

## GAO's Recommendations for Improving Handbook 8

Betty Perloff, USDA-ARS-HNIS

In October 1993 the General Accounting Office (GAO) issued a report entitled "Better Guidance Needed to Improve Reliability of USDA's Food Composition Data." This report was the result of a study during which GAO examined the procedures for producing Agriculture Handbook No. 8 (AH-8), and it includes recommendations for improving the reliability of values published in the Handbook. Evaluations of this type are an important part of government operations, and the Human Nutrition Information Service (HNIS) welcomed the opportunity for an independent and systematic review of its procedures. We are preparing now to implement their recommendations within our budgetary constraints. The purpose of this presentation is, first, to inform our data users about the recommendations and our plans for implementation, and, second, to discuss implications for future food composition data bases.

Full implementation of GAO's recommendations would be very costly and would require either a large increase in resources for generating food composition data or a decrease in the amount of data released by HNIS. If adequate resources cannot be found to fully implement the recommendations, we need input from data users to help us decide how strictly the GAO recommendations should be followed. Since a major use of these data is to estimate nutrient intakes, we believe it is important to look at the quality of food composition data in the context of the quality of other parts of the measurement system for determining those intakes. Therefore, we hope this session, "Perspectives on Data Quality," will help set the stage for users of our food composition data to begin to let us know their views of how the government should balance the competing needs of quantity versus quality for food composition data.

GAO's first recommendation is--

Develop specific quality assurance criteria for HNIS to use in evaluating food composition data obtained from others before the data are included in Handbook 8.

This recommendation was based on a review of the amount and types of documentation that were available for the information published in the 1991 supplement to AH-8. That supplement was the most recently available Handbook 8 publication at the time of their evaluation. They looked for five specific quality assurance measures.

Before discussing those measures, I would like to point out that this recommendation relates only to data obtained from sources outside HNIS, namely the food industry and the scientific literature, since it was for those data that GAO found some of the documentation lacking. Data generated under HNIS's control, i.e., under contracts with analytical laboratories, were completely documented to GAO's satisfaction. I would also like to point out that all values have received an internal evaluation at HNIS, regardless of the amount of documentation that was received and reviewed, and I will return to this topic after a discussion about GAO's specified quality assurance measures. Each of the measures is discussed below.

1. Number of samples analyzed in developing the data. The guidelines which were established in the 1970's for revising AH-8 required that not only the number of samples be known for each value that was used but also that the standard deviation be included if the number of samples was greater than one. This general guideline still exists but is overridden from time to time under special circumstances, which I will explain later. Full implementation of GAO's recommendation would not allow exceptions.

Furthermore, GAO recommends that values in AH-8 be based on a minimum of six samples per food item. Presently, there is no minimum requirement; however, we do try to obtain values for as many samples as possible.

For our contracts, we designate two or three samples, with cost being an important determinant in the final decision. Analysis of one sample for the full set of nutrients currently reported in AH-8 costs approximately \$2,000. Imposing the requirement of six samples for each food, at \$2,000 a sample, means that analysis of each food would cost approximately \$12,000. Based on the funds we have had available for analyses over the past few years, requiring six samples of each food item would have allowed us to analyze about 17 foods a year. This is approximately one-third of the number we have chosen to analyze using fewer samples. However, for this fiscal year this is a moot point, since budget cuts for HNIS have eliminated the funds normally available for food composition analyses.

Because of limited funds, it is especially critical that careful priorities are set for food analyses. We use data from the Continuing Survey of Food Intakes by Individuals to identify major contributors of various nutrients. Those major nutrient contributors with the weakest analytical base then receive the greatest priority for analysis.

2. Method of sample selection. This item includes factors such as individual versus composite sample; the numbers of individual samples, lots, plants, or brands included in a composite sample; the origin of the food; date of harvest or production; and sampling location. This item was also addressed in the original guidelines for revising AH-8. Currently, information concerning these various factors may be recorded about a nutrient value when it is entered into the Nutrient Data Bank System. However, the nutrient value is not rejected if the information is unknown. Although any experimental samples, or samples not representative of foods currently available, would be excluded.
3. Protection and treatment of the sample prior to analysis. This item refers to how the sample is handled at each stage from harvest or production through analysis at the laboratory. It involves conditions such as environment, temperature, time, treatment, lighting, and packaging. It also includes the type of homogenization that takes place prior to analysis. Again, the guidelines address these issues but do not absolutely require rejection of a value if they are unknown.
4. Method of analysis. Information about analytical methods are required before data can be entered into the data bank system for use in AH-8. In fact, a considerable amount of detail about methods is required. Again, exceptions are made under special circumstances, as explained later.
5. Laboratory procedures used to ensure accurate analytical results. Use of reference materials and other procedures to ensure accurate results are extremely important. HNIS has supported development of reference materials and is very careful about requiring stringent quality control procedures for any HNIS-sponsored analyses. However, most official methods do not specify quality control procedures, and standard reference materials currently are not available for all nutrients. Evidence of procedures

used to ensure accurate analytical results are almost never available for data from sources outside HNIS, and data are not rejected for lack of this documentation alone.

