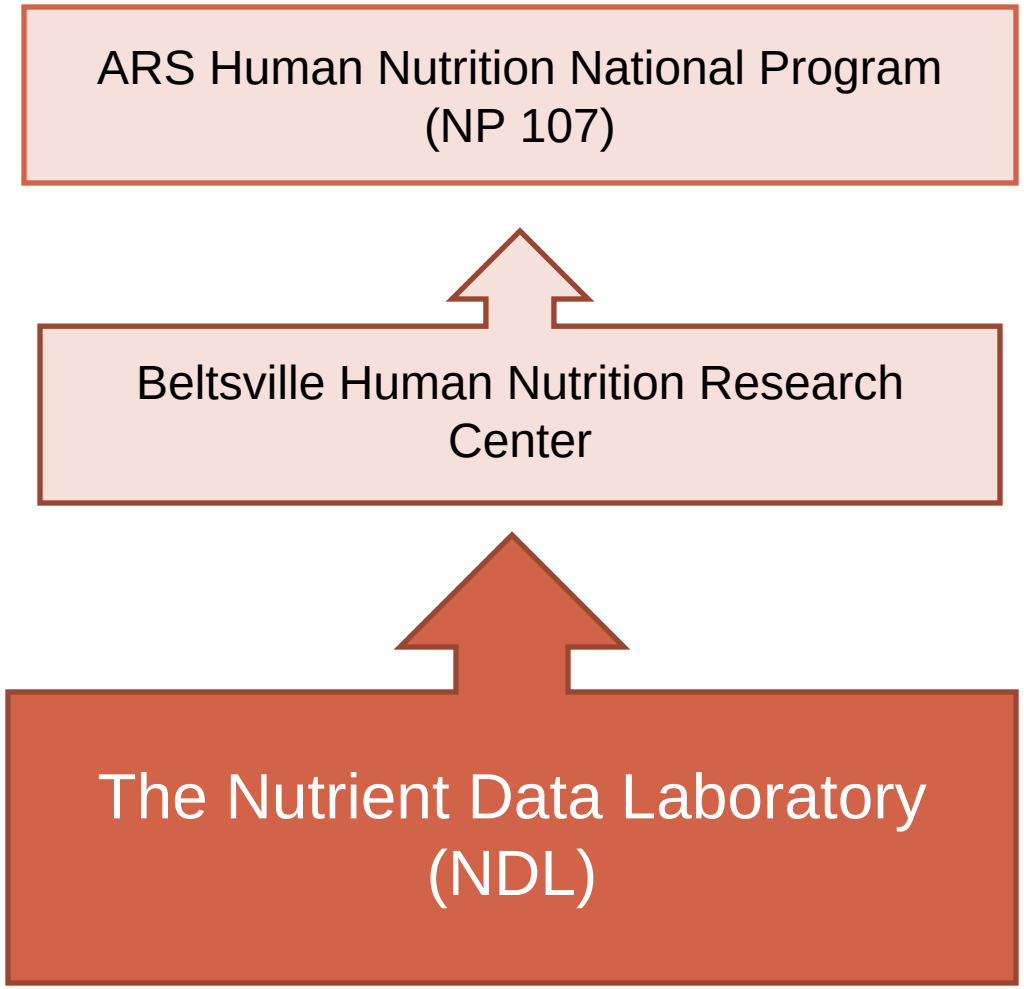
The ARS Nutrient Data Laboratory Research

Kelly Day Rubenstein, USDA-ERS

Assessing the Benefits of Agricultural Research Service (ARS) R&D Within an Economic Framework: Preliminary Results Workshop

March 10-11

NDL measures the nutrient composition of foods in the American diet



NDL's primary output is the National Nutrient Database for Standard Reference

Other outputs:

- publications in the professional literature
- the National Nutrient Databank Conference
- direct communications with users

