SESSION 1: MEETING PUBLIC HEALTH NEEDS OF CONSUMERS

Aligning food composition tables with current dietary guidance for consumers

Suzanne Murphy; University of Hawaii

Background: Federal dietary guidance for consumers in the United States includes three pillars: the Dietary Guidelines for Americans (DGA); the Dietary Reference Intakes (DRIs); and the information on food packages (including the Nutrition Facts Label). Food composition tables (FCT) should include information that is relevant to these types of dietary guidance.

Objective: To review food composition variables that are meaningful in this public health context. Description: A major focus of the 2010 DGA is to help consumers achieve a healthy body weight. In addition to knowing the energy content of food portions, emphasis is placed on decreasing intakes of empty calories (e.g., solid fats and added sugars) and choosing foods with a high nutrient density. Some of these themes are also seen in the recent recommendations by an Institute of Medicine Committee on front of package labeling. Choosing foods from appropriate food groups, and in particular, increasing intakes of fruits and vegetables, is another focus of the 2010 DGA. Thus, it is necessary to be sure that foods on a FCT can be assigned to the correct food groups. In addition, nutrients with a DRI should be included on a FCT, and the units in which the recommendations are expressed should match those on the FCT.

Conclusions: These types of variables are desirable in FCTs that will be accessed by consumers, or used to evaluate consumers' adherence with dietary guidance. Developers and users of FCTs should ensure that their tables align with the latest developments in consumer guidance.

Recent Trends in Ready-To-Eat Breakfast Cereals in the U.S.

Robin Thomas, USDA-ARS-Nutrient-Data Laboratory; Pamela Pehrsson, USDA-ARS-Nutrient-Data Laboratory

Objective: Data in the USDA National Nutrient Database for Standard Reference (SR) were examined to discern trends in ready-to-eat breakfast cereals resulting from manufacturers' reformulations, many in response to public health concerns and consumer demand.

Materials and Methods: The majority of the nutrient data for breakfast cereals in SR are supplied by manufacturers (Kellogg's, General Mills, Quaker, Post). Data for Kellogg's and General Mills ready-to-eat cereals within SR were examined, as those brands represent 62% of the U.S. market. Mean values for total sugar, total dietary fiber, and sodium were calculated for that subset of breakfast cereals within SR releases 18 (2005) through 24 (2011). Values from SR18 (n=120) were compared to those from SR24 (n=151) using unpaired Student's *t*-tests.

Results: Sugar levels fell from 27.5 to 24.8 g and sodium from 511 to 438 mg, a reduction of 10% and 14% ($p < .05$), respectively. Fiber levels rose from 7.1 to 9.4 g, a 32% increase ($p < .05$). Changes were more pronounced starting with SR20 (2007). Newer ingredients contributing to the increased fiber levels include corn bran and oat fiber. More emphasis is being placed on whole grain, with that term used in the ingredients of 78% of cereals

examined in SR24. Chocolate or cocoa, cinnamon, and berries are featured more prominently in cereals.

Significance: Examination of recent trends in this popular breakfast category demonstrates positive changes in their nutrient composition which may have an important impact on public health.

Updates to the NHANES Dietary Supplement Data

Jaime Gahche, Centers for Disease Control and Prevention; Melissa Dimeler, Centers for Disease Control and Prevention; Vicki Burt, Centers for Disease Control and Prevention; Karen Andrews, USDA/ARS; Janet Roseland, USDA/ARS; Joanne Holden, USDA-ARS-Nutrient-Data Laboratory; Johanna Dwyer, Office of Dietary Supplements, NIH; Regan Bailey, NIH Office of Dietary Supplements; Leila Saldanha, NIH Office of Dietary Supplements; Constance Hardy, FDA/CFSAN

Background: With over half of the U.S. adult population taking one or more dietary supplements (DS), it is critical to continue to monitor usage patterns and maintain databases that include information on the nutrients and amounts contained in these products. Objective: To present information on the data collected and available on DS from the National Health and Nutrition Examination Survey (NHANES).

Description: The NHANES is a continuous survey of about 5000 people per year from 15 communities conducted to monitor the health and nutritional status of the U.S. population. Information is collected from participants on their use of DS through a 30-day frequency interviewer-administered questionnaire and two 24-hour dietary recall interviewers (the first in-person and the second over the phone). The labels of the products reported by participants are then obtained from sources such as the manufacturer or company websites and the information from these labels recorded in the NHANES DS database. Participants' data and product information is released publicly on the NHANES website in 2-year cycles.

Conclusion: Collecting data on the use of DS is a critical element in the national nutrition surveillance of the U.S. population. NHANES provides data for researchers to estimate intake of nutrients contributed by DS and total nutrient intake from foods and DS. It also enables researchers to examine associations between nutrient intake and health status indicators, to compare intakes with specific nutritional biomarkers, to assess the types of products consumed and the reasons why these products are being taken.

Potential for Food and Nutrient Databases and Dietary Survey Data to Aid in Foodborne Illness Outbreak Investigations

Mercedes Estrada; University of Minnesota; Lisa Harnack; University of Minnesota; Craig Hedberg; University of Minnesota

Background: Existing food and nutrient databases and dietary survey data have the potential to improve the efficiency and effectiveness of foodborne illness outbreak investigations.

Objectives: 1.) Describe ways in which existing food and nutrient databases and dietary survey data may be useful in outbreak investigations; and 2.) Discuss modifications that may be required to optimize their use for this purpose.

Description: Gathering information about foods consumed by ill (cases) and non-ill (controls) individuals and during the relevant period of exposure is frequently a rate-limiting step of outbreak investigations. Currently this is conducted in the absence of a food database that would allow for rapid coding of foods consumed and identification of ingredients in foods (e.g. identifying foods that contain peanut butter). Existing food and nutrient databases could therefore be useful in coding foods consumed for identification of foods and food ingredients common to the diets of cases. In addition, existing dietary survey data on the frequency of consumption of various foods in the population can provide a ready basis to determine if specific foods are reported more frequently by cases (those with illness) than would be expected. This type of comparison could greatly reduce the time and expense involved in gathering control data.

