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Evaluating the June Area Survey's Field Enumerator Training

by

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Executive Summary

The National Agricultural Statistics Service (NASS) conducts over 400 agricultural surveys annually to make estimates on crops and livestock, explore production practices, and identify economic trends.

In 2015, NASS created the Response Rate Research Team (RRRT) to identify ways to improve response rates. The National Association of State Departments of Agriculture (NASDA) Training sub-team was formed to focus on telephone and field enumerator training. One of the sub-team's tasks was to look at improving current field enumerator training. In early 2017, the sub-team created pre- and post-field enumerator workshop evaluation forms for NASS's 12 regional field offices (RFOs) to use at their June Area Survey (JAS) training workshops.

The JAS is an area-frame-based annual survey that provides information on U.S. crops, livestock, grain storage capacity as well as number, type, and size of farms. The JAS sample is comprised of approximately 10,000 designated land areas (segments). A typical segment is about one square mile--equivalent to 640 acres. NASS Field interviewers are provided a paper aerial photo showing the sampled segment area and must account for all land inside the segment boundary. They divide each segment into tracts of land that represent unique operating arrangements. Field enumerators visit the segments, locate and interview the operator(s) of any land found to have agricultural activity, and record all agricultural activity associated with the operator on a paper questionnaire. Prior to the start of the screening and date collection stages, field enumerators attend a training workshop.

The study showed that overall, field enumerators found that the JAS training workshops increased their knowledge about the survey and increased their perceived confidence in explaining the purpose of the survey. This increase was noted across all field enumerators regardless of their level of experience with the JAS (from new hires to those having over 10 years of service).

The study also revealed other areas of the JAS training needing improvement. Field interviewers indicated that the trainers should spend more time conducting group exercises and instructing on how to properly complete *Section D* (Crops and Land Use on Tract) of the questionnaire and to draw out tracts and fields on the aerial photos.

Recommendations

- Continue conducting in-person field enumerator training workshops.
    - Spend more time on how to complete *Section D* (Crops and Land Use on Tract**)** of the questionnaire
    - Spend more time on how to draw out tracts and fields on the aerial photos.
    - Spend more time conducting group exercises.
- Explore the resources necessary for establishing a survey monkey license and additional staffing resources to maintain the data collection instruments.
- Compare the effectiveness of three training options: 1) In-person training 2) Online self-paced training and 3) Instructor-led online training.

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Abstract

The National Agricultural Statistics Service (NASS) conducts over 400 agricultural surveys annually to make estimates on crops and livestock, explore production practices, and identify economic trends. In 2015, NASS created the Response Rate Research Team (RRRT) to research how to improve response rates. A sub-team was formed to focus on telephone and field enumerator (interviewer) training. One of the sub-team's tasks was to look at improving the current field enumerator training. In 2018, the sub-team studied the effectiveness of its June Area Survey (JAS) field enumerator training workshops using pre- and post-training evaluation forms.

The study showed that overall, field enumerators feel that the JAS training workshops are increasing their knowledge about the survey and thus their perceived confidence in explaining the purpose of the survey. This increase is seen across all field enumerators from new hires to those having over 10 years of service.

The study also revealed other areas of the JAS needing improvement. Field interviewers indicated that trainers should spend more time conducting group exercises and instructing on (1) how to properly complete *Section D* (Crops and Land Use on Tract) of the questionnaire and (2) how to draw out tracts and fields on the aerial photos.

Key Words: training, agriculture, workshops, field enumerators, surveys

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1. Introduction

The National Agricultural Statistics Service's (NASS) primary purpose is to provide timely, accurate and useful statistics on United States' and Puerto Rico's agriculture. NASS conducts more than 400 agricultural surveys annually for the purpose of producing estimates on crops and livestock, exploring production practices, and identifying economic trends. The data collection modes employed are mail, fax, telephone, personal interview, and the internet.

In 2015, NASS formed the Response Rate Research Team (RRRT) to determine how to improve response rates. Multiple sub-teams were established to examine various aspects of the data collection process and to obtain feedback from NASS customers (farmers, data users, agricultural associations, NASS staff, and National Association of State Department of Agriculture (NASDA) enumerators). NASDA employs the telephone and field enumerators for all of NASS's data collection activities.