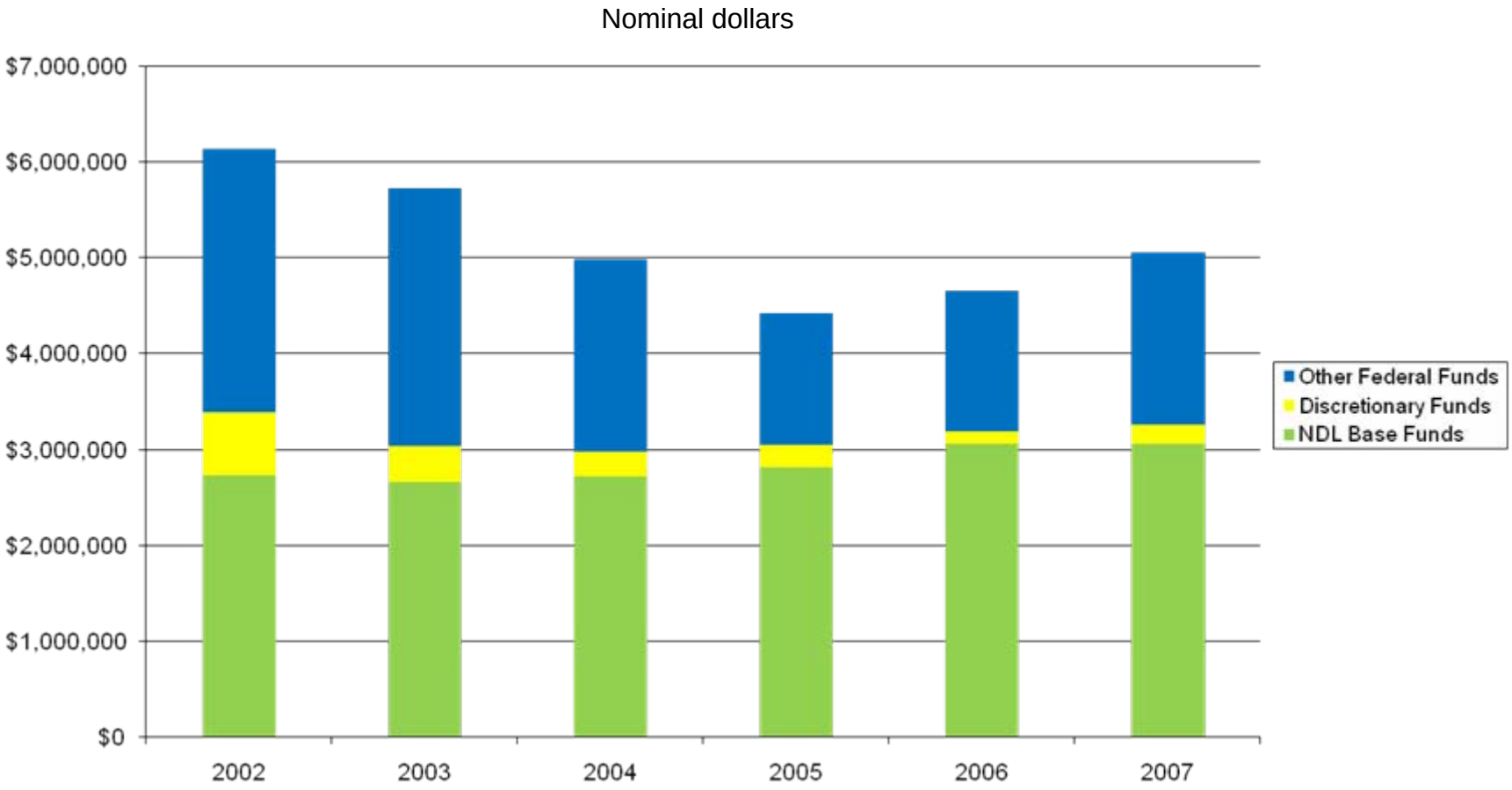
The Standard Reference (SR) database

- Foundation of virtually all public and commercial nutritional databases
- More than 7,000 food items
- Up to 140 nutrients
- Supplementary databases: e.g., fluoride, isoflavone content, choline
- Subpopulations, e.g., American Indian/Alaska Native Foods Database