Conclusion: Existing food and nutrient databases and dietary survey data may be useful to epidemiologists conducting foodborne illness outbreak investigations, although some modifications may be required to adapt their use for this purpose.

Assessment of Nutritional Intake during Space Flight and Space Flight Analogs

Barbara Rice, Enterprise Advisory Services, Inc.; Holly Dlouhy, Enterprise Advisory Services, Inc.; Sara Zwart, Universities Space Research Association; Scott Smith, NASA Johnson Space Center

Background: Maintaining adequate nutrient intake in microgravity is important not only to meet health maintenance needs of astronauts but also to help counteract the negative effects of space flight. Beyond this, food provides psychosocial benefits throughout a mission.

Objective: The purpose of this presentation is to discuss dietary intake data from multiple space programs, including the Space Shuttle and the International Space Station.

Description: These data arise from medical monitoring of both dietary intake and crew health, as well as research protocols designed to assess the role of diet in counteracting bone loss and other health concerns. Ground-based studies are conducted to better understand some of the negative issues related to space flight. Examples of these analog studies are extended bed rest studies, vitamin D supplementation studies in Antarctica, and saturation diving missions on the floor of the ocean. Methods and findings will be presented describing the use of weighed records, diet diaries, and food frequency questionnaires in these various environments. Provision of food and nutrients in spaceflight is important for many body systems including cardiovascular, musculoskeletal, endocrine, immune, and others. Some key areas of concern are loss of body mass, bone and muscle loss, radiation exposure, nutrient intakes during spacewalks, depletion of nutrient stores, and inadequate dietary intake. Initial experimental research studies using food and nutrition as a countermeasure to aid in mitigating these concerns are underway.

Conclusion: Beyond their importance for the few individuals leaving the planet, these studies have significant implications for those remaining on Earth.

SESSION 2: CONSIDERATIONS IN DYNAMIC CONSTRUCTION, ADMINISTRATION AND MANAGEMENT OF DATABASES

Food Composition Databases – needs, new opportunities and international collaboration

U. Ruth Charrondiere, Food and Agriculture Organization of the United Nations (FAO), Rome; Barbara Burlingame, FAO, Rome

Background: The world is facing problems related to obesity, food insecurity, micro-nutrient deficiencies and a high consumption of supplements. Appropriate data on food consumption and composition, including on supplements, are needed to evaluate and improve the situation.

Objective: To indicate how existing food composition databases could be improved and how users could be enabled to utilize them more efficiently for their different purposes.

Description: Researchers or compilers often need to supplement existing food composition databases (FCDB) because they are not available, need knowledge, guidelines and tools to generate, compile and use food composition data correctly. INFOODS/FAO have produced many products free-of-charge, available at http://www.fao.org/infoods/index_en.stm, that can assist them: databases (e.g. on biodiversity including phytochemicals, density database), guidelines (e.g. on food matching, component identifiers, evaluating data), or tools (e.g. Compilation Tool, a FCDB management system in Excel, for standardized compilation and documentation), or a distance leaning tool (The Food Composition Study Guide to improve knowledge or to teach food composition at universities). However, more analytical data are needed on the composition of foods, especially of food biodiversity, processed foods, and supplements enabling estimating nutrient intakes closer to real intakes, especially for those population groups close to or above toxic levels of intake.

Conclusion: If more data on food biodiversity and phytochemicals were included in FCDBs, more consumers might be inspired to fulfill their needs with foods, leading to decreased need for fortification and supplements. The agricultural sector might become motivated to produce more nutritious, delicious and affordable products.

Sources of Variability in the Flavonoid content of Foods

David Haytowitz, USDA-ARS-Nutrient-Data Laboratory; Seema Bhagwat, USDA-ARS-Nutrient-Data Laboratory; Joanne Holden, USDA-ARS-Nutrient-Data Laboratory;, Marlon Daniel, USDA-ARS-Nutrient-Data Laboratory

In 2011, USDA prepared Release 3 of the “USDA Database for the Flavonoid Content of Selected Foods”, which contained data on 500 food items collected from 299 published sources. Flavonoids are secondary metabolites produced by plants in response to various environmental stresses such as climate and ultraviolet radiation. Other sources of variability include cultivar, growing location, agricultural practices, processing techniques and preparation methods, as well as analytical variability. The objective of this talk is to examine and report on variability in the flavonoid content of foods. While the required information needed to assess variability is not available for all foods, data for a number of foods will be

analyzed using analysis of variance for cultivar, location and other factors. For raw orange juice, data for 247 samples representing 109 mean values, i.e. different cultivars, location and year were analyzed. The overall range for hesperetin was 1-39mg/100g; samples from the United States 5-20mg/100g; samples from Brazil 5-25mg/100g; and samples from Corsica (France) 12-26mg/100g. The range of quercetin values in raw yellow onions is 0-91mg/100g, and represents 96 mean values for 402 samples from the U.S., Japan, Spain, and other countries. To assess variability in the flavonoid values, the food description should include information about factors such as cultivar names, locations or seasons that may affect flavonoid synthesis. NDL will be releasing a table containing the individual data used to calculate the means in the USDA database later this year.

ARS, USDA updates food sampling strategies to keep pace with demographic shifts

Pamela Pehrsson, USDA-ARS-Nutrient-Data Laboratory; Charles Perry, USDA-ARS-Nutrient Data Lab; Marlon Daniel, USDA-ARS-Nutrient Data Lab

The Nutrient Data Laboratory, USDA implemented the National Food and Nutrient Analysis Program (NFNAP) in 1997. The goal of this program is to obtain nationally representative estimates of nutritional components of important foods consumed in the U.S. for inclusion in the USDA National Nutrient Databank System; to date, analytical food composition data generated for over 1700 foods have vastly improved overall data quality in the database. The NFNAP sampling approach was updated in 2001 using 2000 U.S. Census data and recently updated to use 2010 Census population estimates. This design, like previous iterations, employs a three-stage, stratified, probability-proportional-to-size (PPS) sample selection process; 1) county selection (based on population density); 2) supermarket outlets within selected counties (based on annual sales); and 3) specific brands of foods (based on market share data). In the first stage, Census regions (4), divisions and states were used to obtain a self-weighting sample of population centers, ensuring geographic dispersion across the 48 conterminous states; 72 locations were selected, with nested subsets of 48, 24 and 12 locations. Due to demographic changes in the population and congressional redistricting, it was necessary to revise the sampling scheme to reflect these changes. With the increased penetration of warehouse-type retail outlets into the grocery industry, the sampling frame was adjusted to include these purchase locations. Food samples which are collected nationally according to a statistically rigorous sampling approach are consistent with national representativeness and allow better estimates of the mean and variability than convenience sampling or less rigorous options.

