ENC Mission Statement:
ENC is a credible source of nutrition and health science information and the acknowledged leader in research and education related to eggs.

Nutrition Close-Up is a quarterly publication written and produced by the Egg Nutrition Center.

Nutrition Close-Up presents up-to-date reviews, summaries and commentaries focused on the role of diet in health promotion and disease prevention, including the contributions of eggs to a nutritious and healthful diet.

ENC Editorial Staff:
Mitch Kanter, PhD
Marcia Greenblum, MS, RD
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SPECIAL FEATURE

By Donna S. Martin, EdS, RD, LD, SNS.
Director School Nutrition Programs, Burke County Board of Education Waynesboro, Georgia

From Malnourished To “Misnourished”: When Was The Last Time You Ate School Lunch?

Chances are it has been a long time since you ate school lunch. And chances are it has changed a lot. Back in 1946, when President Harry Truman signed the National School Lunch Act, the program was designed for two reasons: 1) as an outlet for agricultural commodities produced by flourishing farms after World War II and 2) as a measure of national security, to safeguard the health and well-being of the nation’s children. At that time, many young men were found to be malnourished during their physical examinations for military service. But how much has the goal of the National School Lunch Act really changed from 1946 to 2012?

Fast forward 64 years, President Barack Obama signs into law the “Healthy, Hunger-Free Act of 2010”. The new law is based on recommendations from the Institutes of Medicine. The law gives the USDA the opportunity to make real reforms to the school lunch and breakfast programs by improving the critical nutrition and hunger safety net for millions of children. Nearly one in three children is at risk for preventable diseases, like diabetes and heart disease, due to obesity. If left unaddressed, health experts say the current generation of children may well have a shorter lifespan than their parents.

School Nutrition Programs around the country are not waiting for these new regulations to start making changes in their school nutrition programs. Take a look at some changes already taking place:

- Placing salad bars in a large number of schools
- Removing deep fat fryers and instead, baking all food
- Purchasing and using farm-to-school products as often as they can be found
- Replacing regular hamburger and hotdog buns with whole grain hamburger and hotdog buns
- Making pizza with mozzarella cheese, turkey pepperoni and whole wheat crust
- Offering a fresh fruit or vegetable daily
- Offering only skim or low fat milk
- Stocking vending machines with healthier items
- Chefs working in schools to help develop healthy recipes the students will like

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The Vitamin D Quandary: Are There Health Benefits to Increased Intake

Probably no vitamin has received as much attention in recent years as vitamin D. Discovered in the early 1920’s, vitamin D is now recognized as a prohormone. Activated, it functions as a hormone and is regulated by metabolic feedback loops. The first activation step occurs in the liver where vitamin D is metabolized to 25-hydroxyvitamin D (25(OH)D). The second step occurs primarily in the kidney; however, most cells have vitamin D receptors (VDR) and are capable of synthesizing the physiologically active 1,25-dihydroxyvitamin D (1,25(OH)₂D) locally. Therefore, it is not surprising that vitamin D deficiency is highly prevalent in individuals suffering from chronic kidney disease.

Based on an evaluation of National Health and Nutrition Examination Survey (NHANES) data from 2001-2006, only 8% of individuals aged 1 year and over in the U.S. are at risk of vitamin D deficiency (serum 25(OH)D <30 nmol/L), 24% are at risk of vitamin D inadequacy (serum 25(OH)D 30–49 nmol/L), 67% have values considered sufficient (serum 25(OH)D 50–125 nmol/L), and 1% have values that may possibly be harmful (>125 nmol/L). (Based on definitions of vitamin D status established by the Institute of Medicine (IOM) Committee formed to establish dietary reference intakes (DRI) for the calcium and vitamin D). [1]

**“Serum 25(OH)D levels is currently considered the best biomarker of vitamin D exposure as it has a circulating half-life of 15 days.”**

**Health benefits of vitamin D**

Vitamin D works to aid calcium absorption and its role in bone health is well characterized. It is needed for bone growth and bone remodeling by osteoblasts and osteoclasts. Without sufficient vitamin D, bones can become thin, brittle, or misshapen. Adequate vitamin D prevents rickets in children and osteomalacia in adults. [1, 2] Together with calcium, vitamin D also helps protect older adults from osteoporosis.