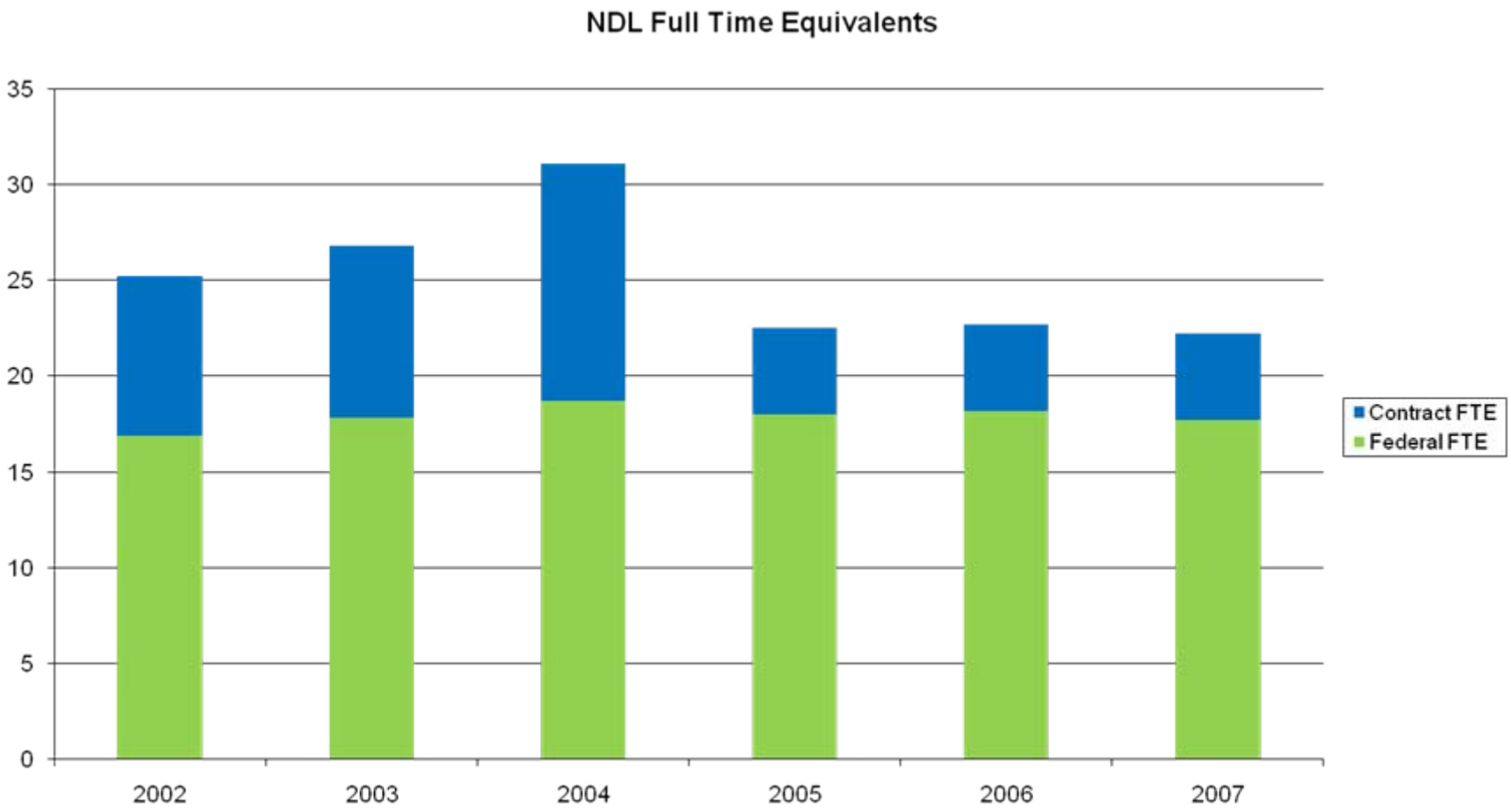
Selection criteria

- Clearly defined program
- Small in terms of mandate, personnel
- Service/capacity vs. basic/clinical
- Dissimilar subject area

NDL budget summary



NDL Full Time Equivalents



Uses for the NDL’s outputs

The NDL’s outputs serve most frequently as tools for other research and information creation.

Use of SR for Medical Research

- The role of nutrition in disease occurrence and modification of risk factors
- Efficacy of different nutrition-related treatments.
- Clinical studies on blood diseases, heart diseases, and cancer (NIH)
- Crossed with intake data for epidemiological and population-based disease studies
  - Example: Harvard Nurses' Health Study

Almost every nutrition-related epidemiological study will make some use of the SR

Use of SR for Nutritional Research

- The biological functions of different nutrients; used in metabolism-related studies
- The nutritional content of dietary supplements and food
- The underlying aspects of the nutritional content of food in the US
- Behavioral research concerning food choices

NDL's Role in Technological Research

- Determining the most effective and accurate methodology
- Sampling is a significant methodological challenge
- Comprehensive data quality: best methods for data processing and dissemination
- Raising data quality has improved the level of statistical significance

Use of the SR for Public Policy

Dietary Guidelines for Americans

government nutrition programs, including research, labeling, and nutrition promotion

Examples:

- Food Stamp programs
- WIC
- Department of Defense feeding plans

International use:

- Guide interventions in countries with malnourishment

- Create national dietary guidelines and national nutrition plans

Use of the SR for Regulatory Requirements

The Child Nutrition Database

- Regulation of school and daycare meals
- Compliance

FSIS/ FDA's regulation of nutrition labels

The Codex Alimentarius Commission

- Codex standards used worldwide to regulate food safety, protect consumers
- FAO uses the SR to make recommendations to the Codex commission

Use of the SR in Nutrition-Related Education

Formal and self-directed nutrition education programs.

