Mangos are Associated with Overall Healthier Diet: Results from the National Health and Nutrition Examination Survey

The Big Picture:
The discovery of new, positive health benefits from eating mangos could have a major impact on future mango movement. In this age of health-conscious consumers, nutrition messages are an extremely powerful marketing tool. Combined with the delicious flavor of mangos, nutrition messages may be a big win for the mango industry. Since 2006, the National Mango Board (NMB) has been working with nutrition researchers to better understand the nutritional benefits of mango and recently they funded a human research study to evaluate the relationship between mangos and healthy diets.

Human studies relative to mangos are limited; however, the NMB commissioned a human research study to examine the association between mango consumption and dietary quality, nutrient intake and physiological parameters a research study was conducted by Dr. Carol E. O'Neil of Louisiana State University's Agricultural Center; Dr. Theresa A. Nicklas of USDA/ARS Children's Nutrition Research Center at Baylor College of Medicine; and Dr. Victor L. Fulgoni, III of Nutrition Impact, LLC. Individuals who participated in the study included children (ages 2-18 years) and adults (ages 19 years and older) to accurately represent the total U.S. population. To determine this sample of individuals, the researchers used the National Health and Nutrition Examination Survey (NHANES) to compare the diets of more than 29,000 children and adults between 2001 and 2008.

The researchers were able to determine demographic and dietary information from NHANES interviews and data. Individuals were identified as mango consumers if they consumed only the following: raw, pickled, cooked and/or dried mango. No mango juice consumers were included in the sample. To determine the diet quality and evaluate the adherence to the 2005 Dietary Guidelines for Americans, the researchers used the USDA created measure called Healthy Eating Index. Researchers evaluated the participants' height, weight and waist circumference; as well as body mass index. Other measurements included blood pressure, cholesterol, triglycerides, blood glucose and insulin. Only individuals with reliable dietary records were considered.

The *Journal of Nutrition and Food Sciences* published the results of this research and the findings link mango consumption to a better diet quality and nutrition intake in adults and children. This research suggests that consumption of mangos in adults is not only associated with an overall better diet, higher intake of whole fruit and more nutrients (such as dietary fiber and potassium), but are also associated with lower body weight and C-reactive protein. C-reactive protein is an inflammatory indicator associated with cardiovascular risk. The following are the research findings, some results varied between children and adults.

**Please note that the number listed in the introduction section of the full research report for fresh mango per capita availability in 2009 is incorrect. The corrected number from the Economic Research Service is .918 lbs/year.*

Overall Findings:

- **Higher intake of whole fruit**
    - For both age groups, mango consumers exceeded the requirement for total fruit consumption compared to non-consumers.

- In children (ages 2-18) and adults (ages 19 and older), mango consumers had higher intakes of total and whole fruit than non-consumers
    - However, mango consumption only accounted less than 1 cup equivalent (CE) of the total fruit intake for both children and adults; suggesting that other fruits were also consumed in higher amounts.

- **Energy, nutrient intakes and Healthy Eating Index**
    - **Sugar intake levels**
        - In both age groups, total sugar intake was higher in mango consumers than in non-consumers; however, added sugar intake was lower.
    - **Fat intake levels**
        - In adults, average total fat, saturated fat, and cholesterol intake was lower in mango consumers than in non-consumers.
    - **Vitamins and nutrients**
        - Mango consumers (either adults and/or children) had higher intakes of Vitamins A, C and B6 as well as calcium, potassium, and magnesium compared to non-consumers.
    - **Healthy Eating Index**
        - Both adult and children mango consumers scored higher on the HEI than non-consumers, meaning they had an overall better diet quality.
    - **Carbohydrates, dietary fiber and sodium intake levels**
        - In adults, total carbohydrates were higher in mango consumers.
        - Adult consumers had nearly 6g more dietary fiber than non-consumers.
            - In adults, the dietary fiber intake of mango consumers was higher than the fiber content of the average amount of mango consumed, suggesting that mango consumers may have an overall healthier diet than non-consumers.
        - Children who consumed mangos, had a 2g marginally higher intake of dietary fiber.
        - Adult mango consumers had lower intakes of sodium.
    - **Physiologic measures (such as body weight, blood pressure, blood lipids and other measures**
        - Adult mango consumers weighed less than non-consumers.
        - C-reactive protein (CRP) levels were also less in adult mango consumers than non-consumers.
        - Other cardiovascular and diabetes risk factors associated with mango consumption were similar in mango consumers and non-consumers.

Looking ahead:
Although results between children and adults varied, in general, mango consumption was linked to better diet quality and nutrition intake. The NMB continues to support mango nutrition studies via several outreach efforts to help spread the word about this superfruit's nutrition story to U.S. consumers. The results from this research will help add to the existing body of evidence suggesting mangos are a nutritional powerhouse.