DISCUSSION

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I thank Robert Tortora for the invitation to participate in this session. First, I will take the opportunity to briefly review the history of cooperation between Iowa State University and the U.S. Department of Agriculture. Then I will close with a few brief comments on the three papers.

This year, 1988, marks 125 years of agricultural statistics within the U.S. Department of Agriculture. It is also the 50th anniversary of formal coopertion between the United States Department of Agriculture and Iowa State University on agricultural statistics. A "Project Agreement for Agricultural Research" between the then Iowa State College and the Department of Agriculture went into effect July 1, 1938. Two years earlier, a conference "Statistical Methods of Sampling Agricultural Data", had been held in Ames. There seems little doubt that the conference and the agreement came about because of the early collaboration between Henry A. Wallace, then Secretary of Agriculture, and George Snedecor.

The agreement had a tremendous impact on the Statistical Laboratory of Iowa State College. Seven employees of the USDA were stationed at Ames as resident collaborators. They were Arnold J. King, Floyd E. Davis, George D. Harrell, Glen D Simpson, Roy A. Blair, Dale E. McCarty and Robert J. Monroe. In addition, new positions at various levels were created in the laboratory. The first four students working on the agreement were Earl Houseman, Paul Homeyer, Emil Jebe, and Raymond Jessen.

Among the objectives of the 1938 agreement was "The development of efficient methods of sampling individual farms in taking economic surveys of American agriculture." A number of sampling studies were conducted under the agreement in the late 1930's and early 1940's.

The largest project conducted under the agreement has been mentioned by several of the speakers. This was the Master Sample of Agriculture. The objective of the project was to develop an area sample that would meet the various data collection needs of the Department of Agriculture. The master sample activity was initiated under the cooperative agreement between the Department of Agriculture and Iowa State University, but the Bureau of the Census joined the operation at an early stage and made large contributions to the project. The sample that was finally constructed was used by the Bureau of the Census in the 1945 Census of Agriculture to collect supplemental information from a sample of farms.

The Master Sample frame was also the foundation for a large study of conservation practices initiated by the Soil Conservation Service, USDA in 1957. Iowa State University cooperated in that study and continues to cooperate with the Soil Conservation Service on similar surveys.

While the Department of Agriculture did not use the original master sample, the work formed the basis for the present-day area samples. As Bosecker describes, the first USDA area samples of the 1950's were drawn from the Master Sample frame. The speakers have explained how the area frames are now regularly updated using, among other things, aerial photography and satellite imagery. The Iowa State Statistical Laboratory continued to work with the USDA in frame development into the 1970's.

Cooperation between what is now called the National Agricultural Statistics Service and the Statistical Laboratory, Iowa State University has continued, largely uninterrupted, to the present day. Persons contributing to that research, in addition to those mentioned, include W.G. Cochran, H.O. Hartley and Norman Strand. (I omit persons currently or recently at Iowa State.) Research has covered a wide range of sampling problems as well as methods of crop forecasting (one of the objectives of the 1938 agreements). The cooperation between NASS and ISU has been mutually beneficial. I hope and expect it to continue to be so.

As Tortora and Hanuschak observe, one can reach two conclusions from the historical record.

1. The Department of Agriculture is producing information of a type very similar to that produced 125 years ago.

An interesting question today, and 125 years ago, is; "How much of a particular commodity (say corn) will be produced in the United States this year?" Quantities of commodities produced and going to market, and the prices of those commodities remain the primary items for which estimates are produced. I expect this to remain so in the foreseeable future.

Those of you that grew up in rural areas know that every crop year is unique. However, 1988 can fairly be called an outlier with respect to weather. Hence, crop production and the USDA estimates of crop production have received more than usual national attention this year.

2. There has been an evolution in the methods used to produce that information.

I believe an occasional observance such as this session is worthwhile. It serves a number of purposes. One is to remind us that procedures we take to be the norm were not always so. They were adopted after years of research, discussion, debate, and I suspect in some cases, critical retirements. It is worth contemplating that it is less than 35 years ago that probability sampling was introduced into the national agricultural data collection system of USDA. And as Fred Vogel describes, random sampling is still only a part of the process.

While there have been many changes associated with improved technology, most seem to have been rather smooth. For example when did the computing "revolution" take place? With the first electric mechanical computer, the first punched cards, the first main frame electronic computer? In retrospect we see a continuing expansion in

the general and, hence, in USDA's, computing capabilities.

There was considerable discussion of the use of satellite data by the authors. In my mind the construction of county highway maps and the introduction of aerial photography, both of which were used to construct the Master Sample frame, were far more important technological bumps for agricultural statistics than was the arrival of satellite imagery.

The authors have described how new statistical techniques, new data collection procedures, and new processing procedures have been adopted by the USDA. However, we would be remiss in our duty if we did not stimulate NASS to study outstanding problem areas and to speed their adoption of existing techniques and technologies.

I urge NASS to report more measures of reliability for their estimtes. Currently, NASS provides little information about variability of the estimates when it releases its estimates of crop acreages and livestock numbers. In fairness, this failing is shared by many federal agencies and, on occasion, by some Statistical Laboratories. None the less, I feel all of us, as statisticians, have a responsibility to provide our users with information about the variability of our estimators.

Fred Vogel has listed a number of problems worthy of study. Fred's list hints at user pressure for additional statistical data and mentions possibly expansions in released data. Clearly, there is an expanding demand for data and for data in a form that is computer accessible. With this demand for data, particularly the demand for microdata, comes an increasing concern for the confidentiality of respondents. While the authors did not mention this area, I know that problems of confidentiality and of respondent cooperation represent areas of concern to them.

The items on Fred's list reflect the two points made previously. Most of the items are not new. For example, I think the first sampler obtained a sample with an extreme observation on the sixth day. And rested on the seventh day because there was no satisfactory method available to handle such samples. Fred's list contains some of the general problems of statistics as they pertain to agricultural statistics, given our current social and technological setting.

I close with the observation that the future for agricultural statistics looks bright. The basis for that observation is the presence in the field of individuals such as the authors of today's papers.

REFERENCE

Fuller, W.A. (1984), The master sample of Agriculture. In Statistics: An Appraisal (H.A. David and H.T. David, Eds.) Iowa State University Press, Ames, Iowa.