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Enhancing USDA's Contribution to Nutrition Monitoring in the 21st Century

A STAKEHOLDER WORKSHOP REPORT

Beltsville, Maryland
October 12-13, 2011

ENHANCING USDA'S CONTRIBUTION TO NUTRITION MONITORING IN THE 21ST CENTURY

WORKSHOP INTRODUCTION

On October 12-13, 2011, ARS convened a workshop of stakeholders interested in National Program 107, Human Nutrition, in Beltsville, Maryland, to discuss the future direction of the dietary surveillance and food composition components of the National Program. The workshop consisted of expert panels that discussed specified topics, and breakout groups that deliberated on questions based on the expert panel discussion. Suzanne Murphy, an Emeritus Researcher at the University of Hawaii, served as the moderator. More than 40 participants representing university, industry, and other Federal government agencies attended the workshop and contributed to the discussions described within this report.

Of the two components, the dietary surveillance program[1] conducts the USDA What We Eat in America (WWEIA) survey component of the National Health and Nutrition Examination Survey (NHANES) in partnership with the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). The ARS dietary surveillance program maintains the Food and Nutrient Database for Dietary Studies (FNDDS) that is used by other agencies and researchers to analyze data from the diet survey by providing weights of typical food portions along with nutrient content. This function has been a part of USDA since 1935.

The other component supports dietary surveillance by providing food composition data[2]. ARS does this by compiling and maintaining analytical data for commonly eaten U.S. foods, a function that has been with USDA since 1891[3]. Currently, the data of as many as 146 nutrients in 7,900 different foods are maintained in the National Nutrient Database for Standard Reference (SR) or multiple specialty databases, such as for dietary supplements and many phytochemicals. The ARS nutrient content data group provides the nutrient dataset that serves as the basis of the FNDDS. This group also has been active in collaborating with the National Institutes of Health Office of Dietary Supplements (NIH-ODS) and other Federal partners in developing an analytically validated dietary supplement ingredient database, as well as a dietary supplement label database.

The dietary surveillance and food composition datasets are some of the most widely used in ARS. Data from the joint ARS/NCHS WWEIA-NHANES survey are used extensively by many researchers throughout the industry, and a recent search of the PubMed database for the terms 'NHANES and Diet' found 9,106 papers. In 2011, the SR was cited in publications more than 400 times. ARS' unique position as the only Federal agency with in-house research components that support both U.S. agricultural production and U.S. human nutrition efforts affords it the opportunity to fully study the important connections and nuances between food production and

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[1] The ARS Surveys Research Group and the What We Eat In America Web site is available at: www.ars.usda.gov/Main/site_main.htm?modecode=12-35-50-00.

[2] The Nutrient Data Laboratory home page is at: www.ars.usda.gov/main/site_main.htm?modecode=12-35-45-00.

[3] The first food composition tables were published in 1891 by W.O. Atwater and C.D. Woods, who assayed the refuse, water, fat, protein, ash, and carbohydrate content of approximately 200 different foods.

supply and human health outcomes. The healthfulness of our nation's diet can be considered the ultimate measure of success of our agriculture; therefore the dietary surveillance and food composition components of the NP 107 Human Nutrition National Program are of importance to all of USDA programs.

While these components have a long history of prominence and success, it is also clear that changes are occurring that are putting increased pressure on the system. Obesity has become the nation's primary health concern, and that condition is directly related to diet and food composition, as are concerns over the consumption of sodium. As the nation's health professionals attempt to reduce the prevalence of obesity, it is important that they have the most current food composition and food consumption pattern data. The food supply is changing, becoming more complex, elastic, and diverse. Health and scientific professionals looking for associations between aspects of the food supply and health outcomes (e.g., cancer prevalence) need reliable and current data. Moreover, as Federal funding becomes less certain, it will be important to accomplish these tasks under tight fiscal constraints. These pressures mean that the dietary surveillance and food composition components will need to seek creative ideas in establishing a course of action for the next few years so that the good work of the past is not lost, but that the needs of the future can be addressed as well.

Those ideas are what were sought at this workshop. This document summarizes the panel discussions and the responses to the questions posed to breakout groups. This document attempts to fairly and accurately express the views of the workshop participants. While the task given to panel members and breakout group participants at this workshop was to think broadly and with no constraints, that must also be balanced with actual constraints – budgetary, legal, logistical, and functional – that limit what can and cannot be achieved. Thus, the workshop constituted a listening session for capturing a wide diversity of clientele perspectives without developing consensus views or formulating formal recommendations.

The report is organized into two sections, representing first, the four panel discussions, then followed by the three breakout sessions notes, roughly following the meeting agenda.

WORKSHOP MEETING NOTES – PANEL DISCUSSIONS

PANEL DISCUSSION A – PRESENT USE OF DATA

Questions for discussion:

- How has the ARS program in dietary surveillance/food composition served traditional stakeholders?
- Is it meeting the present need?
- How will those needs change over the next decade?
- How can ARS best draw attention to its accomplishments and/or needs related to dietary surveillance?