USDA Monitors Levels of Added Sodium in Processed and Prepared Foods

Joanne Holden, USDA-ARS-Nutrient-Data Laboratory; Pamela Pehrsson, USDA-ARS-Nutrient-Data Laboratory; Melissa Nickle, USDA-ARS-Nutrient-Data Laboratory; David Haytowitz, USDA-ARS-Nutrient-Data Laboratory; Jacob Exler, USDA-ARS-Nutrient-Data Laboratory; Bethany Showell, USDA-ARS-Nutrient-Data Laboratory; Juhi Williams, USDA-ARS-Nutrient-Data Laboratory; Robin Thomas, USDA-ARS-Nutrient-Data Laboratory; Linda Lemar, USDA-ARS-Nutrient-Data Laboratory (Ret.); Susan Gebhardt, USDA-ARS-Nutrient-Data Laboratory (Ret.)

Objective: To provide a progress report for efforts by the Nutrient Data Laboratory (NDL) to monitor sodium in processed and prepared foods frequently consumed by the U.S. population.

Methods: Recent concerns by the US public health community about the intake of sodium by Americans have led ARS, USDA to develop a plan to monitor the levels of sodium in highly consumed prepared and processed foods. NDL scientists worked with FSRG to identify highly consumed multi-component processed foods which fell into each of the categories. For each food (e.g., cheese pizza) NDL used market share data to identify the predominant brands and types of foods (e.g., frozen cheese pizza, restaurant pizza) to be monitored for changes in the sodium level over time. Periodically, nutrient values for frequently consumed foods will be updated by chemical analysis or label checks. Estimates will be compared to existing values in the National Nutrient Database for Standard Reference (SR).

Results: Since 2010 about 140 foods have been sampled and analyzed by NDL contractors. NDL will continue to generate new sodium data which will be disseminated in the successive releases of the SR. Accurate and current data for sodium in processed foods will support the assessment of changes in amounts of sodium as well as the assessment of sodium intake by the U.S. population in the years ahead.

Monitoring Sodium in Sentinal Foods

Alanna J Moshfegh, Joseph D Goldman, Jaspreet K Ahuja, Deirdra N Chester, M Katherine Hoy, Carrie L Martin, Donna G Rhodes

Changes in the food supply and marketplace have always been a challenge for keeping databases up-to-date but no more so than today with food companies efforts in gradually reducing the sodium content of their products. This presentation will explain the strategy developed by the Food Surveys Research Group in collaboration with the Nutrient Data Laboratory to identify a list of more than 100 Sentinel Foods for monitoring changes in sodium. The list of foods was determined through careful examination of the foods in the food supply, evaluation of the most recent sodium levels in foods which contribute significant amounts of sodium to the diet through sodium content and/or frequency of consumption, impact of food from commercial food establishment, and consideration of possible reductions as part of the national trend on the part of the food industry to reduce sodium in commercial, multi-ingredient foods. Data sources used include WWEIA, NHANES 2007-2008, the Food and Nutrient Database for Dietary Studies 4.1 (FNDDS), and the National Nutrient Database for Standard Reference 22 (SR). Although the analytical focus for sodium will be the list of Sentinal Foods, the approximately 3000 foods from SR that support the over 7000 foods used in the FNDDS are also being monitored for sodium changes.

Methods for Calculating Dietary Energy Density in a Nationally Representative Sample

Jacqueline Vernarelli, The Pennsylvania State University; Diane C. Mitchell, The Pennsylvania State University; Barbara J. Rolls, The Pennsylvania State University; Terryl J. Hartman, The Pennsylvania State University

Background: There has been a growing interest in examining dietary energy density (ED, kcal/g) as a risk factor for obesity and other diseases. Maintaining a diet low in ED has been recommended in the 2010 Dietary Guidelines, as well as by other agencies, as a method of disease prevention. Translating this recommendation into practice, however, is difficult. Currently there is no standardized method for calculating dietary ED. National survey data is an excellent resource for evaluating factors that are important to dietary ED calculation.

Objective: The objective of this study is to provide information that will inform the selection of a standardized ED calculation method by comparing and contrasting methods for ED calculation.

Description: Dietary ED can be calculated with foods, beverages, or a combination. The NHANES nutrient and food database does not include an ED variable, thus researchers must independently calculate ED. The majority of studies calculate dietary ED using foods only; however, even this method is not standardized. Certain items may be defined as either a food or a beverage (i.e.: meal replacement shakes) and require special attention. The present study evaluates all consumed items and defines foods and beverages based on both USDA food codes and how the item was consumed. Results are presented as mean EDs for the different calculation methods stratified by population demographics (e.g. age, sex).

Conclusion: Using USDA food codes in the NHANES, a standardized method for calculating dietary ED can be derived. This method can then be universally used by future researchers.

Partners in Food Solutions – A technology transfer initiative and need for developing a nutrient database to help produce quality nutritious foods in Africa.

Indra Mehrotra, MS, RD; Rose Toblemann, MS, RD; Sally Schakel, RD

In order to alleviate poverty and food insecurity for the people of Africa, a key component of development strategy is to help Africa build a stronger, more sustainable food supply chain and a more secure future in the process. This presentation will describe the concept of technical philanthropy in Africa that informed the formation of Partners in Food solution (PFS), a nonprofit organization that was founded by General Mills in 2009, and was joined by Cargill and DSM as new corporate partners in 2011. PFS leverages knowledge, skills and technical expertise of food and nutrition scientists, engineers, and other experts in their organization to build in-country expertise in Africa. It links the expertise of volunteer employees to small- and medium-sized food processors (SME). The goal is to improve ability of these companies that receive volunteer based technology assistance to produce high-quality, nutritious, and safe food at affordable prices, and to increase demand for the crops of small-holder farmers who supply commodities to these companies.

