

# Adaptive Design and Sample Management:

Examples from the National Agricultural Statistics Service

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March 2013



“ . . . providing timely, accurate, and useful statistics in service to U.S. agriculture.”



# Start with the end in mind.....

- Start with the estimates and final data products, in order to plan data collection
- **What's the best use of your data collection time and resources if quality of statistics is the goal?**

# To align data collection goals with quality....

- **The data collection strategy is heavily dependent on the needs of the survey**
  - What are key estimates for the survey?
  - What auxiliary data are available?
  - How long is data collection period?
  - What non-response adjustment method is employed?
  - What standards are being used to judge quality?

# For Establishment Surveys.....

- Lots of information on sampled units may be available
  - Past survey contacts (data and response history)
  - Administrative data
  - Publicly available information
  - Info from special handling programs
- More pre-planning for data collection is feasible – proactive sample management

# Two NASS examples

- Agricultural Resource Management Survey (ARMS)
- Crops/Stocks Quarterly Survey

# Our examples...

## ARMS

- Collects farm financial information and costs associated with producing agricultural commodities
- Estimates at US, regional, and state level (for 15 states)
- Lengthy survey with historically low response rates (in the 60% range)
- Sample sizes typically >30k
- Data collection primarily in person over approx. 3 months

## Crops/Stocks

- Collects crop acreage, inventory and production and grain and oilseed stocks
- Conducted in June, September, December and March
- Estimates made for US and state (major commodities and specialty crops differ by state)
- Sample sizes large > 65k
- Data collection period is short (~2 weeks), RR near 80%
- Most data collection is central call center CATI with limited telephone, online, mail and in person interviews

# How is nonresponse handled?

## **ARMS**

- Estimates at US, regional, and state level
- Calibration weighting is used to compensate for nonresponse (including bias) and measurement error
- Multiple calibration targets used based on known external population totals
- ARMS records reweighted to meet targets

## **Crops/Stocks**

- Estimates made at US and state level
- Nonresponse adjustments are made based on strata
- NR strata defined by size in acres, grain storage capacity, and some specialty crops



# Managing data collection in ARMS

- Nonresponse propensity models available and can pre-identify likely nonrespondents
- Calibration targets are known in advance
- Must have minimum amount of target reported in order to use for weighting
- “Impact operations” -- records likely to be nonrespondents and with major contribution to calibration targets



# ARMS data collection strategies

- Target additional resources to likely nonrespondents, beginning with those whose impact on calibration may be greatest
  - Initial in person contact by field office director or other senior level staff
  - Data collection by experienced or supervisory interviewers only
  - Interviewer incentives for hard cases
- Ideally, monitor during data collection

# Managing data collection in Crops/Stocks?

- Also have nonresponse propensity models for this survey
- Additional resources can be targeted at likely nonrespondents
- With limited resources, which hard to get cases should be targeted?

# “Impact Operations” in Crops/Stocks

- Like many establishment surveys, farms are highly skewed
- Often a small number of operations will dominate an estimate – “impact operation”
- Some nonresponse strata can be a proxy for this
  - Strata with large operations (e.g. 5000+ acres) or specialty crops (potatoes)

# Data Collection Strategies Assigned to Crops/Stocks “Impact Operations”

- For those likely to be nonrespondents:
  - Managed by local field office;
  - field enumerator phoned
  - with in person follow up (\$\$\$)
- For those likely to be respondents:
  - Phoned by central phone center (¢)
  - At end of data collection, any of these “easy” cases still pending sent to field office for last attempts (\$)

# Some key differences

- ARMS
  - Strategies support weighting method; not targeted directly at estimates
  - In person interviews already primary strategy
- Crops/Stocks
  - Considered NR strata, but only to identify “impact records” key to survey estimates
  - Targeted effort at records within some NR strata
  - Strategies involve assignment of cases from central to local collection

# Outstanding Issues

- How to identify most “important” units
- What auxiliary information is useful? And how?
- How to identify most effective handling for these
  - Crops/Stocks: is local knowledge helpful for these cases?
  - ARMS: how to improve on in person response rates?
- How to evaluate impact of these strategies?
- Ethics of differential treatment of units
  - For example, incentives provided to only some establishments
- Impact of efforts on other surveys
  - Should we target follow-on survey subpopulations?
  - Should we target operations likely to fall in other surveys? (i.e. those with more NASS burden?)
  - Will extra efforts set expectations or opinions for respondents in other survey contacts?

# We are already treating different sample units differently

- But decisions are often made at local level to serve local goals (e.g. costs, overall response rates,)
- What decisions will improve quality?
- How do we align local decisions and actions with big picture goals?
  - Non-response adjustment strategies
  - Quality goals for estimates

# Going Forward....

- Of course.....More research is needed!
  - These efforts are in their infancy and still developing
- **The approach taken in data collection is heavily dependent on the needs of the survey**
  - What are key estimates for the survey?
  - What auxiliary data are available? What do we know about sample units?
  - How long is data collection period?
  - What non-response adjustment method is employed?
  - What standards are being used to judge quality?
- Data collection strategies should support quality estimates

*... some are unique to establishments but many of the issues are common to all surveys*