Members of the Panel Discussion A included: Anita Singh, USDA Food and Nutrition Service; Wenyen Juan, FDA; Vicki Burt, CDC/OSELA/NCHS; Ronette Briefel, Mathematica Policy Research; and Josephine Deeks, Health Canada.

Consensus among panel members was that the ARS dietary surveillance and food composition components are the most visible and impactful components of the ARS Human Nutrition National Program. While there were many suggestions for improving the program, all agreed that the present functionality cannot be lost.

The panelists' suggestions for improvement included:

1. Faster turnaround time for new data, and
2. Increased data.

Faster turn-around time is crucial for following real-time changes in the food supply (e.g., sodium reduction) and for making policy decisions based on assessment data.

Increased data are needed for several purposes. A primary need of the dietary surveillance program is for data that can help understand consumer choice. This includes expansion of demographic groups, obtaining household data, and obtaining data that assess the local food environment. All panel members agreed that although the current methods of dietary assessment contain error, at present there are no better methodologies available and putting many resources into finding or further developing them is not the best use of resources at this time (this does not preclude pilot work with emerging technologies such as 'omics and biomarkers or evaluating more cost-effective ways of obtaining respondent data). Because nutrition policy decisions will continue to be made at the Federal level, the best data available should be used.

The primary need identified by the panel was for an increase of the types of data collected. Brand name data from the food industry were considered quite important, as well as data on components of contemporary interest, such as fiber and bioactives. Of secondary importance was exploring data that may be useful in the future for holistic characterization of foods (e.g., fingerprint data) and the need for increased linkages between ARS data and data from other groups (e.g., food safety data).

While the panel was unanimous in agreeing that institutions that use ARS dietary surveillance data understand the vital importance of the program, they also agreed that this does not translate to political and financial support, and the panel urged that ARS find ways to increase their visibility. Ideas suggested included increasing contacts with the general public (e.g., social media) and developing ways to influence decision makers (e.g., through the research community and consumer groups). Visibility and support for the program also are the responsibility of partners and stakeholders, the panelists noted.

PANEL DISCUSSION B – NEW AND FUTURE USES OF ARS NUTRITION SURVEILLANCE/FOOD COMPOSITION DATA

Questions for discussion:

- The original purpose of USDA dietary surveillance/food composition data was to look at population level estimates and trends, and the data are developed from that perspective; how does this affect the use of our data for actions such as modeling, selecting nutritious plant varieties, etc.?
- Can the data collection be altered so as to be more accurate at the individual level? If so, how? i.e., Should we monitor variation, retail food items, changes in formulations, variability in dietary supplements and variability in commodities?
- Using USDA What We Eat in America/NHANES data to identify associations with health outcomes: What are the gaps?

Members of the Panel Discussion B included: Kevin Dodd, NIH; Jay Variyam, USDA Economic Research Service; Victor Fulgoni, Senior Vice President of Nutrition Impact (LLC) (an independent consultant); and Johanna Dwyer, NIH-ODS

Whereas, the first panel discussion looked at the traditional uses of ARS dietary surveillance and food composition data, this panel looked to future uses and how that may change data needs. The panel agreed that traditional data and uses must not be compromised, but strongly supported finding a way to accommodate new uses and functionality, especially as more users require data at the individual, rather than population, level. The panel urged innovation as well as increased speed, but acknowledged that depended on funding.

Accomplishment of the above objectives first requires changes to the underlying IT structure; however, panelists recognized that they did not have the expertise to address how this could be done. Panelists also urged increased linkages with other nutrition data sets/sources of information, as well as with human health and agricultural economic information.

All agreed that current estimates of variability of food composition are not adequate, but there was no consensus on how to deal with that issue. Current food sampling methods assess analytical variability by measuring nutrient content in 12 samples obtained from different brands and locations nationwide (where appropriate) based on a statistical sampling methodology. Epidemiologists are able to inject models of variability into their programs when estimating intake or exposure, but, generally, no one has a good understanding of exactly how much variability exists nor what the primary sources of variability.

Other issues noted by this group of panelists included the need for longitudinal data, and increased surveillance of subsets, such as food eaten away from home[4] and dietary supplements and of sub-populations, such as those participating in food assistance programs.

[4] Food eaten away from home is already captured in the WWEIA-NHANES survey, as is participation in food assistance programs and dietary supplement usage.

PANEL DISCUSSION C – THE NEXT DECADE: EXPANDING NUTRITION SURVEILLANCE/FOOD COMPOSITION DATA BY FILLING GAPS, INNOVATIVE METHODOLOGY, AND ESTABLISHING OUTSIDE LINKAGES

Questions for discussion:

- What are the food composition data gaps related to whole foods; e.g., Agricultural and processing-induced variability? Poorly characterized components such as fiber or phytochemicals? Retail foods; e.g., brand names, restaurants? Dietary supplements?
- What are the gaps related to dietary surveillance; e.g., special populations?
- How will 'omics methodology influence dietary surveillance?
- What mechanisms will increase food composition data input (more comprehensive product coverage and chemical composition) from researchers? From industry?