The NASDA Training sub-team was formed to focus on telephone and field enumerator training. One of the sub-team's tasks was to look at how to improve field enumerator training.

In early 2017, the sub-team developed and disseminated pre- and post-field enumerator training evaluations to NASS's 12 regional field offices (RFOs) to measure the effectiveness of their June Area Survey (JAS) training workshops. A formal study was never intended. These evaluations were provided to the RFOs to use as desired. Some, but not all, regions used the forms. After the training workshops, the sub-team received copies of the evaluation forms. However, after reviewing them, the sub-team determined that these evaluations would not be practical to draw statistically valid generalizable conclusions. These findings were not surprising since the forms were not originally intended to be used in a study. NASS's Northern Plains RFO (NPRO) converted the paper evaluation forms to web questionnaires utilizing Survey Monkey. As a result, the information collected was in an electronic format, making the output readily available for statistical analysis.

In late 2017, the sub-team decided to conduct a formal study taking the lessons learned from their earlier efforts. The sub-team originally focused on the Agricultural Resource Management Survey Phase III (ARMS III). However, resources to design, test, and deploy survey evaluations were unavailable. In addition, it was too late to make changes to the ARMS program. The next scheduled field enumerator workshop was for the June Area Survey (JAS). Thus, working jointly with NASS's Training Group, the JAS was selected.

2. Goals

The goals of this research were: 1) determine whether field enumerator training is effective; 2) describe NASS's current field enumerator training; 3) research NASS's past research in evaluating field enumerator training; 4) analyze the pre- and post-training evaluations; and 5) provide recommendations to improve field enumerator training.

3. June Area Survey

The JAS is an annual survey that provides information on U.S. crops, livestock, grain storage capacity and the number, type, and size of farms. The JAS sample is comprised of approximately 10,000 designated land areas (segments). A typical segment is about one square mile--equivalent to 640 acres. Each segment is outlined on an aerial photo and provided to NASS field interviewers (enumerators). Field enumerators visit these segments, locate and interview the operator(s) of any land found to have agricultural activity, and record all agricultural activity associated with the operator on a paper questionnaire. A separate paper questionnaire is completed for each agricultural operation operating any land within the segment. *Appendix A* provides definitions of segments, tracts, agricultural tracts, etc.

4. NASS's Current Training of Field Enumerators

Before the JAS workshop, field enumerators are sent an Interviewer's Manual, a copy of the JAS questionnaire, and practice exercises. The training workshop generally involves a review of the JAS questionnaire including the most difficult sections and a review and handout of JAS assignments, aerial photos, and questionnaires for each field enumerator. During the workshop, role playing exercises as well as various practice exercises are conducted. The workshop also covers how to handle refusals and inaccesibles and how to handle other surveys that are overlapping with the JAS. Time is also devoted to updating field enumerators' iPads. Although currently not used for JAS, the iPADs are being used for those surveys running concurrently with JAS. In 2018, the training budget was reduced causing some RFOs to limit their workshops to only the enumerators' supervisors. The supervisors would afterwards train their enumerator staff as needed. This was a major change from previous years.

5. NASS's Past Research on Field Enumerator Training

Typically, at the conclusion of a training workshop, attendees are provided with a post-workshop evaluation with the typical questions pertaining to what went well and what areas need improvement. These evaluations are reviewed and used to improve the following year's training. For multiple-day workshops, some of NASS's 12 RFOs conduct daily evaluations to understand what topics need to be review the next day. In addition, the evaluation forms are not standardized across each RFO. None of these efforts have led to a formal research report.

6. External Research on Field Interviewer Training

A number of studies point to the importance of evaluating training. The following are some of the highlights.

In *Evaluating Workshops and Institutes Practical Assessment*, Ayers (1989) stated that evaluating training workshops show 1) the real worth of a training program, 2) how to improve future workshops, and 3) justification for current funding and become the basis for future funding.