USDA's Center for Nutrition Policy and Promotion (MyPyramid)

Professionals use the SR database to

- educate clients
- construct dietary plans for:
  - ✓ individuals
  - ✓hospitals
  - ✓schools

Professional education:

Textbooks and student software

Assistance for food surveys

Standard Reference

Food and Nutrient Database for Dietary Surveys

What We Eat in America
(produced jointly with the Dept. of Health and Human Services)

SR used in many secondary databases

- Proprietary systems
  - the University of Minnesota's "Nutrition Data System for Research" designed for clinical research and epidemiological studies
  - "Food Processor" for dieticians and health professionals
  - Systems to generate nutrient labels, as seen in the Nutrition Facts Panels (exp: "Genesis")
- Large corporations may create their own internal databases using the SR

Almond Nutrition Facts

Serving Size 1 ounce (28g)
or about 23 almonds

Amount Per Serving
Calories 160 Calories from Fat 120

	% Daily Value*
Total Fat 14g	22%
Saturated Fat 1g	5%
Polyunsaturated Fat 3.5g	
Monounsaturated Fat 9g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Potassium 200mg	6%
Total Carbohydrate 6g	2%
Dietary Fiber 3g	12%
Sugars 1g	
Protein 6g	

Vitamin A 0% •	Vitamin C 0%
Calcium 8% •	Iron 6%
Vitamin E 35% •	Folate 4%
Magnesium 20% •	Phosphorus 15%

*Percent daily values are based on a 2,000 calorie diet.

Evaluation of economic benefits

Public health:

primarily non-market, attribution difficult

- Public health can be measured and, to a degree, valued
  - health care costs
  - loss of productivity
  - “Quality Adjusted Life Years”
- Connecting public policy interventions with improvements in public health is difficult
  - Role of nutrition not fully understood
  - The relationship between health, disease, environment, behavior and genetics is unclear
  - Measurement of nutrition intake is incomplete
  - Gains in science are cumulative – the “Knowledge Value Collective”

Challenges to conventional techniques

Technique	Suitable for NDL?
Quantitative analysis	
Bibliometric	No, primarily one product, citations to SR often omitted
Cost-benefit	No, costs easily measured but most benefits are diffuse, non-market goods
Rates of return	No, impacted sector not clearly defined
Benchmarking	No, comparable product does not exist
Retrospective analysis	Options for counterfactuals may be limited; survey may be necessary
Narrative assessments	Yes, but may be less credible
Peer review	Yes

(based on Kostnoff, 1995, NAS, 1999)

National Food and Nutrient Analysis Program (NFNAP)

Research improvement using ex-ante peer review

1997 to present

multi-agency effort to upgrade food composition data ; NIH significant supporter

Goals

1) improve information on key foods

2) evaluate existing data

3) develop nationally-based sampling plans

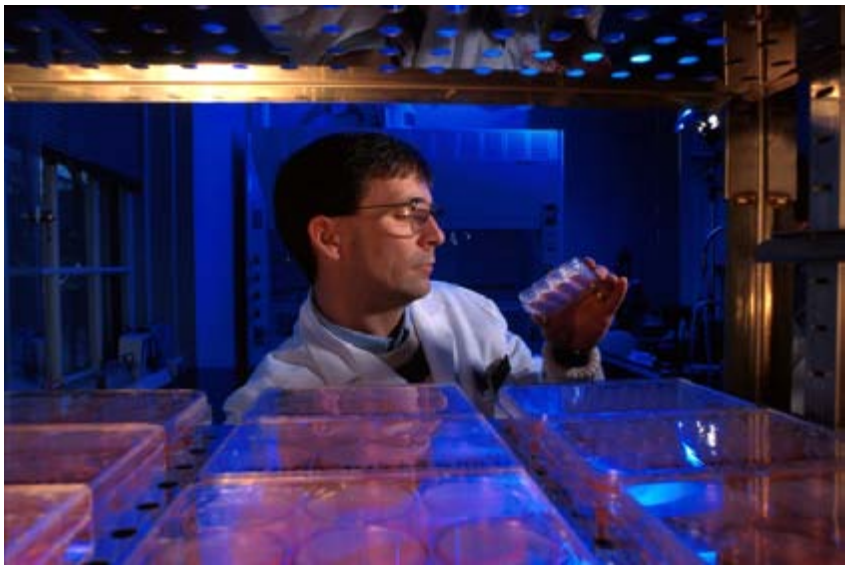
4) analyze samples using state-of-the art methods

5) compile newly generated data to achieve a representative food composition database.

(Source, Haytowitz et al, 2008)

Pre NFNAP review

- NIH required detailed, highly technical proposal
  - Benefits of improved data were thoroughly developed by the NDL
- Proposal subject to rigorous peer review
  - 1994 GAO report found that the NDL procedures were too vague, better quality assurance needed
- NDL improved standards before receiving grant



Peer and user assessment

- Post NFNAP: Statistical power of data significantly improved
- Nationally-based sampling – critical, unique
- NDL has fostered stakeholder involvement
- External expert review found that the NDL:

  “produces, documents and disseminates the most comprehensive and highest quality food composition information in the world... it is considered the ‘gold standard.’”