



## **Recent Developments in Model-based Estimation Techniques in Agricultural Statistics**

Wendy J. Barboza\*

USDA, National Agricultural Statistics Service, Washington, DC, USA –

[wendy.barboza@nass.usda.gov](mailto:wendy.barboza@nass.usda.gov)

In June 2010, the National Agricultural Statistics Service (NASS) began an internal review of its survey and census programs to evaluate how well the agency adhered to the Office of Management and Budget's (OMB's) standards and guidelines related to disseminating estimates. The standard of interest states: "Agencies must use accepted theory and methods when deriving direct survey-based estimates, as well as model-based estimates and projections that use survey data. Error estimates must be calculated and disseminated to support assessment of the appropriateness of the uses of the estimates or projections. Agencies must plan and implement evaluations to assess the quality of the estimates and projections." The review found that many programs published direct survey-based estimates without including error estimates, so NASS changed these programs to adhere to the standard. For some programs, the review found that NASS utilized multiple data sources such as survey estimates and administrative data to produce crop and livestock estimates. To meet OMB's standard for these programs, NASS began to develop model-based estimates and forecasts with accompanying error measurements. This paper will provide an overview of three models, which are being incorporated into the operational environment. The model-based estimation approach utilized for these three projects depended on the data sources available as well as the nature of the data. This paper will discuss a hierarchical Bayes model for crop yield, a time series model for hogs, and a bivariate area-level model for cash rental rates.

**Keywords:** NASS; model; multiple data sources; uncertainty.