As this project began to grow, the need for a nutrient database became apparent. Formulation work is being done in the US and rather than investing in nutrient analysis of test product, it is more cost efficient to calculate nutrient content of the products before finalizing formulas. Coupled with the need for nutrient calculations is the need for data resources. Although there are many international nutrient databases, it is a challenge to find nutrient composition data for locally grown raw agricultural ingredients from Africa. Volunteer database experts have been combing these external databases and scientific literature to populate the already large General Mills nutrient database system. However, the challenge of finding appropriate data sources continues as this project expands.

SESSION 3: NEW DEVELOPMENTS

"Cloud Computing, Accelerating information-Driven Healthcare that Improves Health and Accelerates Innovation"

Jamie Coffin, Ph.D. Dell Healthcare and Life Sciences

James Coffin, Ph.D., Vice President and General Manager of Dell Healthcare and Life Sciences, discusses how information technology and new computing models, like cloud computing, can support database management, improve collaboration between medical professionals, researchers and industry and empower consumers in the management of their health and wellness.

Legibility of Nutrition Facts Panel and Ingredient Statement Images Captured using the Apple iPad 2

Denise King, University of Minnesota; Ellen Swiontkowski, Amherst College; Janet Pettit, University of Minnesota; Jennifer Stevenson, University of Minnesota; Lisa Harnack, University of Minnesota

Objective: A qualitative evaluation of several hand held electronic devices was conducted to identify one that might be feasible for capturing legible images of nutrition facts panel and ingredient statement information on brand name foods. The Apple iPad 2 was identified as most promising, and was evaluated quantitatively.

Methods: A sampling of brand name products (n=100) from four categories (candies, salad dressings, frozen entrees, and frozen pizzas) was conducted in a supermarket. Using an iPad pictures were taken of the nutrition facts panel and ingredient statement for each sampled product. The legibility of the images was rated on a scale of 1 to 4. A score of 1 was assigned when all the text was visible and easily legible whereas a 4 was assigned when some of the text was missing or illegible.

Results: Most of the nutrition facts panel (89%) and ingredient statement (73%) images received a legibility rating of 1 or 2. None of the nutrition facts panel and 7% of the ingredient statement images received a score of 4. Legibility ratings were lower for candies, probably due to product packaging characteristics (majority were in flexible plastic packaging).

Significance: The iPad 2 may be a valuable tool for nutrient database developers who must gather nutrition facts panel and ingredient statement information for brand name foods through supermarket visits. Using this device the process of gathering this information may be expedited, thus aiding in keeping pace with a large and dynamic food marketplace.

Digital food photography: dietary surveillance and beyond

Noemi Islam, Baylor College of Medicine; Hafza Dadabhoy, Baylor College of Medicine; Adam Gillum, Baylor College of Medicine; Tom Baranowski, Baylor College of Medicine; Janice Baranowski, Baylor College of Medicine; Thea Zimmerman, Westat; Amy Subar, National Cancer Institute

Background: The development of computerized dietary assessment methods has prompted researchers to consider graphic user interface elements that facilitate self-reporting. Digital imaging has the potential to be an important component in achieving that goal.

Objective: To describe the evolution of a database of almost 20,000 digital portion size images linked to the USDA's Food and Nutrient Database of Dietary Studies (FNDDS), and document its use in dietary assessment, research, and education.

Description: In 2002, the Children's Nutrition Research Center of Baylor College of Medicine began creating a database of portion size images to aid children in estimating fruit and vegetable intakes. This led to the development of the Food Intake Reporting Software System (FIRSSt), a self-administered 24-hour dietary recall for children that required the expansion of the portion size image database to include all foods. In 2006, a grant was funded to further develop FIRSSt, leading to a collaboration with the National Cancer Institute that included providing portion size images for the Automated Self-Administered 24 Hour Dietary Recall (ASA24), a web-based application designed for adults. This resulted in further expansion of the image database, as both ASA24 and FIRSSt depend on images to aid respondents in estimating portions consumed. More recently, other researchers have requested and used these images in video games for diabetic children, image analysis, and behavioral research.
Conclusion: In addition to utility for self-reported portion size, food images can be used as a validation/calibration tool, and for educating consumers about serving size and healthy eating.

Unique considerations in modifying food composition databases for image-based dietary assessment methods running on small mobile devices

Carol Boushey, University of Hawaii Cancer Center; TusaRebecca Schap, Purdue University; Deborah Kerr, Curtin University; Heather Eicher-Miller, Purdue University; Nitin Khanna, Purdue University; Ziad Ahmed, Purdue University; Edward Delp, Purdue University

Background: The mobile telephone food record (mpFR) application is an image-based dietary assessment method designed to reduce the burden and human error associated with conventional methods. Users take images of foods and beverages at eating occasions using the mpFR. Image analysis allows for automated food identification. The user provides the final confirmation of foods and beverages identified by the automated system. This confirmation step is important since an automated system would need a method to identify new foods (new to the system or new to market), correct foods that are misclassified, and distinguish items (e.g., regular or diet soda).

Objective: Modify FNDDS to accommodate the small screen size available on a mobile telephone.

Description: Eating events have about 6 items and each need to be tagged. To insure that tags are visible on the screen, labels are 15 characters or less. Once a tag is selected, the user sees a list of foods with brief descriptions. From the list, the user selects “correct” or “replace” with a variation of the food, e.g., regular or diet. This step is similar to probes used in dietary recalls. Developers need to be aware that FNDDS is no longer providing short descriptions. Scrolling through long lists is cumbersome on a mobile telephone, therefore work to identify most frequently reported foods using NHANES has aided in shortening the list of foods.

Conclusion: As technology assisted dietary assessment methods continue to evolve, developers of technology-based methods need to appreciate that the USDA food composition databases will likely need unique modifications.