Members of the Panel Discussion C included: Rose Tobelmann, General Mills Corp.; Elizabeth Jeffery, University of Illinois; Paul Coates, NIH-ODS; Gilbert Leveille, President of Leveille Associates (an independent consultant); and Cindy Davis, NIH-NCI.

There was agreement among the panel that variability in nutrient composition data is potentially a major problem, but there was no consensus on how to deal with it or what level of resources should be directed to understanding and correcting for it. Variability can arise from a number of sources – from production all the way through processing. From a health outcome standpoint, it also extends to variation in bioavailability of nutrients from similar products, as well as inter-individual variability.

The panel also identified the lack of data on bioactive compounds as another gap in nutrition surveillance and food composition. Bioactives are commonly thought of as almost synonymous with phytochemicals, but components such as whole grains and many substances ingested from dietary supplements also may fall into this category. Because many Americans consume dietary supplements, and they may represent substantial nutrient and bioactive intake, the panel urged that dietary supplements be given more attention and the architecture of the nutrient database be reconfigured so that data concerning supplements can be placed in the same databases as foods. During the panel discussion, a major issue pertaining to incorporation of dietary supplement ingredients in a combined database was noted as being the significant degree to which actual content of the supplement markedly exceed, or on occasion, are less than the label value[5].

Partnerships with industry were again identified as being important by the panel, and the issue of 'what's in it for industry?' was raised in reference to industry involvement. Appealing to good citizenship may be helpful, but most successful government-private sector partnerships require development of a level of trust between the partners as well as win-win collaborations where both parties see a benefit. Some industry representatives present identified problems that arise with the industry supplying data to government entities; these negatives must be addressed and overcome to foster cooperation.

New 'omics approaches to obtaining more objective data regarding dietary intake relevant to human health has resulted in many researchers suggesting that such methods and technology will

[5] The NDL is currently working with NIH-ODS to assess this problem.

soon displace traditional approaches to collection of nutrition surveillance/food composition data. A critical look at the state of the science does suggest large potential benefits from these technologies, but it is also clear that this will not develop quickly. Consensus did point to the need for ARS to begin now to assess these methodologies. Meetings between ARS, NIH, and industry are crucial to deciding what changes are needed and how best to collect data.

PANEL DISCUSSION D – DATABASES: A BRAVE NEW WORLD

Questions for discussion:

- What are the ontological challenges of large databases; i.e., solving terminology disparities? How do you deal with this?
- What are the physical and technological challenges of large databases? What resources are available?
- How do you deal with quality when data is input by an outside party?
- How do you build linkages between multiple sites of interest?
- How do you redesign database architecture while maintain full functionality?

Members of the Panel Discussion C included: Gary Kinard, ARS (the GRIN database); Jack Okamuro, ARS (the i-plant database); and Simon Liu, ARS National Agricultural Library (NIH approaches).

Panel members with experience with different types of databases spoke of the challenges and approaches associated with maintaining large amounts of data on modern server platforms. It was stated that the research agenda should always drive development of a database and not vice versa. It was stressed that the organizational structure of a database is critical and that poorly organized structure can impede functionality. Differences in ontology were also mentioned as a major impediment, especially when data are collected from diverse sectors (e.g., industry, academia, government).

A theme common to many databases was that many data were incorporated by linkage to other sites rather than by building the site themselves. All linkages require means of interfacing between different servers, data organizations, etc.

The panelists agreed that well-defined policies for entering data, as well as usage of the data, are critical and must be put into place from the beginning. For the ARS GRIN plant database an outside oversight committee is charged with determining the data needs, and many of the needs are met by contacting individual researchers to ask for specific analyses. After data are submitted, a person employed by the database is responsible for checking accuracy, validity, etc. of the data.

WORKSHOP MEETING NOTES – BREAKOUT GROUP DISCUSSIONS

BREAKOUT GROUP 1 DISCUSSION AND SUGGESTIONS

Questions for discussion:

- How sufficient are dietary surveillance data for meeting traditional stakeholder needs? What are the primary issues/challenges? What should be changed?
- How sufficient are food composition data for meeting traditional stakeholder needs? What are the primary issues/challenges? What should be changed?
- How can ARS best draw attention to its accomplishments and/or needs related to dietary surveillance?

Overall, there was agreement among breakout group participants that – given the financial constraints, the nature of traditional stakeholders, and the important caveat that the data are for population-level estimates – current dietary surveillance data are good to excellent. It was stressed that while areas of the component need to be enhanced, nothing should be done to interfere with functionality as it exists now. It was recognized, however, that the usefulness of the data depended on its purpose, as well as the need of the user, and that both of these are changing. Because the data are not meant for individual-level estimates, they may not be well suited for such applications. It was also recognized that additional information could be added to the data as it develops further.

