

1985 AND 1986 CENSUS OF AGRICULTURE TESTS

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1. INTRODUCTION

1.1 Summary

The objective of the census of agriculture is to enumerate all places from which \$1,000 or more of agricultural products were sold (or normally would have been sold) during the census year. Since 1969 the census of agriculture has been a mailout/mailback enumeration rather than a personal one. The census mail list is compiled using records from statistical and administrative lists associated in some way with agriculture. Every effort is made to identify and remove duplicate and nonfarm addresses from the preliminary compiled list, yet many such addresses receive a census report form. All recipients are asked to return completed forms and duplicates. Because nonfarm operators and operators engaged in minimal agricultural activity often think the census does not apply to them, the mail request must motivate response and clearly instruct all recipients to provide the requested information.

A high level of response is required to enumerate farms and to account for duplicate and nonfarm address records. To evaluate response to different forms and mail procedures, tests were conducted prior to the 1987 Census of Agriculture. Two mail tests were designed to evaluate mail followup methods, questionnaire format, and two short questionnaires (an optical mark reader short categorical form and a noncategorical short form). To obtain additional insight into respondents' understanding of the census form, Census Bureau personnel conducted personal and telephone reinterviews with respondents, personal interviews with nonrespondents, and classroom observations and experiments. These tests were structured to evaluate new census content items and to gain insights into data reporting problems.

The test results demonstrated that:

- o a thank you/reminder card is effective in increasing census response, but a precensus letter is not,
- o a letter followup is more effective than a postcard,
- o an agricultural data pamphlet included in the last mail followup was not effective in increasing response,
- o response to the booklet did not differ significantly from response to the foldout questionnaire,
- o response to a categorical short form at the last mail followup was better than to the census form,
- o the categorical form had high read and farm classification error rates,

- o the short form with a question screening for agricultural activity had a high farm classification error rate,
- o reasons for not responding to the census are quite varied,
- o further work on census question format and wording is needed.

A discussion of the mail and reinterview sample designs for the two tests follows immediately. Our experience with mail followup methods, questionnaire format, questionnaire content, reasons for not responding to the census, a categorical questionnaire, and a shorter census questionnaire is described in sections 2 through 7 of the paper. Section 8 discusses application of the test results to the 1987 Census of Agriculture data collection procedures and report form design. Section 9 presents plans for future research.

1.2 Design of the Tests

A sample of 43,938 addresses was selected from the 1982 Census of Agriculture mail list for the 1985 test (Alberti, 1985). Four independent samples were systematically selected--a sample of 3,077 addresses from eight counties stratified by crop and livestock and value of sales; a sample of 30,981 addresses with 1982 reported total value of agricultural product sales (TVP) between \$1,000 and \$500,000, proportionally allocated by expected sales; a sample of 5,680 farm addresses in 1982 with mail size code 13 (unknown size) before mailout; and a sample of 4,018 nonrespondent addresses with mail size code 13. All records in the eight counties were excluded from selection in the three national samples. The national sample was randomly divided into five panels. Panels 1 through 4 had approximately 10,000 addresses each while panel 5 had 800 addresses.

The county sample was designed to obtain information about the census form through personal interviews with farm operators. The counties selected provided geographic distribution across the United States and coverage of varied types of agricultural operations. One hundred of the first 175 respondents from six of the counties were randomly selected for field reinterview. A reinterview report form was developed, focusing on known reporting problems. It included instructions for probes for a maximum of three incomplete or inconsistent sections. An additional systematic sample of 20 test nonrespondents from each county was selected for personal interview, to obtain the respondents' reasons for not returning the test census form. Field interviews, conducted twelve weeks after mailout, obtained a complete response from 464 of the 600 respondents and 69 of the 120 nonrespondents.