SESSION 4: NEW DATABASES

Bioactive Food Component Databases: Opportunities and Challenges

John Milner, PhD, National Cancer Institute, NIH Coordinator of the National Food and Nutrition Analysis Program (NFNAP)

Future directions of the USDA-ARS National Nutrient Data: outcomes from a stakeholders' workshop

John Finley, USDA; Joanne Holden, USDA-ARS-Nutrient-Data Laboratory

Background: A USDA-ARS workshop attended by stakeholders of the Nutrient Data Lab (October 12-13, Beltsville, MD) discussed future directions of the food composition database. USDA funding for the database in actual dollars has remained flat for many years leading to a real decline in support. At the same time the data has seen many uses for which it was not originally designed, resulting in increased demand for more and new types of data.

Objective: The objective of the workshop was to develop plans and ideas for the future that would allow the program to provide data for the most critical uses within the constraints of budgets.

Description: Primary users of the database were unanimous in agreement that the database is an invaluable tool for multiple federal agencies, universities and private enterprises and that present functionality cannot be lost. However, all also agreed that many gaps need to be addressed, the primary ones being the inclusion of retail data and more bioactive compounds. It was agreed that the emerging field of 'omic technologies offers the promise of more data at less cost, however the technologies are not sufficiently mature or validated at this time. It was urged that preliminary work be done to explore these technologies.

Conclusion: The USDA-ARS nutrient database is an international resource that must be maintained. Obtaining adequate long-term support for continued functionality as well as any potential enhancements to the database was seen as the primary obstacle that must be overcome.

Databases for the Future: Where Technology Can Take Us.

James Harnly, USDA

Advances in technology will make it possible to dramatically increase the information content of future databases. Inclusion of taxonomic, genetic, and metabolomic data will allow ready identification of commodities and processed foods and access to nutrient and secondary metabolite content. Taxonomic data has always been available but seldom included in databases. DNA sequencing is now dramatically cheaper and the use of accepted short base sequences (a bar code) for genus, species, and sub-species identification is becoming common practice. This will allow absolute identification of commodities despite sometimes indistinguishable appearances. Use of ultra-high performance liquid chromatography and high resolution mass spectrometry will provide full

characterization of the chemical composition of any food and will allow processed foods to be evaluated for changes based on pattern recognition. Characteristic chromatographic and spectral profiles (e.g. MS, IR, NIR, NMR, and/or UV) can be stored due to advances in computer technology. An interesting ramification of this information is the realization that there is considerable difference in composition of plant foods with respect to individual plants, season, geography, and processing. The high throughput nature of these methods will allow changes in content of processed foods to be closely monitored. As a result, the public will have more complete information about the food they are eating and, ideally, this information will permit farmers to select crops based on nutritional information and not just cost, yield, and growing time.

U.S. Dietary Supplement Ingredient Database (DSID): Children's Multivitamin/Mineral (MVM) Results Released in DSID-2

Karen Andrews, USDA/ARS; Janet Roseland, USDA/ARS; Joanne Holden, USDA-ARS-Nutrient-Data Laboratory; Angela Middleton, USDA/ARS; Ashley Solomon, USDA/ARS; Larry Douglass, Consulting Statistician; Johanna Dwyer, NIH Office of Dietary Supplements; Regan Bailey, NIH Office of Dietary Supplements; Leila Saldanha, NIH Office of Dietary Supplements; Marlon Daniel, USDA-ARS-Nutrient-Data Laboratory

Materials & Methods: The Nutrient Data Laboratory (NDL) identified representative children's MVMs using national surveys and market data. Sixty-five products were purchased in specific market channels in 6 geographic regions, using a statistical sampling plan. Multiple lots per product were analyzed using validated laboratory methods. Analytical results were compared to labeled levels. Statistical regression techniques were used to predict mean values and standard errors for a range of labeled levels. Data estimates were linked to children's MVMs reported in the National Health and Examination Survey (NHANES). Results are available in the recent DSID-2 release at http://dietarysupplementdatabase.usda.nih.gov.

Results: At the most common labeled level for each nutrient, mean differences from label were 1 to <10% for eight nutrients (zinc, phosphorus, iron, magnesium, copper, vitamin B-6, niacin, riboflavin). Five nutrients (thiamin, folic acid, vitamin B-12, manganese, and calcium) had a mean % difference from label of 10 to <20%. Iodine and vitamins A and E averaged 20 to <30% above label, while vitamin D averaged >30% above label.

Significance: NDL at USDA and the Office of Dietary Supplements (ODS) at NIH are collaborating to develop and maintain the Dietary Supplement Ingredient Database, an analytically derived database of representative ingredient values for dietary supplements. DSID-2 data can be applied to dietary assessments to more accurately quantify nutrient intake.

Funding Disclosure: This research was funded by USDA and Office of Dietary Supplements at National Institutes of Health, Interagency agreement ODS/NIH Y1CN501006

A Robust Nutrient Database is an Essential Ingredient for Product Development

LuAnne Waran, Annette Olson, General Mills; Meredith Foley, General Mills; Christine Wold, General Mills; Erin Smieja, General Mills; Becky Gustafson, General Mills

Background: Product development in a health-oriented food company requires frequent formula reiterations. This experimentation includes not only new products but reformulations of current products to meet increasing demands for healthier foods, i.e., lower sodium. In this process it is important to understand new ingredients as well as assuring accuracy of current ingredients.

Objective: To better understand the food product development lifecycle and multiple factors involved in the nutrient content of product reformulations.

Description: A centrally maintained nutrient ingredient database is utilized by different functional groups (R&D and Labeling) to develop nutrition labels for experimental purposes as well as final package labels. Key product health attributes are often determined from experimental labels. A well-planned and efficient analytical maintenance plan for the ingredient nutrient database is crucial to support these claims. Many factors must be considered when maintaining the ingredient nutrient database supporting nutrition label values and claims for food products.

Conclusion: The nutrient ingredient database becomes a tool for the product developer to use in real time versus waiting for analytical lab results to estimate nutrient content of an experimental formula version. The key ingredient of these formula changes is a valid nutrient database to assure meeting market expectations and compliance with regulatory requirements.