Dietary Surveillance

The primary challenge of dietary surveillance is that of obtaining accurate estimates of intake. However, it also was acknowledged that there are limited options for improving these estimates. There was general agreement that intake methods presently employed are the best available and that improved methodology is not likely to be available in the short-term. However, with this as a caveat, it was urged that thought and planning be given to more efficient and/or alternative means of data collection in the future. This includes looking into the possibility of conducting remote interviews with Internet-based technologies, such as Skype or ASA24. It was agreed that technologies with the greatest promise for efficient and reliable sampling at the individual level are those used to obtain metabolomics data. However, there was also agreement that the present usefulness of metabolomics data is limited because of a lack of validated biomarkers, insufficiently characterized predictive power, and variability, etc. The NHANES program maintains a storage bank of samples that can be retrieved for retrospective analysis of metabolites. It was urged that pilot studies begin to use these samples to identify potential metabolic markers of exposure and to start validation studies. One suggestion was to add a metabolomics component to a subpopulation of those interviewed for WWEIA-NHANES.

The turn-around time of WWEIA-NHANES data was of concern by the participants (currently NCHS estimates of dietary intake from WWEIA-NHANES are released 19-20 months following the end of the 24-month survey period). In a time of challenges, such as monitoring sodium reduction, the participants saw a need to rapidly link changes in the food supply to effects on dietary intake patterns and food choices, as well as to chart a response from the food industry. It was proposed that there is also a need for more longitudinal assessments that allow evaluation

and determination of the effects and efficacy of potential changes introduced by industry or resulting from regulatory efforts.

The statistical strength of the survey data was of concern to some break-out group participants, however, it was noted, ARS does not have much latitude to alter this as the cohort size and statistical sampling plan is determined by the NCHS. It was also recognized that a statistically significant increase in sample size could require more subjects than could reasonably be supported with modest increases in budget. Perhaps of greater concern than total sample size were gaps in special populations. It was suggested that more data were needed for infants/toddlers, lactating women, low-income and other vulnerable subgroups, and populations of significance to the military – important sub-populations that NCHS should consider when establishing the sampling frame. Other gaps mentioned included few data on food intake patterns of individuals over time (longitudinal rather than cross-sectional) and geographic/seasonal influences. Dietary supplements are consumed by a vast portion of the population and more data on dietary supplement usage was urged. It was noted that dietary supplement use is captured by WWEIA-NHANES, and in the 2007-2008 release will be linked to the dietary supplement database maintained by the food composition component.

It was recognized that dietary surveillance data are used for additional purposes, such as by the EPA, FDA, and the USDA Food Safety and Inspection Service (FSIS) for estimating food-borne pesticide and contaminant exposure. There is a large amount of toxicity data, and exposure estimates require them to be related to intake measures. For meaningful data, it is especially important to have accurate estimates of percentiles of intake in the tails of the distribution. An associated need is the ability to disaggregate data to more specifically target specific ranges or characteristics of individuals. Use of dietary surveillance data for estimating exposure also illustrates the importance of developing a linked network between multiple agencies/institutions/data sets.

Food Composition

There was agreement among the break-out group participants that ARS food composition data are an international gold standard and a national treasure that must be maintained, and because the data are used as base data for multiple purposes, the quality must not be compromised. The USDA, FDA, EPA, CDC, and NIH are traditional users of the data, and the Department of Defense is becoming an increasingly important user. The data are used by these agencies for recommendations (e.g., the dietary guidelines), policy (e.g., FDA and FSIS for oversight of labels), and calculation of nutrient intake in the WWEIA-NHANES survey, as well as many other functions. Data are also used as base data for other food composition databases by foreign government agencies (e.g., Health Canada), academic institutions (the University of Minnesota database), by private companies (e.g., ESHA Research, Inc.), and by research and academic institutions in multiple ways (e.g., the use of the data by ARS nutrition centers for designing human clinical trials). It was agreed that the functionality of the database was too important to lose for even brief periods of time, and that any changes require a means to upgrade the database while maintaining full functionality. A common complaint from the participants was that data access was somewhat archaic and should be made more user-friendly[6], and that some aspects of

[6] The portal has been redesigned to make it more user-friendly.

data are not immediately apparent (such as how current data are, whether values have been determined analytically, and how many brands may have been aggregated under a single category).

The participants found that a primary issue facing the nutrient database is the scarcity of brand name data (including restaurant data) needed to monitor changes in food products that contain substances with implications for health (e.g., trans fat and sodium). Because of its association with hypertension and cardiovascular disease, the sodium content of the food supply has fueled calls by numerous groups for drastic reductions. However, because the primary biomarker of sodium intake (24-hour urine collection and analysis) is burdensome, it may not be feasible to use it to track biomarkers of reductions in sodium intake, and thus monitoring sodium in the food supply, perhaps with access to brand name data, may be the best alternative.

The participants pointed out the major obstacles to obtaining such data include the reluctance of industry to provide proprietary data[7], frequent reformulations, data inaccuracies, limited information on components not required by law (label regulations mandate data for only 14 of the 65 nutrients currently included in the ARS FNDDS database, although some manufacturers may include more), and how to address brand name products where final preparation occurs in the home. In monitoring changes, brand name data needs to be linked with proprietary market information to calculate the impact on overall consumption (as well as to target products with the greatest market share), and timely market information is quite expensive. Additionally, participants noted**,** legal issues arise when including brand name products in a government database, such as the right of a government agency to develop a product that may compete with existing private database products, and inaccuracies of imputed data (required to assess dietary intakes).