A modified 1982 census sample form and a new optical mark reader (OMR) categorical short form were used for the 1985 test. The census sample

form contains all sections on the regular census form plus six additional sections. In the census, the sample form is mailed to all large and unique operations and a sample of remaining addresses. Testing this form permitted evaluation of all data items collected for the census. The OMR form was used to determine if a shorter, less complex form elicited response from hardcore nonrespondents and provided accurate data for farm classification. Respondents from the sample receiving the categorical short form were reinterviewed by telephone to evaluate the mail farm classification.

Because the results from the test of the OMR categorical short form had high read and farm classification error rates, a short noncategorical form was designed to collect somewhat more detailed data (than the OMR form) from mail list addresses that were expected to be small or unlikely to represent farm operations. A stratified systematic sample of 1982 farm operations was selected from cases whose 1982 reported TVP was less than \$40,000. A subsample of 3,136 addresses (including all cases specializing in vegetables, fruit, and horticulture--to obtain adequate data review of these items) received the short form in December 1986. The completeness and accuracy of the reported data was evaluated through a telephone reinterview of mail respondents.

2. TEST OF MAIL FOLLOWUP METHODS

2.1 Background

To reduce costs of census followup mailings and to more efficiently process census data, the Agriculture Division desired to increase response to the census. In past censuses an initial mailing was made in mid-December (with a census due date of February 15) followed in the next six months by a sequence of cards, letters, and forms accompanied by letters to nonrespondents. A thank you/reminder card mailed after the initial report form (but at different points in the data collection process) was used for past censuses, though there was no comparison data on its use. The highest level of response in past censuses occurred near the census due date, with response peaking approximately three weeks after a followup mailout. A test of variation in the sequence of mailings of letters and forms indicated that a form elicited a higher level of response (Ruggles, 1984). It was suggested that a precensus letter might motivate census response.

To determine whether an acceptable level of response could be achieved earlier in the census, the test census due date was February 1 rather than February 15. Though forms elicit a higher level of response, the budget would not permit their use for all followup mailings. Consequently, a sequence of third class mail followups was tested. This alternated forms accompanied by letters and letters alone. A four week period between followups was selected (to minimize contacts to respondents who had just returned their forms in response to the last followup). Statistical tests were designed for a precensus letter, a thank you/reminder card mailed prior to the due date, a post card

followup (instead of a letter), an agricultural data pamphlet with the second form followup, and an OMR form in lieu of the second form followup (see Section 6).

2.2 Experimental Design

Panels 1 - 4 of the three national mail samples were used in a complete factorial design to test variants in the mail followup procedures (Chart 1). Panels 1 and 2 had no precensus contact, while panels 3 and 4 did. All addresses in panels 1 and 4 received a thank you/reminder card between the initial form mailout and the February 1 due date, while nonrespondents received a report form after the due date. Four weeks after the first form followup was mailed, nonrespondents in each panel were randomly divided into two equal subpanels, one of which received a card and the other a letter. Five weeks after this followup all remaining nonrespondents received a form, while half of the nonrespondents in each subpanel also received an agriculture fact sheet. Because the response behavior of mail size code 13 addressees differs greatly from the other mail size groups, the mail followup methods were analyzed independently for the two size groups.

CHART 1

MAIL FOLLOWUP TEST

	PANEL 1	PANEL 2	PANEL 3	PANEL 4
12/06	--	--	PRECENSUS LETTER	PRECENSUS LETTER
12/31	INITIAL MAILOUT	INITIAL MAILOUT	INITIAL MAILOUT	INITIAL MAILOUT
1/15	THANK YOU/ REMINDER CARD	--	--	THANK YOU/ REMINDER CARD
2/7	REPORT FORM	REPORT FORM	REPORT FORM	REPORT FORM
3/6	CARD OR LETTER	CARD OR LETTER	CARD OR LETTER	CARD OR LETTER
4/10	REPORT FORM	REPORT FORM	REPORT FORM	REPORT FORM

2.3 Results

Responses to the mail test consisted of all form receipts excluding postmaster returns (undeliverable mail). The response rate for each group was calculated weekly by dividing the total responses by the total forms mailed minus the postmaster returns. The most effective mail followup methods were determined using response rate as a factor in an analysis of variance controlling for size of operation (Winters, 1986). The tests of the precensus notice and thank you/reminder card used response rates as of February 21, the test of the card used response rates as of April 17, and the test of the data pamphlet used response rates as of May 15. The data for the last test excluded

records for which the expected TVP was less than \$10,000 or that had size code 13, as these records were used in the test of the OMR form.