SESSION 5: CHARACTERIZING DIETS ACROSS THE FOOD STREAM

Multi-level Dietary Analyses Require Comprehensive, Standardized Data

Jill Reedy, National Cancer Institute

Dietary intake occurs within the context of a broader food environment. It is important to be able to characterize the entire flow of foods throughout the food stream, from the US food supply to manufacturers, grocery stores and outlets, households, and finally to the consumer. Examining diets, food offerings, and food supplies at these various levels requires databases that reflect the particular forms of food at each level (raw, processed, or prepared, and read-to-eat). Furthermore, interpreting diets in relation to dietary recommendations requires databases that provide information on the key dietary components of concern. Available databases for addressing these issues across multiple levels are variable in their breadth of coverage and their data quality. This session will present a framework for the food stream, and introduce the databases available at each level, describe their strengths and limitations, and identify data gaps.

Foods and Nutrients in the National Food Supply

Jean Buzby, Economic Research Service, USDA

The ERS Food Availability (per capita) Data System includes three distinct but related data series on food and nutrients available for consumption in the U.S. food supply. The data system can be accessed for free at http://www.ers.usda.gov/Data/FoodConsumption/ The Food Availability data series is the foundation for the two other data series in the system and includes data on several hundred commodities, such as fresh spinach, eggs, and chicken. It provides estimates of per capita availability (e.g., pounds of beef available for domestic consumption per capita per year). The second data series, the Loss-Adjusted Food Availability data, is produced by ERS and adjusts the per capita Food Availability data for food spoilage and other losses to more closely approximate actual per capita intake. This series provides two key per capita estimates for each commodity: the number of calories per day and the number of MyPyramid equivalents per day. For example, users can obtain loss-adjusted pounds of beef available for domestic consumption per capita per year. The third data series, the Nutrient Availability data, is computed by USDA's Centers for Nutrition Policy and Promotion. This data series provides estimates of the total amounts available per capita per day of calories and 27 nutrients and dietary components (e.g., carbohydrates, protein, and fatty acids) in the U.S. food supply each year from 1909 through 2006. This data series also provides estimates of nutrients and dietary components contributed per capita per day from the major food groups for two individual years--1970 and 2004.

Addressing Gaps in Market Level Databases

Shu Wen Ng, University of North Carolina at Chapel Hill

There is currently a research gap in efforts to monitor and measure the foods and nutrients sold or bought in the US. This presentation will review available commercial data sources that collect information about foods sold or purchased in the US, measures of the nutritional content of these foods, and the socio-demographic conditions under which food purchases are made. It

will discuss some of the existing opportunities and challenges with monitoring sales/purchases of Consumer Packaged Goods (CPG) products, random-weight products (e.g., fresh produce, meats, deli cuts), and away-from-home foods. In particular, there are complex and overlapping sets of measurements from commercial vendors that allow for assessment of rapid shifts in the packaged food sector at the market, household and individual levels, but these data sources vary in their coverage, depth and linkability. The presentation will include options for ways in which to combine data on food purchase/sales, nutrition facts panel labels, industrial ingredients, and food composition to result in a more comprehensive measurement of the types, amounts, prices, locations and nutrient composition of foods. Moreover, it will discuss how additional data and collaboration from industry could aid efforts to better characterize the food and nutrient choices available to US consumers.

Databases for Characterizing Foods in the 'As Eaten' Form

Elizabeth Condon, Mathematica Policy Research

Background: Most available databases that provide nutrient and guidance-based food group data for foods in the 'as eaten' form are designed for assessing food intakes by individuals.

Objective: To describe features of available databases that can be used to characterize foods in the 'as eaten' form and identify gaps in available data.

Description: Existing databases are designed primarily to characterize food intakes by individuals and provide nutrient and guidance-based food group data for foods in the 'as eaten' form. These databases can also be used to characterize food offerings from outlets such as fast food and other restaurants, schools, worksites, and USDA nutrition assistance programs. Using existing databases for special populations or purposes other than assessing individual-level intake can be challenging. Reported foods may differ considerably in nutrient and ingredient content from foods available in the databases. In addition, yield factors may need to be applied to foods that are reported in raw, dry, or unprepared forms to represent the amount of food available for consumption. Currently, there is no single data source that provides yield factors for all types of foods.

Conclusion: The ability to characterize diets of individuals and food offerings available in different settings and programs is limited by the foods included in existing databases. There is a need to expand currently available databases to include a broader range of foods, including more foods from restaurants. There is also a need for a database with yield factors for transforming foods to the 'as eaten' form.

SESSION 6: INITIATIVES EMPOWERING CONSUMERS

SuperTracker Incorporates Food Composition Data into Innovative Online Consumer Tool

Trish Britten, USDA

Background: The SuperTracker online dietary and physical activity assessment tool is a major outreach effort to encourage behavior change and help implement the 2010 Dietary Guidelines.

Objective: To provide a user-friendly but powerful interface to help individuals enter food intake, compare it to nutrient goals and the USDA Food Patterns, and track intake over time.

Description: At its core, the SuperTracker relies on a food database adapted from ARS's Food and Nutrient Database for Dietary Surveys (FNDDS) and MyPyramid Equivalents Database (MPED). Modifications and additions increase the databases' convenience for users: Food names were simplified and in some cases, additional names were assigned; portions and portion descriptions were modified; and MPED values were assigned for foods new to FNDDS 2007-08, to assure that these newer foods were included. SuperTracker is multifunctional, allowing for tiered levels of involvement by users, from looking up a single food to comprehensive dietary and physical activity assessment, goal setting, and planning over time. Features include creation of individualized "combos" and favorite foods, to simplify entry of items consumed often. It provides real-time interactive feedback to users, and offers multiple report options to meet varied users needs. The SuperTracker relies on data from FNDDS and MPED to provide accurate feedback, which enables users to take control of their dietary choices. Monitoring food intake can help individuals become more aware of and improve what they eat and drink.

Conclusion: The SuperTracker can empower consumers to track their food intake and activity, in order to improve their health.

Campbell Soup Company Initiatives Impacting Nutrition Databases

Trish Zecca, Campbell Soup

Objective: To describe Campbell's wellness initiatives and how they may affect food composition databases.
Description: Campbell's has been systematically reducing sodium across our portfolio of products for more than 40 years; however nutrition databases may not accurately reflect the sodium content of current products in the marketplace. This presentation will provide a brief overview of: 1) Campbell's sodium reduction journey & other wellness initiatives, and 2) Issues related to the accuracy, access and impact of the use of nutrient databases.