The break-out group participants noted that where proprietary nutritional information is not forthcoming, a choice must be made to allocate limited resources to additional brand-specific analyses or focus on maintaining generic values for food products. This is problematic in a time of budget uncertainties, but one way, it was noted, is to target foods/products for which extramural funds are available. This results in an ad hoc approach, as some producers (e.g., most dietary supplement manufacturers) are not interested in funding analyses, whereas others provide funds at lengthy or infrequent intervals, making it difficult to truly assess the current state of the food system. Break-out participants agreed that a plan must be developed to provide adequate resources for continued maintenance of the database, whether by reducing its breadth to a size supported only by current ARS funding; developing a more efficient means of acquiring data; or acquiring additional support from stakeholders. Methods for setting priorities for future analytical work will be essential to leveraging limited resources, as the Nutrient Data Laboratory sets priorities for food and nutrient monitoring by identifying and ranking Key Foods, a list of 500-600 generic foods that together contribute about 75 percent of approximately 20 nutrients of public health significance to the American diet.

Central to this problem, participants noted, is the question of what should be in the foundational SR database. A question was posed as to whether all of the 144 nutrients now included in the

[7] There may be an opportunity through the Grocery Manufacturers Association to acquire proprietary food data, although industry data should ideally be electronically downloaded directly from the company with the product.

database are still of interest today? Perhaps the emphasis should be on the components of food with the greatest change, e.g., sodium, iodine, trans fat. There were numerous suggestions that more information needs to be available on the content of bioactive food components and their variability due to cultivar and environment, but modern analytical tools such as time-of-flight mass spectrometry (TOFMS) currently provide more data than can be handled or understood. Other questions also were voiced: Which constituents are important? What about secondary metabolites? Additionally, spices and flavorings are components that have traditionally been defined as substances that only lend flavor characteristics, break-out participants noted, but increasing evidence indicates that some have potentially important biological functions as well. To what extent do they need to be considered (likewise to what extent should colorings and allergens also present be included)? Another important issue for the participants, in developing and maintaining a database for dietary analysis, is keeping track of the changing definitions of nutrients/food components of interest, as illustrated by the definition for fiber and the multiple definitions for whole grain.

Break-out participants also expressed concern that advances in information technology suggest that consideration should be given to the architecture of the database. The user should be able to access, on one screen, past values for the same components of a food, as well as when updates were made. The database needs to be configured in a manner that allows searches for all data from one interface. Linkage of the database with other information regarding food and diet would allow more complete assessment of the diet as a whole, allowing simultaneous searches of all data including those now in separate databases such as dietary supplements and bioactives. They suggested that other linkages should allow access to chemical structures, toxicity and exposure data, metabolomic data, chemical structures, pertinent scientific literature, and perhaps regulatory data. Databases in other fields and/or other countries have been structured to do this, some participants noted.

Drawing Attention to ARS Dietary Surveillance/Food Composition

While users are well aware of the importance of ARS dietary surveillance and food composition data, the break-out participants noted, this has not translated into strong financial support for the ARS components – perhaps because surveillance and composition data is base data and not viewed as on the cutting edge of solving societal health problems or leading to breakthroughs in nutritional science. Consequently, there are no grants that target the program and young investigators are not focusing on this area of research. The participants suggested that this means it is more important than ever to maintain a high profile of the program's accomplishments.

The break-out participants suggested that ARS personnel who either maintain or use these data clearly communicate to stakeholders the potential programmatic losses if funding is not adequate. Along with this, the participants noted it would be helpful if more emphasis be placed on the fact that NHANES dietary data are a partnership between the Department of Health and Human Services and ARS and much of the current information would not be available without this partnership. The participants suggested using multiple channels and sources of media to ensure communication with other scientific groups (e.g., food scientists), data users, the general public and/or officials that understand the funding process. Of special importance is the rapid communication of new data of contemporary interest (e.g., information on dietary patterns of

obese subgroups, sodium content). While exemplary releases of such information have occurred, the participants noted that they have been very limited, perhaps because of resource constraints.

Specific suggestions by break-out participants to increase the visibility and importance of food composition and dietary surveillance data include:

- Develop simple media bullets for use by USDA officials and/or advocacy group/committees;
- Disseminate such information through media such as television (e.g., Dr. Oz) or cell phones (development of specific apps, use of Twitter);
- Demonstrate the importance of this data[8];
- Exhaustively search the Federal Register to determine how many times the dietary portion of NHANES is mentioned to provide data for media bullets mentioned above; and
- Develop two or three simple, easy to understand statements of purpose and importance that resonate with the public and politicians to convey to appropriate individuals.