An accumulating body of evidence suggests it may have other roles in human health and that vitamin D deficiency contributes to an increased risk for many chronic diseases, including cardiovascular disease and certain forms of cancer. Low vitamin D intake (<400 IU/day) was also associated with lower mental health-related quality of life scores in older women in a recent study. [4] However, there are opposing professional points of view on the health benefits of high doses of vitamin D. Although doses of 10,000 IU (250 μg) of vitamin D are not associated with classical toxicity, there is emerging data that intakes above the IOM established Tolerable Upper Intake Level (UL) of 4000 IU (100 μg) per day for adults is associated with all-cause mortality, cancer, cardiovascular risk, falls and fractures. [5, 6]

The Agency for Healthcare Research and Quality (AHRQ) was commissioned to conduct a systematic review of the scientific literature for vitamin D, calcium, and a combination of both nutrients by the IOM Committee formed to establish DRIs for these nutrients. [1] According to the AHRQ review, higher serum 25(OH)D concentrations or higher vitamin D intake is associated with an increased risk for some cancers and all-cause mortality. [5] There was inconsistent evidence linking vitamin D and the risk of cardiovascular disease. As most cells have VDR, in exploratory studies vitamin D inhibits cell proliferation and stimulates the differentiation of cells when bound to the VDR; suggesting anti-cancer benefits. There is also preliminary evidence to suggest that vitamin D can modulate autoimmune diseases including rheumatoid arthritis and play a role in many biochemical mechanisms. [1, 5]

These are unproven theories and are being tested by the National Institutes of Health.

**Indicators of vitamin D status:**

Serum 25(OH)D levels is currently considered the best biomarker of vitamin D exposure as it has a circulating half-life of 15 days. [1, 2] Although, serum 25(OH)D levels do not reflect the amount of vitamin D stored in body tissues and it is not clear if it is the best indicator of health outcomes, it is used to make comparisons of intake or exposure with health outcomes. Unlike 25(OH)D, serum 1,25(OH)₂D is not considered a good indicator of vitamin D status as it has a short half-life of 15 hours, is tightly regulated by the body, i.e., levels typically only decrease when vitamin D deficiency is severe, and levels are not responsive to a vitamin D challenge test. [5, 2]

There is considerable variability in the assays and among laboratories that conduct vitamin D analyses. [8] The two most common methods are antibody based (radioimmunoassay or RIA) and liquid chromatography based (liquid chromatography–tandem mass spectrometry or LC MS/MS). The LC MS/MS is the preferred method, especially for research purposes, as it allows for separate quantification of serum 25(OH)D₃, 25(OH)D₂, and the epimer of 25(OH)D₃. The epimer of 25(OH)D₃ is not measured by some immunoassays. The epimer of 25(OH)D₃ is converted to a form of 25(OH)D that differs in biological activity from the hormone produced from 25(OH)D₃; however, its biological significance remains unclear.

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The “Healthy, Hunger Free Act of 2010” will lead to changes that will be phased in over a three-year period, starting in school year 2012-2013. The majority of the lunch changes will be effective July 1, 2012, while the breakfast program changes will not be effective until July 1, 2013. The changes can be summed up as:

1. At least 50% of the grains served must be whole-grain rich (by school year 2014, 100% of the grains must be whole grain rich). A whole grain-rich food must contain at least 51% whole grains to be counted as whole-grain rich.
2. The grade levels for planning menus have changed to K-5, 6-8 and 9-12, from the more variable age/grade grouping.
3. The only menu planning option allowed will be Food Based Menu Planning (FBMP) replacing Nutrient Standard Menu Planning (NSMP).
4. The only milk allowed to be served will be fat-free or low-fat milk. Any flavored milk will need to be fat-free.
5. The new breakfast menu pattern now includes a 1 cup fruit requirement instead of ½ cup. Students will have to have a ½ cup serving of fruit on their tray in order for the meal to be reimbursable. Only ½ cup of the fruit offered can be juice. At breakfast, the menu includes two servings of grains or one serving of a grain and one serving from the protein group.
6. The serving size for fruits and vegetables has increased considerably for all grade levels. Menus must include a fruit and vegetable serving everyday at lunch. In order for a meal to be reimbursable, a student must have at least ½ cup serving of fruits or vegetables on their tray.
7. Schools are required to offer at least 1 cup a week of each of the following vegetable sub-groups: red and orange, dark green, beans and peas, and starchy.
8. Calories for lunch now include a minimum and a maximum range that is averaged over a week.
   a. Grades K-5: 550-650 calories
   b. Grades 6-8: 600-700 calories
   c. Grades 9-12: 750-850 calories
9. Sodium levels now have intermediate target ranges to help schools reach final targets. Changes represent a sodium reduction of approximately 25-50% in breakfasts and lunches.
   a. Target 1:
      School year 2014-2015: 1,230 mg – 1,430 mg at lunch
   b. Target 2:
      School year 2017-2018: 935 mg – 1,080 mg at lunch
   c. Final Target:
      School year 2022-2023: 640 mg – 740 mg at lunch
10. Zero grams of “added” trans fat will be permitted per serving of food. This does not include naturally occurring trans fat found in meat and dairy products.
11. Gives USDA authority to set nutritional standards for all foods sold regularly in schools during the school day. This includes vending machines, a la carte lines and school stores.

