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2015 Dietary Guidelines Advisory Committee

The National Dairy Council® (NDC) appreciates the opportunity to submit comments for consideration by the 2015 Dietary Guidelines Advisory Committee (DGAC) in response to the Federal Register notice (79 FR 29770) issued May 23, 2014.

The NDC, the non-profit organization founded by U.S. dairy farmers, is committed to nutrition research and education about dairy's role in the diet and health and wellness. NDC provides science-based dairy nutrition information to, and in collaboration with, a variety of stakeholders committed to fostering a healthier nation, including health professionals, educators, school nutrition directors, academia and industry. Established in 1915, NDC comprises a staff of registered dietitians and nutrition research and communications experts across the country.

**Dairy products contain multiple nutrients important for bone health and are culturally acceptable and affordable**

The following comments are offered regarding the important topic of bone health, as DGAC Subcommittee 2 has indicated it will review the literature on Dietary Patterns and Bone as they evaluate the current science on health and nutrition in support of developing national food-based dietary recommendations. The comments are based on five review papers about dairy products and bone health published between 2011 and 2014 by experts in the field.

These comments consist mainly of short sections taken from each paper, or set of papers, about dairy products and bone health; however, the quotes are intended to highlight key points but not to replace a complete reading of each paper. Not only do these reviews summarize research on the topic, they help illustrate the complexity involved with evaluating diet and bone growth and maintenance. For example,

adequate nutrition plays a role in bone and muscle health in the elderly, both of which are associated with lower fracture risk (2). While calcium is the nutrient most commonly associated with bone health, dairy products also provide protein, phosphorus (as inorganic phosphate), vitamin D, potassium and magnesium (1, 2). These nutrients have specific functions on their own, and they interact in the body in ways that support development and maintenance of bone as well as other health benefits (1, 2, 3). At current intakes of about two servings of dairy foods/day, milk, cheese and yogurt provide 58% of the vitamin D, 51% of the calcium, 28% of the phosphorus, 18% of the protein, 16% of the potassium, and 13% of the magnesium in the diets of Americans two years and older, on average (6). If Americans consumed one more serving of dairy/day, it would nearly close the dairy group gap (2.8 servings) while helping meet nutrient recommendations (7). In the context of nutrition guidance, milk and milk products are affordable sources of key nutrients, including calcium (1, 8).

***How sound is the science behind the dietary recommendations for dairy?, Connie M Weaver PhD (1)***

“Milk products, along with fruit, vegetables and whole grains, were identified by the 2005 and 2010 DGAC as foods that need to be increased to meet nutrient needs and for improved health. The role of milk products in meeting 3 shortfall nutrients for various age groups is shown in Table 3 [calcium, magnesium and potassium]. The best and most economical source of the limiting nutrients is dairy.”

In regards to bone health: “Studies of milk avoiders compared with age-matched cohorts in the same population with the same geographic and cultural environment are the strongest type of observational studies because they are the least confounded by factors such as other dietary constituents, race, sunlight, physical activity, etc. Studies of this type show an advantage to milk drinking in both children and adults.”

“The evidence is strong for the role of dairy in meeting daily nutrient recommendations. Because milk and other dairy products are concentrated sources of so many essential nutrients, it is difficult to achieve recommended intakes with dietary patterns that contain little or no dairy products.”

“Evidence for a benefit is stronger in children for calcium balance and bone mineral density and in adults for blood pressure because these biomarkers of health outcomes can be studied in shorter RCTs.”

***Dairy in adulthood: From foods to nutrient interactions on bone and skeletal muscle health, Jean-Pierre Bonjour MD, et al. (2)***

“Key teaching points:

- Preventing bone loss and risk of falling are key to reducing age-related increases in fragility fracture
- Ca and vitamin D are needed to reduce the risk of hip fracture
- Increasing Pi [inorganic phosphate] intake stimulates the renal reabsorption and the overall retention of Ca
- Protein intake through the production of insulin-like growth factor-I (IGF-I) positively interacts with vitamin D metabolism and the Ca-Pi economy
- Interactions of Ca, Pi, protein, and vitamin D reduce bone resorption and increase bone formation, attenuating age-related bone loss
- Mechanical loading of skeletal muscle acts in concert with amino acids and IGF-I on skeletal mass and strength”

“With respect to potential impact of foods on bone metabolism, dairy products are of particular interest. Dairy foods contain nutrients including Ca, Pi, and protein in appreciable amounts compared to their recommended allowances. The beneficial effect of these 3 nutrients on bone organic matrix formation and mineralization while exerting an inhibitory effect on bone resorption has been well documented.”

### ***Protein Intakes and Osteoporosis (3-5)***

Three reviews are included below that address the relationship between dietary protein and bone health from three different perspectives. The consumption of dietary patterns that produce acidic urine has been hypothesized as a risk factor for bone disease and has led to erroneous recommendations to reduce animal protein foods to protect bone health. These manuscripts were published during 2011 to 2013 and all conclude that recommendations to limit protein intakes with the aim to protect bone health do not have scientific merit.

#### ***Nutritional disturbance in acid-base balance and osteoporosis: a hypothesis that disregards the essential homeostatic role of the kidney, Jean-Pierre Bonjour MD (3)***

- “It is well-established biological fact that the degree of urinary acidity varies according to the type of consumed foods. ...the hypothesis was put forward that bone could play a buffering role, with the consideration that nutrients, particularly animal proteins with their acid load, could be a major cause of osteoporosis. Variations in human diets across a plausible range of intakes have been shown to have no effect on blood pH. Consistent with this lack of a mechanistic basis, long-term studies of alkalinizing diets have shown no effect on the age-related change in bone fragility. Consequently, advocating the consumption of alkalinizing foods or supplements and/or removing animal protein from the human diet is not justified by the evidence accumulated over the last several decades.”

#### ***Causal assessment of dietary acid load and bone disease: a systematic review & meta-analysis applying Hill's epidemiologic criteria for causality, Tanis R Fenton, PhD RD, et al. (4)***

- “A causal association between dietary acid load and osteoporotic bone disease is not supported by evidence and there is no evidence that an alkaline diet is protective of bone health.” AND “Based on the review of the literature to date and an application of Hill's criteria to the evidence the relationship between dietary acid with risk of osteoporosis is not confirmed. Further research is needed to determine whether fruit and/or vegetables are protective of bone health and what are the ideal protein intakes for bone health.”

#### ***Dietary protein and skeletal health: a review of recent human research, Jane E Kerstetter PhD RD, et al (5)***

- “Recent epidemiological, isotopic and meta-analysis studies suggest that dietary protein works synergistically with calcium to improve calcium retention and bone metabolism. The recommendation to intentionally restrict dietary protein to improve bone health is unwarranted, and potentially even dangerous to those individuals who consume inadequate protein.”

Thank you for the opportunity to provide comments.

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