Beth Kanter (author, speaker, and master trainer) recommends including an evaluation survey for workshops. The survey should have questions to measure participants' views on whether the instructor has been an effective teacher and whether the workshop has been effective in advancing the participants' learning. Stiegler & Biedinger (2016) stated that the optimization of data quality begins with the selection of the interviewers, continues in interviewer training, and ends with interviewer monitoring.

In 1959, Donald Kirkpatrick created the Four-Level Training Evaluation Model to help trainers measure the effectiveness of their training in an objective way. This model has evolved over time and has become the gold standard. Today, the four-levels are as follows: 1) Reaction, 2) Learning, 3) Behavior and 4) Results. Kirkpatrick, (1996) also mentions the importance of keeping in mind the practicality and expenses when evaluating training.

The Kirkpatrick Model has been modified by companies over time to the following:

- Pre-training skills assessment: Measure the learner's level of knowledge or skill pre-learning and again post learning.
- Application in the workplace: Assess whether the newly learned skills or knowledge are being applied in the workplace.
- Individual behavior assessment: Assess whether the training improved the individual's embracement of the corporate culture and goals.
- Team behavioral assessment: Measure whether teamwork is being more coherent and effective.
- Meeting goals or targets: Measure the individual/team performance against goals or targets every few months to assess the impact of the learning.

7. The Study

After a general review of the 2017 pre- and post-field enumerator training evaluation forms and receiving technical guidance from NASS's survey methodologists, Kathy Ott and Heather Ridolfo, the 2018 field enumerator training evaluations were re-designed. The questionnaire was comprised of a series of 10-point scale questions. This was based on research by Wittink and Bayer, (1994). Additionally, the sub-team decided to add several open-ended questions.

Justin VanWart of the NPRO updated the Survey Monkey web survey versions accordingly. Screen shots of the pre- and post-workshop evaluations are provided in *Appendices* B and C.

The 12 regional offices were given the option to participate in the research study. The Delta, Eastern Mountain, Great Lakes, Heartland, Mountain, Northern Plains, Northwest, Pacific, Southern Plains, and Upper Midwest agreed to participate.

8. Methods, Analyses & Findings

The regions participating in the study provided their feedback on using and receiving the pre- and post-workshop evaluations. The training evaluation data were downloaded from Survey Monkey, processed, and analyzed. Basic statistics from Survey Monkey were disseminated to the respective RFOs.

There were 1,108 partially completed/completed pre-evaluation forms and 819 completed post-evaluation forms. Duplication caused by multiple submissions by field enumerators were removed from both data sets. Records with missing or erroneous enumerator IDs and those having only one of the two evaluations forms completed were also removed from the data sets. Thus, the total number of good matches was 534 or 48 percent. In the future, the number of missing/erroneous IDs will be reduced by adding a "hard" edit check in the enumerator ID field and perhaps a more sophisticated edit can be programmed to determine whether the field enumerator has completed a pre-evaluation before providing the post evaluation.

The Wilcoxon Signed Rank Test was utilized to assess whether significant differences in perceived knowledge were found after completing the training. The Wilcoxon signed-rank test is a non-parametric statistical hypothesis test used to compare two related samples, matched samples, or repeated measurements on a single sample to assess whether their population mean ranks differ (i.e. it is a paired difference test) (Wilcoxon, Katti & Wilcox, 1963). Each question was evaluated pre and post training.

8.1 The Screening Process and Screening Form by Years of Service

Overall, trainees experienced a significant increase in knowledge about the screening form and process. However, according to the values in the actual estimate column (*Table 1*), new employees (0-3 years) experienced the greatest increase in perceived knowledge with an average increase of 2.28 points after training. The training had the smallest effect (yet still significant, $p < 0.01$) on more experienced employees. The evidence shows that the training was a success in increasing the enumerators' perceived knowledge of the survey.