The test results demonstrated that:

- o the precensus notice was not effective for either size group,
- o the thank-you/reminder card was effective in increasing census response for both size groups,
- o the letter was more effective than the card for the nonmail size 13 group, but there was no significant difference between the card and the letter for the size 13 group,
- o the agriculture data pamphlet was not effective for either size group.

The only seemingly inconsistent result for the two size groups was the effect of a card versus a letter. The fact that there was no significant difference between the card and the letter for the mail size 13 group may indicate that minor differences in procedures do not motivate this group to respond. Additional comparisons of response rates on given dates were made between the mail test and the 1982 census to verify that the changed due date had not reduced response. A statistical test of the change in the due date was not built into the experimental design.

3. TESTS OF QUESTIONNAIRE FORMAT

3.1 Background

A booklet style report form was proposed for the 1987 census to facilitate imaging and processing, and to alleviate many of the design constraints imposed by the 10 1/4" x 14" multiply folded form used in the previous two censuses. Low response to the 1974 census (which used a lengthy booklet style form) had triggered the design of the foldout form. Since problems other than the format of the 1974 report contributed to the low response, a booklet style form with the same content as the 1982 foldout form was considered a viable test option. The mail test was designed to compare response for the two formats.

3.2 Experimental Design

All addresses in Panels 4 and 5 with mail size code other than 13 were used to compare the booklet form to the foldout. For this sample universe, Panels 4 and 5 had 7,541 and 801 cases, respectively. Panel 4 had a larger size because it was used to test several mail followup procedures. Both panels received mailings of the same type on the same schedule. Response rates were monitored from initial mailout to May 13 (test closeout).

Staff reinterviewed respondents in the six cluster counties who had received a foldout form to determine how difficult the respondent had found the foldout form to be (very hard, somewhat hard, somewhat easy, very easy), and the relative difficulty of the booklet form (harder, same, easier) shown to the respondent. Two factors limited the results from this test--(1) the reverse mail interview procedure vis a vis foldout and booklet was not tested, and (2) different colors were used for the two

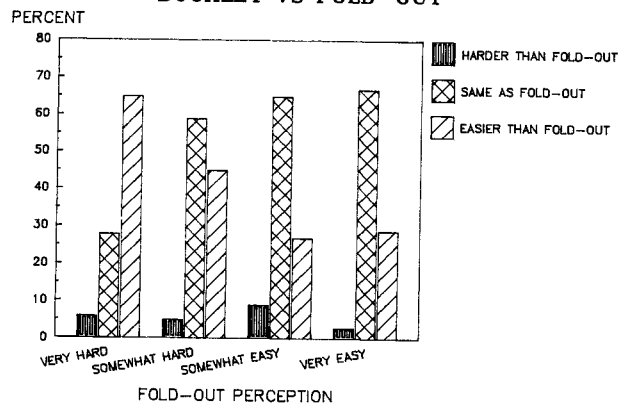
forms (blue for the foldout and yellow for the booklet).

3.3 Results

The cumulative response rates of 77.6 percent for the foldout and 75.4 for the booklet were tested at the May 13 closeout and found not to be significant at the .05 level (Ausby, 1986). Response rates were also tested by weekly increase, by operation size, and by geographic region. The only significant difference was in the response rate for the week ending January 31, where the response to the foldout was higher than to the booklet.