Another change coming out of the new law includes the ability of school systems to serve supper to the children if they stay after school for any type of educational enrichment program. In Burke County, Georgia, where they have the highest child poverty rate (47%) of any county in the country, this program has been a tremendous success for the students and parents alike. The Burke County School Nutrition Program started feeding the football team on some nights when they could work in some educational activities and the team has credited this extra nutrition with helping them win the State Championship title. Previous to being fed this supper meal, the coach stated the children were suffering from malnutrition and were unable to complete practices and games. Offering a hot meal at night has also encouraged other students to stay after school for much needed tutoring.

The major goal of the school meals program is to make sure the nation’s children are provided healthy meals that prevent them from being malnourished (1946) or being “misnourished” (2010). The second goal is to help the United States farmers; previously to use the abundance of agricultural crops (1946) and today to help promote locally based agriculture (2010). And finally, in 1946 we had military personnel who were malnourished while in 2012 we have people who are rejected from joining the military because they are overweight.

I encourage you to eat a school lunch someday soon. You will be well fed at a reasonable price and your local lunchroom cafeteria may become your new favorite lunch spot! *
Cultural Influences
In the US, the process of acculturation continues to influence Hispanic eating behaviors. Unfortunately, acculturation is often associated with a less healthy diet that includes frequent intake of processed foods, meats high in fat and sugar with a less frequent intake of fruit, vegetables, lentils, and beans. On the other hand, the Hispanic community continues to influence and shape American eating habits and marketing strategies. An example of the influence of this rapidly growing segment can be seen in American supermarkets where there are complete aisles and sections of Hispanic/Latino products with dual languages in evidence from nutrition facts panels to cash registers.

Generally, Hispanic housewives tend to buy more fresh produce than canned or processed foods. Milk, eggs, cheese, bread, rice and beans are part of the weekly grocery shopping list of almost every Hispanic household.

Breakfast is a Key Meal
Selection of protein sources in the Hispanic community is affected by culinary traditions and taste with additional consideration to healthfulness and affordability. In some cases, the driving factor when buying food is price.

Breakfast is always considered very important, if not, the most important meal of the day. Hispanic parents understand that they are role models, passing on traditional eating habits. Therefore, the tradition of eating breakfast has been preserved and maintained throughout the generations. There is a popular belief that to have a wonderful and blessed day no one should leave home without eating breakfast.

Breakfast usually includes some type of protein. Hispanics living in US tend to eat eggs for breakfast more often than non-Hispanics, wanting to preserve the taste of traditional dishes. Warm breakfast dishes are prepared more frequently in Hispanic households than in other American homes. Eggs have been part of the Latin American cuisine since even before the Spanish conquest. There is such wide variety of eggs preparation methods ranging from traditional and simple like eggs rancheros and boiled eggs, to the more elaborate chilaquiles with eggs (baked tortilla strips with salsa, topped with sunny side up egg and sprinkle with fresh cheese). Eggs are a protein choice of the highest quality and high digestibility, making them an important nutrient source at any stage of life.

Protein Preferences in The Hispanic Community

Food Preferences: Protein
Protein preferences among Hispanics include both lean and high fat cuts of animal proteins, such as: red meat, pork, poultry, eggs, fish, steaks, fajitas, ground meat, sirloin, and deli meat like ham and turkey. Fish selection varies depending on the country of origin. Fish choices include tilapia, catfish, trout, shrimp, sardines and canned tuna. Cod is consumed more during the Lent, and Christmas holidays. Cheeses are especially important to note in the Hispanic diet. Most Mexican fresh cheeses have an average fat content of less than 7 grams per ounce. Vegetable protein among Hispanics comes primarily from beans and lentils. Most typical dishes are served with rice and beans on the side. Hispanic mothers are primarily responsible for the planning, shopping, and cooking in the typical household. They understand that a healthy diet includes fruits, vegetables and beans, often preparing soups or broths that include these ingredients. Since the time of the Aztecs, it has been well understood that the key for health and wellness is a proper diet; therefore consumption of protein is considered especially important for correct functioning of the body and an adequate defense system.