Table 1: Screening Process and Screening Form by Years of Service

Years of Service	Wilcoxon Signed Rank P-Value	Paired T-Test P-Value	Actual Estimate Absolute Value	N
0-3 Years	<0.001	<0.001	2.28	237
4-9 Years	<0.001	<0.001	0.76	135
10+ Years	<0.001	<0.001	0.30	158
All	<0.001	<0.001	1.3	534

8.2 The Purpose of *Section D* and How to Use It?

Field enumerators consistently stated that *Section D* was a difficult section of the questionnaire due to its complexity. Overall, trainees experienced a significant increase in knowledge in how to complete *Section D*. According to the values in the actual absolute estimate column (*Table 2*), new employees (0-3 years) experienced the greatest increase of perceived knowledge (an average 2.31 point increase after training). Older employees (10+ years) experienced the least amount (yet still significant) of knowledge gained. These findings suggest that the majority of enumerators increased their knowledge of *Section D*, especially those with little experience.

Table 2: Purpose of Section D and How to Use It?

Years of Service	Wilcoxon Signed Rank P-Value	Paired T-Test P-Value	Actual Estimate Absolute Value	N
0-3 Years	<0.001	<0.001	2.31	235
4-9 Years	<0.001	<0.001	0.88	133
10+ Years	0.003	0.001	0.29	154
All	<0.001	<0.001	1.35	526

8.3 The Purpose of the Other Parts of the Questionnaire?

Field enumerators were asked for their thoughts pertaining to the rest of the questionnaire. Overall, trainees perceived a significant increase in knowledge about the purpose of other parts of the questionnaire. According to the values in the actual estimate absolute column (Table 3), new employees (0-3 years) experienced the greatest increase (an average 2.39 point increase after training). Older employees (10+ years) experienced the least amount (yet still significant) of knowledge gained.

Table 3: The Purpose of the Other Parts of the Questionnaire

Years of Service	Wilcoxon Signed Rank P-Value	Paired T-Test P-Value	Actual Estimate Absolute Value	N
0-3 Years	<0.001	<0.001	2.39	237
4-9 Years	<0.001	<0.001	0.84	133
10+ Years	<0.001	<0.001	0.35	150
All	<0.001	<0.001	1.39	521

8.4 How Confident are you in Your Ability to Explain the Purpose of this Survey?

Overall, trainees experienced a significant increase in their perceived confidence on how to explain the purpose of the survey. According to the values in the actual estimate column, new employees (0-3 years) experienced the greatest increase (an average2.01 point increase after training). Older employees (10+ years) experienced the least amount (yet still significant, $p < 0.01$) of knowledge gained. Knowing the purpose of the survey and having self-confidence are key aspects in having a successful data collection effort and improved data quality.

Table 4: How Confident are you in Your Ability to Explain the Purpose of this Survey?

Years of Service	Wilcoxon Signed Rank P-Value	Paired T-Test P-Value	Actual Estimate Absolute Value	N
0-3 Years	<0.001	<0.001	2.01	235
4-9 Years	<0.001	<0.001	0.96	133
10+ Years	<0.001	0.002	0.31	153
All	<0.001	<0.001	1.24	525

8.5 Text Analysis of Opened-ended Questions

A text analysis using SAS 9.2 and Text Explorer in SAS JMP 13 Pro was conducted on the open-ended questions 6-9 of the pre-training evaluation and questions 6-11 of the post-training evaluations. See *Appendices C* and *D* for copies of the evaluations.

8.5.1 Text Analysis of Pre-Evaluation Form

Questions 6 and 7 pertain to the field enumerators' perception of the most difficult sections of the questionnaire and what they would like to have covered more in the training workshop. According to term and phrase frequency lists, *Section M* (Land Values) and *Section D* were mentioned over 100 times as being the most difficult for JAS's respondents to complete. In addition, *Section D* was mentioned approximately 100 times when enumerators were asked what additional information they wanted covered at the training workshop.

Questions 8 and 9 pertained to concerns about enumeration and reasons for non-response. The number one concern that field enumerators mentioned was time (or lack thereof) of the farmers/ranches sampled. The overarching theme in these responses, according to term and phrase lists, is that there are too many surveys and not enough time for the farmers/ranchers to complete

them. In addition to lack of time, issues with government trust and busy respondents were the most mentioned reasons for nonresponse as perceived by field enumerators in Question 9.

