

Challenges Inherent in Delivering Simple, Yet Science-Based Answers to Complex Food Quality Questions

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Common, Difficult Questions

- ❑ What foods should my family eat more of?
- ❑ I am worried about pesticides in food. Which foods should I avoid?
- ❑ How can I maximize my chances for a healthy pregnancy and baby by seeking out organic food?

Need for a Food Quality Index

"What We Eat in America" – major USDA report released in September 2005.

Press release states that:

More so than at any time in our history, Americans are "overfed and undernourished."

Only 15% of Americans have a healthy diet based on USDA's "Healthy Eating Index."

A Nation Overfed

- ❑ Average daily caloric consumption up 1,200 calories since the 1970s.
- ❑ Average diet delivers several hundred calories in excess of energy needs.
- ❑ Obesity and diabetes are now called epidemics and few quibble over the choice of word.

A Nation Undernourished

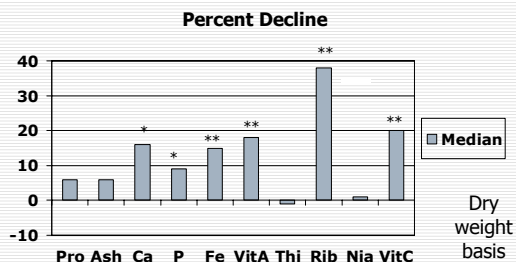
- ❑ "What We Eat in America" documents surprising array of sometimes deep nutritional deficiencies.
- ❑ Average person consumes inadequate intakes of about 2.5 essential nutrients daily.
- ❑ Many deficiencies are by a country mile and clearly significant.

Nutrition in the United States

- ❑ Low intakes of nutrients (NHANES 2005)
 - Vit. E 93%, Mg 56%, Vit. A 44%, Vit. C 31%
 - Most get less than adequate intakes of Vit. K, Ca, and fiber
- ❑ Low intakes of recommended foods
 - Fruits—70% eat less than 2 servings/day
 - Vegetables—58% eat < 3 servings/day
 - Whole grains—few consume regularly
- ❑ Greater than 50% calories from added sugars, fats, and white flour

(Slide from Don Davis AAAS Presentation, February 2006)

Nutrient Density in 43 Garden Crops: 1950 to 1999



* $P < 0.05$
 ** $P < 0.01$

(Davis, Epp & Riordan, J Am Coll Nutr, 2004; 23:669)

Nutrient Decline

- ❑ Soybean protein content is a major concern.
- ❑ Argentinian Roundup Ready GM soybeans average 32.6% crude protein (CP); conventional beans in China and India, 44.9% and 39.6%; U.S. beans (half RR-half conventional) averaged 37.1% CP.

(Source: Karr-Lilienthal, et al., J. of Food and Ag Chemistry, 2004)

Nutrient Decline

- ❑ Some animal feeders are switching corn suppliers looking for consistent 8% protein content – some corn now tests 6% protein or lower.
- ❑ Pioneer Hi-Bred data shows levels were often over 10% into the early 1960s and have declined to 8-9% in the 1990s.

(Source: "Protein Problems," *Farm Journal*, Mid-March 2005)

The Dilution Effect

- ❑ Discussed in a review by Jarrell WM, Beverly RB. *Advances in Agronomy*, 1981; 34:197–224 (101 refs.)
- ❑ Yield-enhancing methods tend to decrease nutrient concentrations
 - Fertilization, irrigation, plant density, pesticide use
- ❑ The dilution effect is well accepted by agronomists & horticulturists

Nutrient Density and the Dilution Effect

- ❑ Percent decline of some nutrients in high-yield conventional crops over the last 40 years is about equal to the percent increase when crops are grown in organic systems.
- ❑ Wine makers fully accept the conflict between yields and grape quality, and premium vines are managed for lower yields.

Organic Center Food Quality Index (FQI)

Drewnowski commentary in the *American Journal of Clinical Nutrition* (2005) challenges the nutrition/food science community to develop a more sophisticated, comprehensive FQI that encompasses food "plusses" and "minuses."

Components of the Organic Center's Food Quality Index

Positive attributes:

- ☐ Nutrient density
 - ☐ Taste and sensory attributes
 - ☐ Protein levels and quality
 - ☐ Antibiotic susceptibility status of bacteria present in food
 - ☐ CLA levels and omega 3, and omega 3 to 6 ratios in animal products
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Components of the Organic Center's Food Quality Index

Negative attributes:

- ☐ Presence of added fats, salt, sugar
 - ☐ Pesticide residues/risk
 - ☐ Mycotoxin levels/risk
 - ☐ Microbiological contamination
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Need for Multiple FQIs

- ☐ Food quality must be evaluated relative to stated needs and quality attributes.
 - ☐ One shoe does not fit all. FQI values will vary by sex, age, health status, during pregnancy, and between people trying to maintain – or regain – good health.
 - ☐ Consumer tastes, preferences, and values can be taken into account in weighing different factors.
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Developing and Testing the Center's Food Quality Index

- ☐ An enormous task that will take years and much investment.
 - ☐ Many institutions, labs, and companies will need to lend a hand in developing methods and essential data.
 - ☐ A long journey worth the time, expense and patience it will take since consumers will keep asking complex questions.
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