Conclusion: The use of dated databases may over-represent consumption of sodium and other nutrients to limit from certain foods and lead to unnecessary or overly restrictive recommendations for action and public policy.

SESSION 7: REGULATORY ISSUES INVOLVING DATABASES THAT HAVE IMPACTS ON INDUSTRY AND CONSUMERS

Nutrient Databases: Critical Tools for Regulation and Policy

Jessica Leighton; Food and Drug Administration

Developing effective national, state or local regulation and policy to promote healthy diets requires (1) an assessment of the problem to determine what regulations or policies should be developed, (2) further analyses to determine the components of the regulation or policy, and (3) ongoing analyses to monitor compliance and impact of the regulations or policies. Nutrient databases provide one of the critical tools needed to conduct these analyses. This session will present examples of how nutrient databases have been and are being used to conceptualize, develop and monitor regulations and policies to support initiatives that address key diet related diseases and conditions such as obesity, heart disease and stroke. The examples to be highlighted include labeling requirements for the Nutrition Facts labels and nutrition labeling in chain restaurants as well as policies for reducing sodium and trans fat intake. This session will also identify improvements in existing databases that could enhance the quality and timeliness of nutrient data to support regulatory and policy efforts.

Innovative Usage of Archival Versions of a Food and Nutrient Database to Track Trends in the Sodium Content of Menus at Leading Fast Food Restaurants

Mayly Thor, University of Minnesota; Janet Pettit, University of Minnesota; Lisa Harnack, University of Minnesota

Objective: Illustrate the use of an existing food and nutrient database to track trends in the sodium content of fast food restaurant menu offerings.

Methods: Using archival and current versions of the University of Minnesota Nutrition Coordinating Center Food and Nutrient Database, a dataset was assembled to examine trends in the sodium content of restaurant menu offerings at eight leading fast food restaurant chains over a 14 year period (1997/1998-2009/2010). Due to the alternating nature of updating menu items and their nutrient composition every other year, trends were examined in seven 2 year intervals (1997/1998, 1999/2000, 2001/2002, 2003/2004, 2005/2006, 2007/2008, 2009/2010).
Results: The mean sodium content of menu items available at the eight restaurants examined increased from 459.0 mg/item (SD 477.1) in 1997/1998 to 592.9 mg/item (SD 582.8) in 2009/2010. Similar upward trends were observed for two of the three menu item categories examined (lunch/dinner entrees and fried potatoes). There appeared to be little change in the mean sodium content of side dishes.

Significance: Existing food and nutrient databases may be useful for monitoring trends in the nutritional quality of foods in the marketplace, thus providing an alternative to creating databases *de novo* for this purpose. There are some limitations in using existing databases for food supply surveillance purposes. For example, updates to some food categories may be sporadic and some food brands of interest may not be included. However, there are numerous benefits, including ready access to retrospective and prospective information on foods in the marketplace.

Estimating Iodine Intake Status in the United States, 2003-2008

WenYen Juan, CFSAN/FDA; Jaspreet Ahuja, USDA/ARS/BHNRC; Katie Egan, US FDA; Jaime Gahche, Centers for Disease Control and Prevention; Paula Trumbo, U S Food and Drug Administration

Objective: To estimate the prevalence of iodine inadequacy based on usual iodine intake distribution from food and dietary supplements for 13 age-gender groups in the U.S. population aged 4 years and older and for pregnant women, and to identify the main food sources of iodine.

Materials and Methods: National estimates of usual iodine intakes from food and from total intake were determined using the National Cancer Institute method. Analytical iodine composition data from the FDA Total Diet Study, adjusted for iodized salt used in cooking, and consumption data from the What We Eat in America, National Health and Nutrition Examination Surveys (WWEIA, NHANES), 2003-2008 were used. The contribution of iodine intake from major food groups was also determined.

Results: The mean daily intakes of iodine from food for the 13 age-gender groups ranged from 217 to 345.3 mcg with the highest found among males, ages 14-18 years; intake by pregnant women was 314.9 mcg. The prevalence of inadequate iodine intake from food was 2.3% and 8.5% among the U.S. population, aged 4 years and older and pregnant women, respectively. The prevalence did not change much when dietary supplements were included. Milk and milk products, bread, and egg were the top food sources for both aged 4 years and older and pregnant women with milk providing about 30% of total iodine from food.

Significance: There is a low prevalence of iodine inadequacy for the U.S. population, including pregnant women. Efforts in monitoring intake and strengthening food composition data are warranted.

Prioritizing Non-Vitamin and Mineral Ingredients (non-VM) in the Dietary Supplement Ingredient Database (DSID)

Leila Saldanha, NIH Office of Dietary Supplements; Johanna Dwyer, Office of Dietary Supplements, NIH; Joanne Holden, USDA-ARS-Nutrient-Data Laboratory; Karen Andrews, USDA/ARS; Regan Bailey, NIH Office of Dietary Supplements; Joseph Betz, NIH Office of Dietary Supplements; Jaime Gahche, Centers for Disease Control and Prevention; Constance Hardy, FDA/CFSAN; Janet Roseland, USDA/ARS

Background: DSID is a federally funded database that contains analytically derived information on the composition of dietary supplements (DS). DSID contains estimates of nutrients in adult and child multi-VM supplements (MVMs). Addition of nutrients in over-the-counter (OTC) prenatal MVMs & omega-3 fatty acid supplements is in-progress.
Objective: To develop a process for prioritizing and selecting non-VM bioactive ingredients for inclusion in DSID.

Description: The DSID ad hoc Federal working group was polled to identify non-VM ingredients of interest. The criteria used to score and rank the 41 non-VM ingredients of interest were existence of studies or safety concerns, public exposure, federal research priorities, and availability of validated analytical methods and analytical reference materials.

Public health significance, previously used to rank VM ingredients, was not scored due to lack of data, so the existence of studies or safety concerns replaced this criterion. Criteria were ranked from 1-5, with 5 as the highest. The top scoring 11 ingredients resulting from this ranking process were: CoQ10, garlic, saw palmetto, ginkgo biloba, glucosamine, ginseng, green tea catechins (EGCG and other catechins), milk thistle, echinacea, flaxseed, and turmeric (curcumin).