Health Impacts of Eating Habits
Obesity and its health consequences are a major concern among Hispanics. This is especially true amongst Hispanic/Latino children who are currently among the most affected by the obesity epidemic in the United States. It is estimated that about 38% of Hispanic children ages 2 to 19 are obese or overweight compared with rates of African Americans and Anglos, 36% and 29% respectively. There is strong parental influence on children's eating habits in the Hispanic family, which is demonstrated by the family atmosphere, where certain foods may be offered or not allowed. Healthier cooking methods among Hispanics, especially for protein foods, are moving in the direction of grilling and baking instead of frying.

Selection of protein sources in the Hispanic community is affected by culinary traditions and taste with additional consideration to healthfulness and affordability.

By Araceli Vazquez, MS, RD, LD
DietGenics, Nutrition Consulting

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The Vitamin D Quandary: Are There Health Benefits To Increased Intake

In conclusion, health professionals need to know what method was used to determine serum vitamin D levels and if the laboratory participates in a quality assurance program. Currently the health risks of high supplemental intakes of vitamin D are unclear, so individuals ingesting high doses (e.g., above the IOM recommended RDA and UL levels) for the prevention or treatment of chronic diseases should be monitored by their physician.

References:

Additional vitamin D resources for professionals are available at: http://ods.od.nih.gov/Research/VitaminD.aspx.
Dietary Cholesterol:
Is It Time To Re-Think Long Held Beliefs?

The American Heart Association (AHA) recommends < 300 mg/d of dietary cholesterol for healthy populations. In contrast, dietary guidelines from the European Union, United Kingdom, Ireland, Canada, Australia, Korea, Japan, India and New Zealand do not have an upper limit for dietary cholesterol based on an interpretation of the scientific literature by health experts in these various countries.\[1\]

While AHA and other US-based recommendations in principle allow for the consumption of cholesterol containing foods in the diet, existing messages continue to lead to uncertainty for health professionals and the general public. Eggs are an affordable source of high quality protein; they also contain highly bioavailable lutein and zeaxanthin, potent circulating antioxidants, which have been shown to protect against age related macular degeneration. Eggs are also a good source of choline, a key nutrient for normal fetal development and for cognitive performance.\[2\] Despite these nutritional attributes, the concern regarding blood cholesterol is foremost in the minds of many consumers and health professionals, precluding the use of nutritious foods like eggs by those who can benefit from the added nutritional benefits provided by these foods.

It is important to educate people on the evidence regarding dietary cholesterol derived from epidemiological data and clinical interventions. Numerous large epidemiologic studies including Framingham (n = 912), Health Professionals Follow Up Study (n=43,732), The Nurses’ Health Study (n=80,082) and NHANES III (n = 27,378) did not find any association between the number of eggs eaten per week and coronary heart disease. In addition, recent clinical interventions from my laboratory and those of others have demonstrated that the lipoprotein profiles resulting from additional cholesterol consumption (via eggs) do not increase the risk for heart disease.\[3-5\] In studies where a challenge of dietary cholesterol derived from epidemiological data and clinical interventions. Numerous large epidemiologic studies including Framingham (n = 912), Health Professionals Follow Up Study (n=43,732), The Nurses’ Health Study (n=80,082) and NHANES III (n = 27,378) did not find any association between the number of eggs eaten per week and coronary heart disease. In addition, recent clinical interventions from my laboratory and those of others have demonstrated that the lipoprotein profiles resulting from additional cholesterol consumption (via eggs) do not increase the risk for heart disease.\[3-5\] In studies where a challenge of dietary cholesterol provided via consumption of 3 eggs per day given to adult men and women for 4 weeks, the LDL/HDL, a key marker of heart disease risk, was not altered. While some of these individuals (about 25% of the population) did raise their LDL in response to eggs, an increase in HDL was consistently observed in these subjects allowing for the maintenance of the LDL/HDL ratio. Similar results have been observed in children consuming 2 eggs per day for one month and in overweight individuals following a carbohydrate restricted diet (15% energy) for 12 weeks. A major finding of these clinical interventions is that egg intake leads to the formation of the larger, more buoyant LDL particles resulting in a shift from the pattern B, associated with small dense LDL and increased risk for heart disease, to the less atherogenic pattern A, in 15% of individuals. Thus dietary cholesterol challenges involving high daily intake of eggs for extended periods of time do not alter the LDL/HDL ratio, while increasing the formation of large LDL, two factors that are known to be protective against cardiovascular disease risk.