8.5.2 Text Analysis of Post-Evaluation Form

Question 6 pertains to the field enumerators' perception of whether the survey was explained adequately. According to the post survey response, 97 percent (517) said "yes" when asked if all aspects of the survey were covered during the training.

Questions 7 and 8 ask for the field enumerators' perception on what they found most and least useful in the training. According to Question 7 and *Figure 1*, the field enumerators thought that the *Section D* training was the most useful. Based on the responses in Question 8, a majority of people indicated that all the information was useful in varying degrees.

Figure 1: Word Cloud of Most Useful Training Items

Question 9 pertains to areas of the survey that field enumerators would prefer more training time on. According to term and phrase frequency, three themes emerged: (1) *Section D*, (2) maps, and (3) group practice.

Enumerators were also asked to indicate where in the training less time could be devoted to going forward (Question 10). Responses appeared fairly random, except that many (37) mentioned "nothing" in their answers, indicating that they perceived their time was well spent overall.

Questions 11 and 12 focused on what field enumerators would like to have done differently in the workshop. Additional comments appear quite specific to each individual. However, there were high frequencies of positive terms and phrases such as "nothing," "good," and "great." These are indicative that the information conveyed during the workshop was well-received.

9. Discussion & Lessons Learned

NASS continues to search for ways to improve the efficiency and overall quality of the field enumerator training. Evaluating field enumerator training workshops provides the agency with a

baseline to determine whether resources allocated to training are effective. Future research could be done to compare the effectiveness of in-person instructor led training, online self-paced training, and instructor-led online training.

Having the training evaluations available online has several benefits: 1) edit checks to improve data quality 2) eliminate the need for paper forms, and 3) receive results faster. Also, the data can be reviewed once the evaluation has been submitted to make sure the trainees are completing the form as intended. In the future, NASS may want to consider the excerpt from John Eades's 2014 blog on "*3 Ways to Measure Training Effectiveness*". John Eades is an author, speaker on leadership development and organizational alignment, and CEO of an e-learning company. He states that:

> "Creating a visual assessment of an employee's skill set and performance before and after a training moment. These snapshots, or skylines, of a learner's abilities can give a clear picture of performance and skill improvements you can directly tie to training. A simple example would be, testing a sales person's current sales skills prior to training, then retesting the individual after the event to see the delta."

At NASS, this could be a dashboard displaying each enumerator's performance, including skills attained, goal-oriented behaviors, teamwork skills and targets met. NASS could better monitor interviewer performance with this type of visual assessment of employee skills pre and post training, and apply adaptive or tailored training curriculum where the data show an area of needed improvement.

Training evaluations and online displays could also be expanded to include the ARMS Phase III and Objective Yield to measure the effectiveness of these field enumerator training workshops. The regional field offices' staff were also greatly appreciative with the insight that the training evaluations provided.

If formal evaluation of training workshops continues, we suggest the following strategies to improve future studies:

- Add a "hard" edit check to the enumerator ID question on the pre and post-evaluation forms where it is not only required but also the length of the input is correct. This will reduce the number of non-matching completed pre- and post-training evaluations.
- Program Survey Monkey to reduce the number of repeated submissions.
- Define reasons why field enumerators are not able to complete both evaluations.
- Review what the two non-participating regions are doing and try to standardize/add questions so these regions could be added into future studies.

10. Recommendations

- Continue conducting in-person field enumerator training workshops.
    - Spend more time on how to complete *Section D* (Crops and Land Use on Tract**)** of the questionnaire and how to draw out tracts and fields on the aerial photos.
    - Spend more time conducting group exercises.
- Explore the resources necessary for establishing a Survey Monkey license and the additional staffing resources required to maintain the data collection instruments.
- Compare the effectiveness of three training options: 1) In-person training, 2) Online self-paced training, and 3) Instructor led online training.