The respondents reinterviewed on form perception (274 of the 464 completed interviews) felt that the ease of completing the two forms was about the same (Chart 2). For respondents indicating a preference between formats, more thought the booklet looked easier than thought it looked harder (chi-square significant at .01). Contingency table analysis revealed a significant dependence between the respondents' perception of the foldout and the booklet. People who reported that the foldout appeared to be hard thought the booklet appeared easier.

CHART 2
FORM PERCEPTION
BOOKLET VS FOLD-OUT



4. TEST OF QUESTIONNAIRE CONTENT

4.1 Background

As previously mentioned, reinterviews were conducted in six counties to obtain both respondent and nonrespondent information on specific aspects of the report form and the data collection process. Section 4 provides information obtained from respondents; Section 5 deals with the mail nonrespondents.

4.2 Reinterview Questionnaire Design

The method of selecting cases from six counties for reinterview was described in Section 1.2. The reinterview questionnaire had the following components: (1) respondent verification, general questions about the census report form (including perception of the form), recall time for completion, and need for file copy, (2) questions on acreage, contract crops, livestock inventory and sales, (3) probes for

three specified incomplete items, (4) probes for specified inconsistent response items. When probing for incomplete items, the interviewer showed the respondent a card with seven specified reasons for not answering census items. These reasons included: did not see, did not think it applied, did not understand, did not have information needed, did not want to give information, some other reason, and did not know why omitted.

4.3 Results

The results from the 464 reinterviewed cases in the six counties indicate that acreage was generally correctly reported, acreage and land use data are often inconsistent, crop and livestock reporting could be improved by obtaining an indication of whether either were contracted, and the use of "none" and "yes/no" boxes would improve data reporting (Polgreen, 1986).

5. REASONS FOR NOT RESPONDING

5.1 Background

Historically, nonresponse to census of agriculture mailings has approximated 15 percent. Results from a sample-based survey of nonrespondents used to adjust census data have demonstrated that the farm status of mail list nonrespondents differs from that of respondents. Because nonrespondents were also expected to differ in other ways, information was sought from nonrespondents to better identify means of eliciting response from them.

5.2 Questionnaire Design

The questionnaire collected data to evaluate the following tasks associated with completing and mailing the census form: opening the envelope containing the census report form, filling out the census form, completing the census form, and mailing the census form back. Nonrespondents' perceptions of the census form and their reasons for not responding to the data request were also determined. Agricultural activity questions were asked to determine the agricultural status of the nonrespondents' operation.

5.3 Results

The agricultural operation status for the 69 interviewed nonrespondents was obtained to analyze response (by farm status) to the tasks of completing the report (Ausby, 1986). Forty-four (64 percent) were farm operators; 14 (20 percent) were not farm operators; 11 (16 percent) could not be classified. When shown the envelope containing the census report, 60 said that they received the envelope; 11 of the 60 receiving the envelope did not open it. Of the 49 nonrespondents who opened the census envelope, only 15 started to fill out the form. All the interviewed nonrespondents were shown a foldout report form and asked for their perception of the difficulty of the form when they first saw it--was it very hard, somewhat hard, somewhat easy, or very easy to complete. Fifty-six percent thought the form appeared to be either somewhat hard or very hard to complete and 44 percent thought it appeared to be

somewhat easy. This was in direct contrast to the distribution for the 457 interviewed respondents where 44 percent thought that the form appeared to be either somewhat hard or very hard to complete, 56 percent thought it appeared to be somewhat easy or very easy (Polgreen, 1986).

The nonrespondents were shown a card stating five reasons for not responding to the data request--didn't apply, didn't understand, didn't have the information, didn't want to, or some other reason. Over half of the 43 nonrespondents reporting this data categorized their response as some other reason. Such reasons included: disliked government, did not get around to it, out of town, wife supposed to do it, did not have the time, faced foreclosure, waited to do it with income tax, never fills out forms, and will fill out if paid.