Additional reports have shown that when subjects consume one egg per day, more in alignment with normal consumption, for one month, LDL cholesterol does not increase significantly. However, the HDL is substantially increased, resulting not just in the maintenance but in a decrease in the LDL/HDL ratio. We just finished an intervention where enrolled participants had metabolic syndrome. One of the inclusion criteria for metabolic syndrome is low HDL. Subjects in this study were asked to follow a carbohydrate restricted diet (30% energy from carbohydrates) and to also consume 3 eggs per day. At the end of the study, most participants raised their HDL including those who had normal values at baseline. Interestingly, in this study, subjects did not raise their LDL; consequently, they had a significant improvement in the LDL/HDL ratio. Thus, eggs are not just innocuous for individuals with metabolic syndrome but they actually modify one risk factor (low HDL), which may even result in these individuals no longer being diagnosed with metabolic syndrome.

It is always a challenge for consumers to interpret dietary recommendations. Eggs, because of their cholesterol content, are often limited in consumer's diets, depriving individuals of an affordable food rich in nutrients. We need to take a fresh look at the way the cholesterol “message” is delivered to the consumer. It is important to emphasize that added dietary cholesterol does not appear to increase cardiovascular disease risk in healthy individuals, while at the same time emphasizing the health benefits of foods such as eggs for different populations. ✷
References:

Countries such as Ireland, United Kingdom, Canada, Australia, Korea, Japan, India and New Zealand do not have an upper limit for dietary cholesterol.
Numerous large epidemiologic studies did not find any association between the number of eggs eaten per week and coronary heart disease.
Subjects with metabolic syndrome who were asked to follow a carbohydrate restricted diet which included 3 eggs per day, raised their HDL levels without raising their LDL levels thereby significantly improving their LDL/HDL ratio.

2012 Tracking Survey: What Health Professionals Think
Every couple of years the Egg Nutrition Center conducts a survey among health professionals (HP) to assess their opinions and behaviors regarding health/nutrition in general, and eggs in particular. The survey always produces some interesting insights from which we can learn and build upon.

This past year’s survey included responses from more than 2400 health professionals who were randomly selected from subscriber lists of various HP trade publications. Survey participants were contacted via e-mail blast. The majority of our respondents were dietitians (RD) (65%). Nurse practitioners (NP) (20%), personal trainers (9%), and physician assistants (PA) (5.5%) comprised the remainder of the respondents. The make-up of the respondents largely mirrors the demographic of our present Close-Up readership.

Some of the more interesting findings are as follows:

- Among the leading risk factors for heart disease, smoking topped the list of contributors to disease, followed by diabetes, genetics, poor diet quality and blood pressure. Of 11 risk factors provided, dietary cholesterol intake was cited by only 1% of respondents as a leading contributor to heart disease risk.
- 68% of respondents believed that protein intake at the breakfast meal is important; 73% felt that protein in the morning aided in all-day satiety.
- 77% of respondents felt that eating breakfast helped to prevent childhood obesity, and 63% felt that a high protein breakfast could help children to perform better in school.
- 97% of HPs believe that eggs can be a part of a healthy diet, and 81% considered the protein in eggs to be the “gold standard”
- 56% of HPs indicated that they recommended 5 eggs or more per week to healthy patients who liked to consume eggs; 35% said they would recommend 3-4 eggs per week.
- For those who recommended limiting egg consumption, cholesterol was most often cited (50% of respondents) as the reason to limit.
- Main reasons cited for consuming eggs were: a nutrient dense food (35%); an inexpensive source of high quality protein (26%); a great source of high quality protein (22%); and satiety promoting (17%).

We were extremely heartened by the fact that roughly 30% of the PAs, NPs and Personal Trainers were aware of the programs of the Egg Nutrition Center, and that 50% of the RDs were familiar with ENC. When asked about their awareness of ENC in 2009, only 5% of the HPs queried said they were aware of ENC programs.

The results of the 2012 survey reinforced the fact that HPs are interested and aware of many of the key nutrition issues of the day, though some issues remain controversial. While more and more HPs are familiar with newer research indicating the increasingly important roles of dietary protein, the dietary cholesterol issue still warrants clarification. Though most HPs acknowledge that dietary cholesterol may not be as great a risk factor as previously thought, there is still reluctance by some HPs to recommend cholesterol-containing foods because of long-standing beliefs.

These and other issues give us at ENC a “to-do list” that we’ll be sure to follow up on in the coming year. Funding more research on nutrition-related issues, monitoring the scientific literature, and reporting to you on new and interesting research findings will all remain key objectives for ENC in 2012 and beyond.