Conclusion: Obtaining input from the research community on the non-VM bioactive ingredients selected for analysis and inclusion in DSID, developing strategies for a statistical sampling plan, and deciding on whether and how to report data for constituent levels not declared on the product label, i.e., proprietary formulas. Pending availability of funds.

Evaluating the nutritional content of foods with whole grain labeling

Dunja Sumanac, University of Toronto; Rena Mendelson, Ryerson University; Valerie Tarasuk, University of Toronto

Background: To support adequate fibre and magnesium consumption, it has been recommended that half of the grain products consumed each day be whole grain. In concert with these recommendations, the term 'whole grain' is now increasingly appearing on packaged food products, but manufacturers' use of this term is voluntary and unregulated. The relation between front-of-package whole grain references and the nutritional quality of products is unclear.

Objectives: To assess the nutrient content of products with front-of-package reference to whole grain, using publicly available nutrient content information.

Methods: A random sample of 40 products with whole grain references was drawn from two Toronto supermarkets, and nutrition facts table (NFT) information was recorded. Products were compared to those in the Canadian Nutrient File (CNF), version 2010, in an effort to obtain more nutrient content information than was available on the package.

Results: Only 11 of 40 products could be matched exactly to foods in the CNF. Generic matches were possible for 14 products, but no match was found for 15 products. A comparison of CNF and NFT nutrient data revealed no significant differences for exact product matches, but significant differences in sodium and calcium content for products with generic matches, suggesting imperfect matches.
Significance: Current publicly available nutrition information is insufficient for evaluating the complete nutritional quality of whole grain products. As nutrition guidance evolves to promote whole grain, standardized information on whole grain content and associated nutrients needs to be provided to enable consumers to make better-informed dietary decisions.

SESSION 8: GLOBAL HORIZONS

Towards the European Food Composition Data Interchange Platform

Paul Finglas; Institute of Food Research
Simone Bell; EuroFIR AISBL

Background: Food composition data (FCD) comprises the description and identification of foods, their nutrient and bioactive constituents and properties. There have been differences within and beyond Europe in the way FCD are expressed with respect to food description, nutrient definitions, and the methods used to generate data.

Objectives: (1) To provide tools to overcome existing differences among member states and other countries with respect to documentation, quality and interchange of food composition data; and (2) to develop and test a comprehensive and accessible food databank platform that provides a single, authoritative source of FCD in Europe enabling to interchange and update data between countries, and also give better access to users. Description: The establishment of the CEN's (European Committee for Standardisation) TC 387 project committee on Food Composition Data, and the preparation of the Food Data Standard has addressed these deficiencies by enabling unambiguous identification and description of food composition data and their quality (e.g. databases), for dissemination and data interchange. This provided a key step in the implementation of FCD interchange using decentralised computer systems instead of traditional data-centre models. Conclusion: The harmonisation of food description using the LanguaL and other thesauri and data documentation and quality has laid the foundations for greater integration and exchange of FCD in Europe. Closer integration of FCD with food consumption data will be a major goal in order to improve nutrition and public health research in Europe. Funding acknowledgements: EU FP6 (CT-2005-513944) and further extended under EU FP7 (GA No 265967).

US, Canadian, and Australian datasets seen through foreign eyes

Jayne Ireland, Danish Food Information; Anders Møller, Danish Food Information

Background: Food composition databases (FCDBs) include information referring to the description and identification of foods and their nutrient composition. However, different databases may present data in different formats and with different levels of documentation. Presentations cover a wide range of technical solutions and layouts, so it is often difficult to compare values between data sets or import data using a standard procedure.

Objective: The objective of this paper is to analyze three major online English-language FCDBs – USA, Canada and Australia - from the point of view of advanced users (e.g. foreign FCDB compilers).
Description: In order to standardize food composition work in Europe, EuroFIR (http://www.eurofir.info) created a common standard, whereby national and specialized FCDBs can present data and metadata in a uniform way. Data from these three online FCDBs were downloaded and transformed according to EuroFIR specifications, using the documentation provided on the respective websites. Correspondence tables were created to link national documentation (e.g. USDA Source Code, Derivation Code) with EuroFIR thesauri (e.g. Acquisition Type, Method Type). Recommendations for improvement of data

documentation in the 3 databases and an example of merging data from these different sources on the EuroFIR eSearch platform will be presented.

Conclusion: Despite their different levels of documentation, the data in the 3 major online FCDBs can be compared and interchanged with only little loss in information when presented in a uniform format. This demonstrates the benefits of using standardized systems for linking and describing food composition data.

Limitations of food composition databases and nutrition surveys for evaluating food fortification in the US and Canada

Jocelyn Sacco, University of Toronto; Valerie Tarasuk, University of Toronto

Background: With widespread supplement use and a growing market for fortified food products, it is becoming increasingly important to monitor risks of excessive nutrient intakes in the population. However, neither Canadian nor US nutrient composition databases systematically differentiate between naturally occurring nutrients and those added to foods, and the consumption of foods with added nutrients is not always assessed in dietary data collection.

Objective: To describe limitations in the Canadian Community Health Survey (CCHS 2004) and National Health and Nutrition Examination Survey (NHANES 2007-08) for the assessment of nutrient intakes from fortified foods and the evaluation of food fortification policies.

Description: Working with FNDDS 4.1, we identified voluntarily fortified foods by food code names containing certain key words (e.g. 'fortified') and the presence of three nutrients for which additions were tracked in the database. This strategy is likely to have resulted in an underestimation of voluntarily fortified food consumption and thus an underestimation of the probability of excessive intakes in the US population. Our efforts to model proposed policy changes to food fortification in Canada were similarly limited by our inability to differentiate added sources of niacin and retinol in CCHS 2004. This thwarted the assessment of risks associated with additional fortification because the Tolerable Upper Intake Levels only apply to retinol and added sources of niacin.

Conclusion: As food fortification expands, it is important that food composition databases and 24hr dietary recall collection methods evolve to facilitate monitoring and evaluation of the associated population health benefits and risks.