11. Conclusion

Overall, field enumerators indicated that the JAS training workshops are increasing their knowledge about the survey and increasing their perceived confidence in explaining the purpose of the survey. This increase is across all enumerators regardless of the level of experience but greatest for less experienced field enumerators.

Trainers need to spend more instruction time on *Sections D* of the questionnaire and on drawing tracts and fields on the aerial photos. In addition, more time should be dedicated to conducting group exercises.

As training budgets tighten, other training options, such as online self-paced training and instructor-led online training, should be explored. This research is a start to defining a baseline to compare these other training options with the current in-person instructor-led training.

In conclusion, the research shows that NASS should continue to hold in-person instructor-led field enumerator workshops for the JAS.

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Appendix A
JAS Definitions

Segments: Land areas with identifiable boundaries such as ditches, roads, railroads, streams, etc. that serve as sampling units in the June Area Survey. Segments are assigned a permanent number and outlined in red on aerial photos. Segments generally range in size from one-half square mile to three square miles.

Tract: An area of land inside a segment under one type of land operating arrangement.

There are two types of tracts:

1.) Ag Tract: Consists of agricultural land.

2.) Non-Ag Tract: Consists of residential, shopping centers, lakes, woods, and any land not considered agricultural.

Usable: Completed reports for agricultural tracts - questionnaires containing usable data.

Appendix B
Pre-Workshop Evaluation Form

1. How many years have you worked on this survey?

- ◯ 0-3 years
- ◯ 4-9 years
- ◯ 10 years or more

Please rate how knowledgeable you are on the following parts of the June Area

Survey by moving the slider below and using the following scale: 0 = no knowledge and 10 = very knowledgeable

2. The screening process and the screening form:

0=no knowledge 10=very knowledgeable

3. The purpose of Section D (Crops and Land Use on Tract) of the questionnaire and how to complete it

0=no knowledge 10=very knowledgeable

4. The rest of the June Area questionnaire

0=no knoweledge 10=very knoweldgeable

5. Where 1 = "Not at all confident" and 10 = "very confident" how confident are you in your ability to explain the purpose of the survey to respondents?

0=not at all confident 10=very confident

6. What sections/parts of the survey do you think will be most difficult for the respondents and why?

Appendix B
Pre-Workshop Evaluation Form – Continued

7. What particular questions or sections of the survey would you like to have covered or explained further at the workshop?

8. What particular questions or concerns do you have about other surveys, enumeration, NASS, and/or NASDA that you would like discussed at the workshop? Please be specific.

9. What reasons do you expect to hear from farmers/ranchers for not wanting to participate in this survey?

* 10. Please select your state

11. Please enter your full enumerator number (for example, in Nebraska, my number is 234 and Nebraska is the 31st state so my full number is 31234)

Appendix C
Post-Workshop Evaluation Form

1. How many years have you worked on this survey?

- ◯ 0-3 years
- ◯ 4-9 years
- ◯ 10 years or more

Please rate how knowledgeable you are on the following parts of the June Area

Survey by moving the slider below and using the following scale: 0 = no knowledge and 10 = very knowledgeable

2. The screening process and the screening form:

0=no knowledge 10=very knowledgeable ☐

3. The purpose of Section D (Crops and Land Use on Tract) of the questionnaire and how to complete it

0=no knowledge 10=very knowledgeable ☐

4. The rest of the June Area questionnaire

0=no knowledge 10=very knowledgeable ☐

5. Where 1 = "Not at all confident" and 10 = "very confident" how confident are you in your ability to explain the purpose of the survey to respondents?

0=not at all confident 10=very confident ☐

6. Do you feel all aspects of the survey were explained adequately?

- ◯ Yes
- ◯ No

If No, please explain

Appendix C
Post-Workshop Evaluation Form - Continued

7. What was the **most useful** information to you?

8. What was the **least** useful?

9. What should **more time** be spent on?

10. What should **less time** be spent on?

11. What could we do differently at future workshops?

12. Additional comments about the workshop.

* 13. Please select your state

14. Please enter your full enumerator number (for example, in Nebraska, my number is 234 and Nebraska is the 31st state so my full number is 31234)