6. 1985 OMR CATEGORICAL SHORT FORM TEST

6.1 Background

The response to the census tapers off dramatically about four months after the initial census mailing. To determine whether response could be motivated late in the data collection process, two mail procedures were tested during the second form followup: (1) an agriculture census data pamphlet included with the form (discussed in Section 3), and (2) an optical mark reader (OMR) categorical form designed to provide sufficient agricultural data for determining farm status and imputing data for small operations.

6.2 Experimental Design

The test universe included all nonrespondents whose expected TVP was between \$1,000 and \$10,000 or had mail size code 13. Half the cases from each subpanel (4,452) received the OMR form and half received the census form. Response rate, OMR machine read error rate, and farm classification error rate were examined. To evaluate the OMR form machine readability, the farm status assigned by the machine edit was compared to that assigned clerically. The same classification rules were programmed for the OMR equipment as were used for the clerical classification. To evaluate OMR form farm status classification, a telephone reinterview was conducted for a sample of 600 respondents. The farm status assigned clerically (based on the OMR form data) was compared to the status based on more detailed reinterview data (which was considered to be the true status).

6.3 Results

Weekly cumulative response rates to the second form mailing were calculated for both groups over a five week period. All weekly cumulative response rates for the OMR form were significantly higher than for the census form at the .01 level of significance (Owens, 1986).

Forty-three percent of the OMR forms (435 of 1,005) had a different farm status assigned by the OMR equipment than clerically. Use of writing instruments other than #2 pencils and lack of care in filling the circle contributed to this higher than expected error rate (Owens, 1989).

The farm status classification, upon reinterview, differed from the clerical assignment for nine percent of the reinterview respondents (53 of 580). Thirty-six of the 53 incorrectly classified cases were false out-of-scopes (reinterview farms previously classified as nonfarms). These thirty-six cases represented 30 percent of the 118 nonfarm cases in the reinterview sample. Seventeen of the 53 cases were false inscopes (reinterview nonfarms previously classified as farms), representing 4 percent of the 462 farm cases in the reinterview sample. The high incidence of false out-of-scope percent raises concern because, using OMR data, farms will incorrectly be classified as nonfarms (Owens, 1989).

7. 1986 SHORT FORM TEST

7.1. Background

A short form was proposed for use in the census data collection to reduce overall respondent burden. The OMR categorical short form was one option considered to achieve this and other objectives. Because the OMR form had both high machine read and classification error rates, redesigning a categorical form to reduce burden was not a viable solution. Rather, a noncategorical short form was developed to permit more accurate farm classification and provide more adequate data for imputing detailed census data items than the OMR form.

Two questions were of particular interest: (1) could the respondent understand and complete the form, and (2) did an initial question screening for agricultural activity (screener) ensure that actual farm operators provided the necessary agricultural data for the census? The screener was evaluated by selecting a subsample of respondents for telephone reinterview.

7.2. Experimental Design

The mail sample design for the short form test using 3,136 farm addresses from the 1982 census was described in Section 1.2. Approximately four weeks after the initial mailout, a sample of 590 respondents was selected for reinterview from the 1,587 receipts. The sample was stratified on the major agricultural commodity produced and on the "yes/no" response to the screener, with overrepresentation of producers of vegetables, horticulture, and fruit. The final reinterview sample had 283 "yes" respondents and 307 "no" respondents.

A clerical staff determined farm status in all cases. Data on mailed questionnaires was subjectively reviewed to identify questions or problems that might affect the quality of data. Farm status, based on mail and telephone, respectively, was compared for reinterview sample cases. Response to the screener and its relationship to other data were examined.