As a matter of policy, it was suggested that What We Eat In America should be included in any citations of the dietary intake portion of NHANES data and appropriate citations of the database should be included in publications that utilize data derived from there. It was also urged that reviewers for scientific journals ensure that when ARS food surveillance data are used in a potential publication that they be cited in a correct manner.

One group of break-out participants identified the need for an advocacy group/committee that could assist in presenting ARS accomplishments and needs to funding officials and bodies. It was suggested that ARS work though selected commodity groups/non-governmental organizations (e.g., the National Dairy Council, Grocery Manufacturers Association) to disseminate specific messages to the top human chronic disease non-governmental organizations (e.g., American Heart Association) as well as the three major nutrition/food societies – the American Society for Nutrition, the Institute of Food Technologists, and the American Academy of Nutrition and Dietetics.

BREAKOUT GROUP 2 DISCUSSION AND SUGGESTIONS

Questions for discussion:

- Dietary surveillance data – the next generation: How will it be used? How does this change the way we collect and present data?
- Food composition data – the next generation: How will it be used? How does this change the way we collect and present data?
- Should the primary function of ARS dietary surveillance and food composition monitoring be one of taking 'snapshots' of dietary data, or should it develop a 'systems' approach that characterizes the breadth, elasticity and fluidity of the food supply?
- How important is variability in dietary data? What sources should be examined? Should the data allow for comparisons, for example, between organic and conventionally grown produce?

[8] See, for example, a publication of the USDA Economic Research Service, "Assessing the Benefits of Public Research Within an Economic Framework: The Case of USDA's Agricultural Research Service; Paul W. Heisey, John L. King, Kelly Day Rubenstein, Dale A. Bucks, and Rick Welsh" a benefit analysis of the Nutrient Database.

There was general consensus that the ARS activities in the dietary surveillance and food composition components are of national and international importance and that nothing should be done that would impede present functionality. There also was agreement among the break-out participants that additional uses of the data are now of great interest and consequently ARS should be proactive and consider what is needed beyond what is currently provided, e.g., individualized instead of population-wide measures and that methods and programs need to address this change (although some also voiced the opposite opinion that nutrition surveillance should remain at only the population level).

Improved and increased subpopulation assessment was urged, such as for ethnic groups and distinctive eating patterns (e.g. organic food consumers vs. traditional consumer); such data may require additional surveys of subpopulation groups. Tied to this was a need to improve the robustness of the data through expanding information on variability of food composition data (thus potentially increasing level of accuracy or permitting determination of confidence limits or ranges when needed), more rapid inclusion of data on reformulations in the marketplace due to the fluid nature of the food supply and integration of dietary intake data with behavioral data.

Potential new uses of data, as well as enhancing the robustness of the data, necessitate changes in methodology as well as additional resources. Continuing to develop and refine methods to gather food/dietary intake data was considered a top priority – while it was acknowledged that current food intake methodologies have inherent flaws, it was also acknowledged that few other technologies are available. There was consensus that 'omics technologies may be the future, but at present they are still in the very early investigation phase. A suggestion was given that a subset of samples be analyzed by present and emerging technologies and that the data be used to determine predictive robustness; it may be possible to facilitate this through cooperation with the National Center for Health Statistics. A related problem is the need for biomarkers to assess exposure to the vast array of bioactive food components. Partnerships with institutions such as the National Center for Health Statistics could facilitate biomarker and 'omics validation studies. It was acknowledged that while other new technologies may not replace the dietary recalls, they can be used to augment the WWEIA survey methodology (e.g., photography/cell phones). On-line self reports were also suggested (e.g. ASA24), especially for reporting attitudes and eating behavior. Instruments also should be available to assess eating behavior and factors involved in food choice.

Whether nutrition surveillance should take more of a systems approach over the present approach of 'snapshots' at specific intervals was quite controversial among participants, and opinions depended in part on how the data would be used by a specific individual or group. Initially, most thought that the entire food surveillance/food composition monitoring program, given the ability to make changes, should evolve toward a more systems approach that allowed for more data as well as data integration. Increased data should not be limited to chemical analyses (e.g., nutrients/phytochemicals), but there should also be a means to track the food environment through all parts of the food supply. This would allow characterization of diets/food supply as a whole based on the idea that individuals make choices within a particular environment (e.g., food availability, what is in marketplace at specific locations).

It was agreed by break-out participants that there is an increased use of the nutrient database food composition data for individual estimates of intake, rather than primarily for population or sub-group-wide estimates, and that such usages will probably increase in the future. With a national emphasis on obesity, nutrients and eating behavior related to chronic disease, and the need for changes in the food supply, such as sodium reduction, data are increasingly used to determine household nutrient consumption, estimates of individual eating patterns, and individual nutrient intake.

Participants noted that data also are being used in epidemiologic studies where error associated with food intake measures can be accounted for, but not error associated with nutrient content. There is much current emphasis on the food environment**,** and food composition data may be used to assess differences and nutritional inadequacies between local and micro-environments.