As I mentioned before, GAO examined the documentation for data published in the 1991 supplement to AH-8. The supplement is an annual update and includes pages to be added to the handbook as well as replacement pages where newer values need to supercede previously published values. The number of quality assurance factors they found in the documentation of each data source is listed below.

Number of quality assurance measures in documentation	Number of data sources with documentation
5	10
4	14
3	6
2	3
1	8
0	7
Total	48

As you can see, only 10 out of 48 items included documentation for all five quality assurance measures. The information in this table may be interpreted in two ways. It could be viewed (1) that HNIS was lax in not obtaining the needed documentation for the other 38 items, or (2) that full implementation of GAO's recommendation prior to 1991 would have eliminated approximately 80 percent of the data used for the 1991 supplement. When making your interpretation, please keep in mind that a number of competing factors complicate the development of food composition tables: (a) the need to ensure the best possible values; (b) the need to publish complete nutrient profiles for each food to prevent resesarchers from having to estimate missing values, (c) the expense of obtaining analytical data, and (d) the fact that the contribution of data to the National Nutrient Data Bank by the food industry is strictly voluntary.

We rely upon the goodwill of the food industry for most of the data in AH-8. However, there are no legal requirements that anyone provide data to HNIS. When data are supplied by the food industry, we seldom receive complete documentation regardless of the number of times we request it. It is a burden that most companies are not able, or willing, to bear. When data and documentation are requested, we receive a range of responses, of which some examples are provided below:

1. Analytical data with mean, number of samples, standard deviation, references for methods of analysis, and descriptions of quality control procedures for most of the nutrients.
2. Analytical data with no indication of variability. We may or may not be able to obtain references for methods of analysis for some of the nutrients.
3. Values for most of the food components in AH-8 but no indication if values are analytical or calculated.
4. Label claim data as the percentage of U.S. RDA per serving for only those nutrients required for nutrition labeling.
5. No response.

Our original guidelines for accepting data from outside sources for AH-8 would not have allowed us to accept values falling into the second, third, or fourth category above. We relaxed our requirements to include values from the second category under certain circumstances. Specifically, we believe that analytical data which were generated and were used for the purpose of preparing nutrition labels should be included in AH-8 if (1) data with better documentation are not available and (2) the data have passed an internal evaluation. In fact, all values receive the same evaluation before they are used regardless of the amount of documentation that is received. This includes a comparison to existing values for the same or a similar food item. The amount of variance expected differs for different types of foods, but in general we expect no more than 5-10 percent variance for proximates and 10-20 percent for vitamins and minerals. Acceptability of values with larger than expected variances are decided on a case by case basis.

The GAO cited an example of how HNIS had used data from fast food companies for bacon cheeseburgers even though little supporting documentation was received. About the only information we knew was that the data were analytical. For the review of those items, we constructed recipes based on information about the components of the bacon cheeseburgers and calculated nutrient profiles from our Standard Reference Data Base to use for comparison. The calculations were provided to GAO as documentation of our internal review of the items.

Figure 1 provides a frame of reference for the amount of data that is available with complete documentation. Approximately 85 percent of the data in the National Nutrient Data Bank are from sources outside HNIS, namely the food industry and the scientific literature. Very few of those data, about 10-15 percent, are completely documented according to GAO's recommendations. More than half of those data are documented for at least three of the five GAO recommended quality assurance measures.

As you can see 100 percent of data generated by HNIS contracts include all five quality assurance measures, and as I mentioned earlier those analyses cover foods considered major sources of nutrients. The determination of which foods are major sources of nutrients takes into account not only the amount of nutrient in a food but also the consumption level of the food.

One of the reasons we have chosen to use data with less than 100 percent documentation and with limited numbers of samples has come from our participation in this conference over the years. We have been convinced that it is better for USDA to provide data with limitations than for each researcher to have to derive missing values. In view of the GAO findings and our own belief that the situation with food composition data does need to be improved, we would like to revisit, with you, your requirements for the quality of food composition data as we take steps to respond to the GAO recommendations.

First, we have increased our efforts to obtain additional documentation from our traditional data sources. While the publication of the GAO report has helped focus attention on the need for better documentation, so far the increase in documentation that we have received is negligible. Food companies have been overwhelmed with trying to respond to new nutrition labeling requirements and can find little sympathy for the government's problems regarding quality of food composition data in AH-8. It only stands to reason that the food industry as a whole is not prepared to supply the government with additional information when we can offer no incentive. We will continue to address this issue with food companies.

Second, we are preparing specific data evaluation criteria which cover the GAO recommendations. As you can see from the chart on sources and documentation, unless a considerable amount of resources can be found to fund more analyses, strict adherence to the criteria will eliminate more than half of the data that are now used. Some type of compromise, such as a scoring system, may have to be implemented.