7.3. Results

Ten percent of the reinterview sample (56 of 533) had a farm status different from that originally assigned. Of the 56 incorrectly classified cases, 34 were false out-of-scopes and 22 were false inscopes. The 34 false out-of-scopes represented 13 percent of the 269

mail out-of-scope cases in the reinterview sample. The remaining 22 incorrectly classified cases represented 8 percent of the 264 mail inscope cases. Landlord only and land idle were the most frequent reasons given by respondents answering "no" to the screener that were false out-of-scope cases (Gatt, 1987).

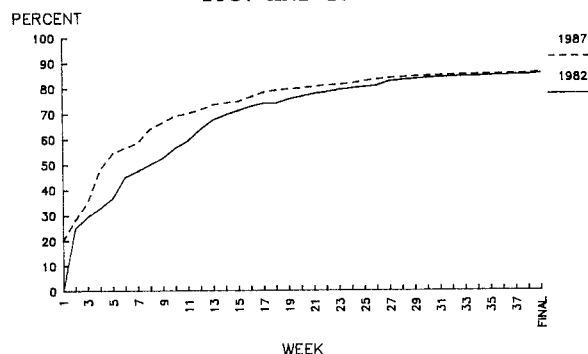
One reason to use a screener is to reduce respondent burden. However, over 40 percent of the respondents who answered "no" to the screener provided agricultural data. Accordingly, any reduction in respondent burden attributable to the screener is minimal.

The review of the short form data identified problems in the fruit and "other livestock" sections. Not enough space was allocated to the fruit section for writing in the data. Respondents did not accurately report items in the "other livestock" section if those items were not explicitly listed.

8. APPLICATION TO THE 1987 CENSUS OF AGRICULTURE

The most successful application of the 1985 and 1986 test results to the 1987 Census of Agriculture was the mail followup procedures. The 1987 census data collection used the panel 1 followup procedure (an initial mailing in mid-December, a thank you/reminder card two weeks prior to the February 1 due date, a form with a letter a week after the due date, a letter four weeks later, and another form with a letter four weeks later). The response to this procedure peaked at 17.5 percent above the 1982 response rate on February 12 (Chart 3). Although final 1987 census response was nearly the same as 1982, early response to the census increased the data reporting quality by reducing recall bias, decreased the cost of census processing by eliminating followup mailings, and permitted more flexibility in the scheduling of data keying.

CHART 3
CENSUS OF AGRICULTURE RESPONSE RATES:
1987 AND 1982



A short form was used in the 1987 Census of Agriculture for mail list addresses expected to have TVP less than \$20,000 and less likely to represent farm operations. Based on results of the noncategorical short form test, the screener and wording and format of the fruit and "other livestock" sections were modified.

A discussion of classification error for the 1987 census short form is presented in Gatt (1989).

9. FUTURE RESEARCH

A more complete test needs to be conducted to determine whether a booklet format questionnaire adversely affects census response rates. Factors that need to be controlled include type and timing of mailings to both samples and color of questionnaire. A more adequate size sample is needed than that used for the 1985 booklet test. Such a test is planned in early 1990.

A controlled test measuring classification error for several screeners with samples drawn from the same universe is needed (Gatt, 1989). Such a test is planned in early 1990 using the 1987 census short form screener, another type of screener, and a short form without a screener.

During the field interviews, it was found that nonrespondents actually contacted were willing, with minimal motivation, to answer routine questions. This factor, and other aspects of the field interviews designed to identify reasons for response and nonresponse, were incorporated into a much broader four-panel study of agriculture census advertising awareness and response behavior during the 1987 census. Results from this study of response behavior should provide insights for research in motivating response.

In addition to the tests discussed in the paper, classroom observations and experiments using six questionnaire variants were conducted. Due to lack of sufficient data, no statistical analysis was possible. An ongoing program of classroom observations and experiments is planned to test variants of question wording for new data content items and for items identified in the 1985 reinterview analysis needing broader testing prior to implementation. Ideally, the results of classroom observations are used to design questionnaire variants for classroom experiments in a sequential pattern. Final variants are tested more broadly by mail.

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