There was consensus that variability of food composition could be real and an extensive problem, but there is not enough known at present. Accordingly, an effort should be made, not to extensively document variability in many foods, but to gather preliminary information to assess whether the problem is indeed of sufficient magnitude to warrant more attention. However, this requires several changes in data collection and storage, including development of a database infrastructure that supports preservation of all data behind any estimate (e.g. data collected over time, multiple values averaged for an estimate). Potential sources of variability (especially in plant foods) include cultivar, year, growing environment, processing, maturity, geographical area, weather and climate. It was agreed that variability is only of importance in commonly consumed foods.

Much discussion in the break-out group centered on the acquisition and use of retail food data. The easiest data to access, perhaps through industry partnerships, would be label data, and acquiring such data would not necessitate further analyses. However, it was noted, there are potential problems and limitations associated with this data as it is often based on legal rather than analytical standards. As an example, if label values were used for trans fat content, advocacy groups might claim that the database was misleading because the labels might list trans fat values as zero (because the analyzed amount is below the FDA cut-off of 0.5 gram/serving, the considered error of detection), while analytical data would determine measurable amounts of trans fat. Label data may also need correction factors due to the regulation that label values must be no less than 10 percent below and no more than 20 percent above analyzed values, which typically results in intentional overages to ensure that label**s** meet the regulatory standard. Obtaining and compiling retail data may require special arrangements with industry, such as requiring that data not be identified by brand name. Alternatively, it was suggested, instead of directly acquiring and maintaining the data, the database could link to the UPC code or to an industry Web site.

The break-out group participants identified partnerships as essential to gain access to industry data. It was discussed that while there are relatively few impediments to acquiring label data (of which the utility may be diminished due to the resources required to obtain, monitor, and update the information), ARS cannot make demands for such data, but must work with industry in a manner that results in a mutual benefit. It was suggested that one potential solution might be to work with groups such as the Grocery Manufacturers Association to act as facilitators.

Another suggestion was that restaurant food data should also be considered for capture (or at least linkages), as up to 40 percent of foods consumed in the United States are now eaten away from home. Additionally, allergens present in foods, the most important of which are required to be included on the label, could also be captured. The participants noted that emphasis should be on capturing data with major market shares as there are diminishing returns for including smaller retailers. Partnerships could be explored with data management companies/services (e.g., Google) that allow quick searches and data uploads to devices such as cell phones.

Another issue discussed that is associated with incorporating retail data is quality assurance. However, it was thought that this could be addressed by database architecture rather than by extensive resource-intensive examination. For example, retail or label data could be added as-is, but with an identification tag (currently SR contains the source codes for various types of data, e.g., analytical, manufacturers calculated, label values, etc.) identifying source. Discrimination between various classes of data could then occur by a search engine that could access all data, only SR data, all data resulting from official Association of Official Analytical Chemists (AOAC) analyses, or only ARS analyzed data, for example. It was suggested that strategies would need to be employed to deal with the continuous need to update based on reformulations and changes in marketed portion sizes, and that all retail data would need to be tagged with the time of entry into the database.

Other future needs/uses of food composition data mentioned included:

- More information on non-nutritive components of plants: e.g., phytonutrients, particularly those considered to be most physiologically relevant (although this is unknown in many cases);
- Institutional food – especially that sold to schools;
- Convenience foods; and
- Tracking country of origin.

BREAKOUT GROUP 3 DISCUSSION AND SUGGESTIONS

Questions for discussion:

- How can the food industry work with ARS to improve food composition data on proprietary products: Issues, challenges and solutions?
- How can individual researchers work with ARS to supply food composition data? Issues, challenges, solutions.
- If you had an unlimited budget, what do you see as the most important items to add to dietary surveillance? Rank in terms of importance.
- If you had an unlimited budget, what do you see as the most important items to add to the food composition database? Rank in terms of importance.

ARS – Food Industry Partnerships

A common theme throughout the workshop was the need for more retail food data from the food industry; however in-depth discussion of this topic revealed many complications. These can be broken into three distinct questions:

1. Should ARS try to develop partnerships with industry?

2. If partnerships are to be developed, what are the pros and cons of this arrangement for industry and USDA?
3. What mechanisms will facilitate such a partnership?

Group participants agreed that question 1 needed prolonged consideration. Private food data companies/programs (e.g., ESHA Research, Incorporated) as well as some public programs already supply this information (retail food data). How will an ARS database be different? Will this be in competition with a product from the private sector?

If ARS decides that it is appropriate to develop such a database, the second question then becomes what are the advantages/disadvantages (to cooperation) for industry (i.e., is there enough in it for them to warrant their participation)? The negatives need careful consideration as it was reported that some companies that released data in the past had the data used against them for regulatory purposes. The core of this problem is that government data is in the public domain and that data that was released purely for informative purposes may be searched by competing companies as well as other agencies that may use it for regulatory or even criminal investigations. Likewise activist groups also can search everything in the public domain and use data to call into question company products or even as a basis for legal action. Of particular concern is the Freedom of Information Act and how it may impact potential confidential data.