Models for scoring systems have previously been developed for a limited number of nutrients by our colleagues at USDA's Food composition Laboratory (FCL). We hope that they will be able to assist in the development of a more complex model, involving multiple nutrients, which could be built into the structure of a larger data base management environment. In fact, we believe a significant step was made in that direction earlier this month when Dr. Wayne Wolf, a prominent member of FCL, was detailed as Acting Chief of the Nutrient Data Research Branch.

The release of the GAO report was very timely because we were in the process of planning a redesign of our Nutrient Data Bank system. In fact, last year we had decided to extend the planning phase on advice of our Federal Data Bank Users Group. At the time GAO released its report, Dr. Loretta Hoover, a nutrient data base specialist from the University of Missouri, was working with us at USDA to define the specific areas that needed change or improvement. The whole area of data quality and how to record specific information for making quality determinations is a part of the redesign effort. We had already planned for a much more extensive set of codes than is presently used to indicate specifics about the derivation of nutrient values. Dr. Hoover was able to identify where documentation requirements might be affected by new evaluation criteria based on GAO's recommendations. We have also been working with Dr. Philip Kott, research statistician with the National Agricultural Statistics Service, who is making recommendations for statistical requirements for the new system.

GAO's second recommendation is--

Develop procedures to better direct the generation of food composition data under HNIS' contracts.

As mentioned before, data generated under HNIS contracts meet all five of the GAO's recommended quality assurance measures. In fact, HNIS has a very stringent quality assurance program. Contractors must successfully demonstrate their ability to analyze samples accurately before any contract is approved. Also, during a contract they are periodically sent additional samples to check their work. In response to this particular recommendation, HNIS will expand its quality assurance procedures to disguise control samples and to make regular on-site visits to the laboratories.

In closing, decisive public debate regarding food composition research has been lacking for too long. While any criticism is painful, the recent GAO report has helped to focus attention on the requirements for a high quality food composition data base. However, the responsibility for adequate and reliable food composition data extends beyond the compilers of the data. Before we will ever be able to generate adequate amounts of reliable data, we need a policy that sets as priority the development of (1) standard reference materials for all nutrients and (2) official methods that are not only less expensive than current methods but also require the use of appropriate quality control procedures.

We also need public policy that provides an incentive to the food industry to contribute data to the National Nutrient Data Bank. In addition, we need to consider the development of what many other industrialized nations have--a government laboratory whose primary mission is to provide food composition data for the country's food supply.

Finally, HNIS wants to ensure that the needs of data users are fully understood and considered. We welcome your input and we look forward to working with you and other data users to develop a consensus on how best to meet data quantity and quality requirements.

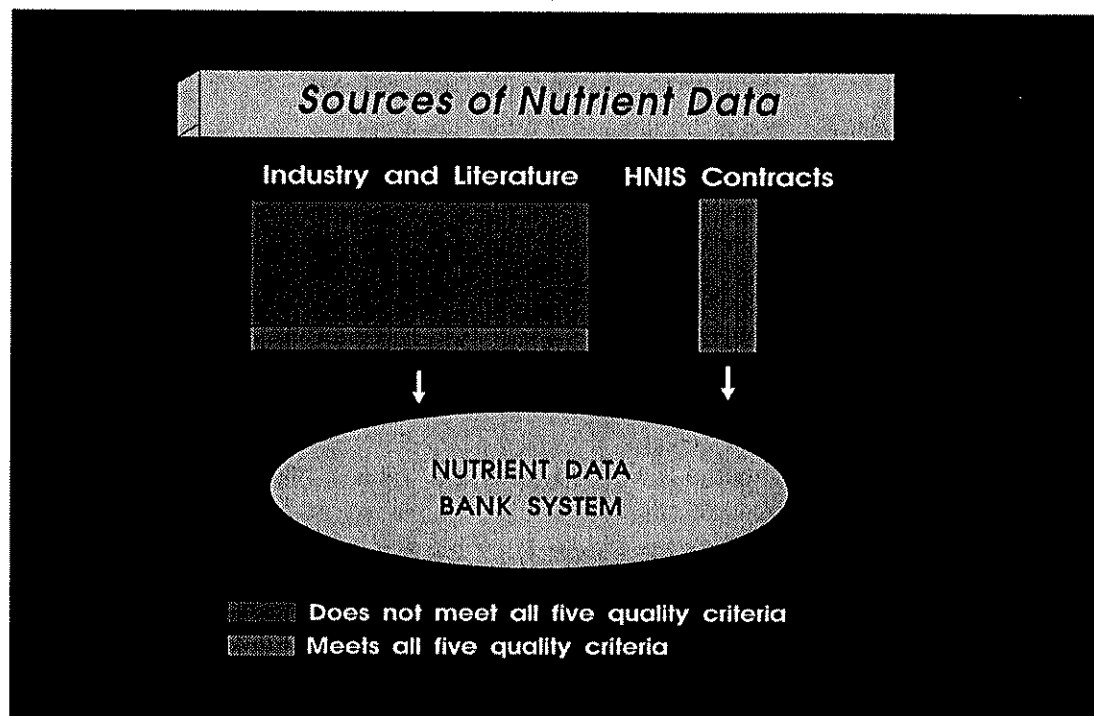


Fig. 1