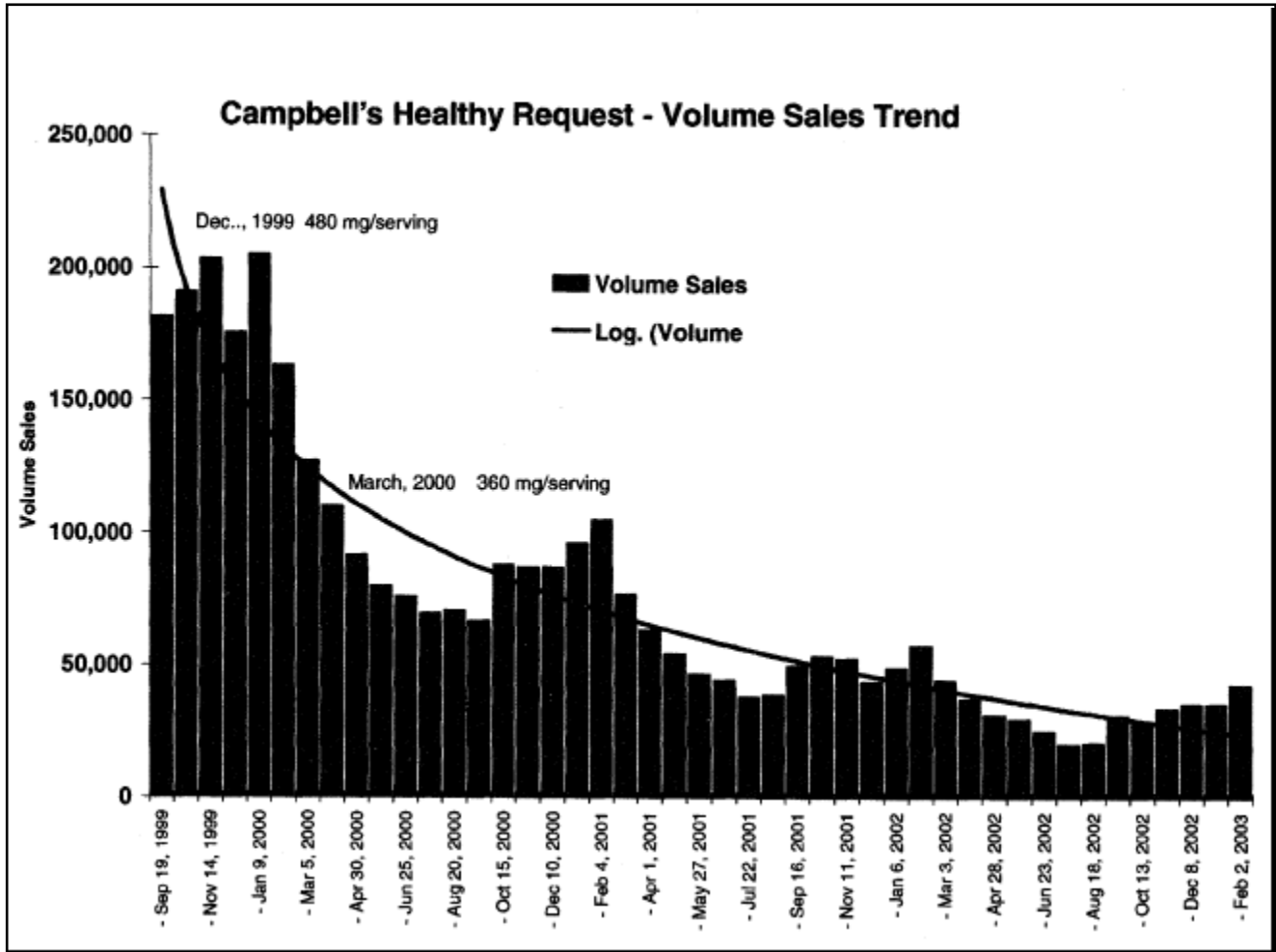
We appreciate the opportunity to comment on these important issues and look forward to continuing to play an active role in achieving results that will benefit the health and well-being of all Americans.

Sincerely,



Gregory D. Miller, Ph.D. M.A.C.N.
Executive Vice President
Research, Regulatory, & Scientific Affairs

Figure 1.



Source: Campbell's Healthy Request - Volume Sales Trend: 1999 - 2003. Exhibit to ConAgra Comments C 127 to 91N-384H, 2003. In: Fed. Reg. 2005;70(188):56828-56849. <http://www.fda.gov/ohrms/dockets/dailys/03/jul03/072203/96p-0500-c000037-001-vol13.pdf>.

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