If these negatives can be overcome, there still needs to be advantages that can be demonstrated to industry. The advantages may be more difficult to discern, but a few were suggested. One suggestion was that many food companies are working on stealth methods as opposed to overt and transparent reduction of sodium in food products. At some point in the future, however, these companies will need to be able to back up any voluntary reduction claims with data, and that could be readily supplied if ARS had sodium data for their product across reformulations. Another advantage to industry is that people in the nutrition division of food companies spend large amounts of time fielding questions regarding the nutrient content of their products. If the company had product data within the USDA framework, then these questions could all be diverted to the ARS. ARS must clearly articulate these or other benefits as industry will not enter cooperative arrangements without a strong incentive.

It is also essential that the correct people in industry be identified and approached, group participants agreed. Nutrition divisions may see clear benefits of cooperation, but past experience shows that the legal department may have objections. It will take meetings with high level individuals (CTOs, VPs) to work out ways around potential roadblocks. ARS may have to consider alternative arrangements, such as having the industry data collected and maintained by a private entity (e.g., IOM, ESHA) that could be done under the umbrella of a Cooperative Research and Development Agreement (CRADA). ARS would finance the program and sit on an oversight board, but would not own the data, thus distancing itself from many legal hurdles.

ARS – Researcher Partnerships

There was agreement among the breakout participants that researchers not associated with the ARS dietary surveillance and food composition components-could potentially supply a great amount of data at a very low cost, similar to what is done with the GRIN database. However, it was also acknowledged that before doing so, specific issues need to be addressed.

First, ARS should find and evaluate key scientists doing the work in a particular field, identify what data they are generating, and determine the quality of their data. Finding the correct researchers can be done by exhaustive literature searches, as well as by asking people in the field. Another approach, however, is to develop agreements with granting agencies, such as the USDA National Institute of Food and Agriculture (NIFA), that require awardees in certain categories to submit compositional data. Groups such as International Life Sciences Institute (ILSI) may be beneficial for determining mutually beneficial relationships with specific segments of the food industry.

The participants noted that plant scientists generate large amounts of compositional data, but much of that data is not relevant to ARS nutrition surveillance and composition needs and prior discussion is needed to determine what data should and should not be submitted. Additionally, there is an issue of ensuring data quality. Extensive checking of data for quality control could become very burdensome for the food composition program and filters/procedures must be designed and put into place to alleviate this. One possibility is that user-generated data could be submitted online and then held in a designated repository until review. Well-designed and user-friendly methods of uploading data to the ARS site or holding repository would be needed to facilitate this. ARS would need to consider some means of recognizing data contributors.

An oversight committee similar to that of the GRIN database could be valuable in solving problems, deciding on quality, etc. Selected individuals could be invited to a committee/meeting where procedures/rules are discussed and adopted.

Most Important Additions to the Food Composition Database and Nutritional Surveillance Program

Breakout group participants were asked to list, in priority order, the additions they would most like to see in the two components. There were fewer agreements on priorities for the food composition than for the dietary surveillance, reflecting in part the diverse uses of the database.

Food Composition Database:

1. Faster releases of new versions of the database (More frequent updates to brand name products could be facilitated by industry sponsored brand name database).
    - Stay current with WWEIA.
2. Annual update of sentinel foods[9].
3. Ability to export files in other formats[10];
4. Expanded coverage of bioactives.
5. Retail foods.
    - Brand-specific items.
    - Standardized data from restaurant chains.
    - Random samples of mom-and-pop outlets.
    - School lunch foods.
6. Location of where commodities came from – exploration of variability.

[9] It should be noted that although the SR is released on an annual basis; only data in even numbered versions (e.g., SR24) are used to develop estimates for the WWEIA. SR24 is supporting estimates of intake from 2009-2010 which will be released in summer 2012.

[10] The NIH–TOX-21 program has developed a bioinformatics program that may be an example.

7. Beverages (teas from tea bags, loose tea, instant); energy drinks; away-from home coffee drinks (this has been done on a limited basis).
    - Continued coverage of all nutrients covered by Dietary Reference Intakes other than biotin, iodine, molybdenum
8. Dietary fiber (needs new definition).
9. Whole grains (needs definition).
10. Glycemic index.
11. Sugars (added and intrinsic).
12. Expansion of Dietary supplements.

Dietary surveillance[11]:

1. Explore new methodologies and innovative techniques.
    - Innovation to allow more efficient ways of collecting data and collection of more data.
    - Reduce dependence on travel and site visits for gathering data (i.e. more reliance on remote data gathering).
2. Explore use of 'omics and biomarkers.
    - Collect preliminary data that can be used for validation.
    - Collect samples in a manner so as to allow retrospective analyses.
3. Add a longitudinal component to the data.
    - 5-year follow-up.
    - Lifetime follow-up.
4. Increase sample size of specific population groups so that local and regional information can be accessed.
5. Capture information about the food environment.
6. Capture data on eating behavior and dietary choices.
7. Create mobile phone app for efficient dissemination of data.

[11] Priorities 3, 4, and 5 are primarily the responsibility of NCHS, and ARS does not presently have authority to change these.