

**Research Report**

**The Feasibility of Obtaining the Social Security Number from Farm  
Operators and Its Use in Identifying the "Overlap" Domain in Multiple  
Frame Sampling**

by

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The Feasibility of Obtaining the Social Security Number from Farm Operators and Its Use in Identifying the "Overlap" Domain in Multiple Frame Sampling

SUMMARY

1. Farmers can report their SS number with relative ease. The rates were 87.4 percent from the area frame and 88.5 percent from the list frame. The reporting accuracy was quite high at 94.5 percent. This comparison could only be made on the list respondents. Tables 1 and 2 show these results.
2. About 10 percent (31 reports) of the interviewed respondents either hesitated or showed hostility toward the SS number question. Of the 31 reports, only 3 did not report their number.
3. The SS number match confirmed most of the possible matches made by conventional matching methods based on name and address. In fact, 95.9 percent of the possible matches were confirmed as positive matches.
4. Using the SS number as the only matching criterion resulted in fewer positive matches than conventional methods. But when both methods are used in a complementary manner the total matches exceeds the two separate methods. There would be a gain from both the operational and theoretical standpoint in using the SS number.
5. Enumerators differed in their abilities to obtain SS numbers.
6. The SS matching procedure could be utilized for any multiple frame survey if the list frame has the SS number for each name. This procedure will be used in Tennessee on the 1971 JES on a pilot project basis. Cost analysis for identifying overlap will be obtained for this state and further evaluations will be made.

BACKGROUND

Multiple frame sampling requires that every unit in the population of interest belong to at least one of the frames, and that it be possible to record, for each sampled unit, whether or not it belongs to the other frame. The latter requirement is the underlying reason for this project to test whether the SS number can serve as a unique link between two frames. The current procedure for identifying which units belong in both frames, often referred to as "overlap," consists of an observational check of names and addresses of the sampled units from one frame against the complete list of the other frame. This matching of units is usually done manually, but it can be done on a computer. The current procedures result in a relatively high number of possible matches. Each of the possible matches must be categorized as being in one frame or both. Often a

judgment decision has to be made as to whether the units are the same and in some cases a personal or phone contact is required to make this decision. With ample resources, including time, we can resolve the possible matches. However, it appears from past work that name and address alone does not provide adequate information for determining overlap. Other techniques are more satisfactory but are more expensive to carry out. The study was undertaken in Oklahoma and Tennessee to determine farmer's ability to report their SS number, and to explore the possibilities of using it to assist in identifying overlap in multiple frame estimation.

To use the SS number effectively in the matching process, two conditions must be met. First, one frame, generally a list, must include the SS number for each reporting unit. Second, the SS numbers for respondents must be obtained for members of the other frame, usually an area frame. If these two conditions can be satisfied, the identification of which units are the same (make up the overlap domain) could be achieved by matching the SS numbers. The purpose of the project was to test whether the above conditions can be achieved under survey conditions. Current developments indicate that the farmer's SS number can be obtained for list frames in the future. The reporting unit's number could either be the operator's personal SS number or it could be the employer's identification number in the case of a corporation.

In this study, the second condition, obtaining the SS number in interviews, was studied in depth. Analysis was made of (1) the feasibility of asking SS numbers, (2) the reporting accuracy, and (3) the use of the number in identifying overlap.

#### THE SURVEY

An area frame and a list frame were used for the frames in two Crop Reporting Districts of Oklahoma and Tennessee. A sample of ten area segments was selected from each Crop Reporting District from the area frame. Within each district, the segments were randomly assigned to two enumerators. All tract operators within each segment were interviewed using a questionnaire similar to that of the June Enumerative Survey (JES). The questionnaire included a question to obtain the farm operator's SS number.

The list frame was obtained from the Agricultural Stabilization and Conservation Service (ASCS) records. Two printouts were obtained for each county with the units arrayed (1) alphabetically on the first four letters of the last name, and (2) ascending SS numbers. The printouts contained the name, address and SS number for each applicant. Questionnaires were mailed to the list frame sample of 536 people in the two states. An interview follow-up was made of non-respondents. Enumerator assignments were random in both frames so that enumerator effects could be examined. A "respondent reaction form" was completed by the enumerator for each respondent immediately following the interview. This form was used to evaluate the respondent's reaction about being asked to report his SS number.

### ANALYSIS

The segment identification sheet provided the name and address of each tract operator. This information was used to match the tract operators against the list frame using current methods. The SS numbers obtained during the interview were used independently in determining the overlap portion. The list sample check data (that included the SS number) provided a validity check on the reporting accuracy of their SS number.

In preparing multiple frame estimates, it is assumed that the list frame direct expansions are the same as the area expansions for the overlap domain. Because variation in the list expansion is usually smaller than the area expansion, the list estimate is usually used as the estimate of the overlap domain. Hence, the area frame provides an estimate of the non-overlap domain, i.e., provides an estimate for list incompleteness.

Most of the analysis dealt with attribute data. The proportion of respondents reporting SS numbers and the fraction of the number being reported correct were two of the events studied. Probability statements can be made by using the usual binomial formula:

$$\hat{p} = \frac{\sum_{i=1}^n a_i}{n}$$

where  $a_i$  is either 1 or 0 for the  $i^{\text{th}}$  observation and  $n$  is the number of observations.

$$\hat{\sigma} = \sqrt{\hat{p} \hat{q} / (n-1)}$$

where  $\hat{\sigma}$  is the estimated standard deviation of the proportion  $\hat{p}$  and  $\hat{q} = 1 - \hat{p}$ . Multiple frame estimates were not pertinent to this project and not generated. A nested analysis of variance was used to test for variability between enumerators. The model used was:

$$Y_{ijk} = \mu + a_i + b_{j(i)} + e_{k(ij)}$$

where  $Y_{ijk}$  is the observation from the  $k^{\text{th}}$  sampling unit by the  $j^{\text{th}}$  enumerator from the  $i^{\text{th}}$  area. The following assumptions were made:

$$a_i \sim (0, \sigma_a^2), b_{j(i)} \sim N(0, \sigma_b^2), \text{ and } e_{k(ij)} \sim N(0, \sigma^2).$$

## REPORTING ABILITY AND ACCURACY

Tables 1 and 2 summarize the farmer's ability to accurately report their SS numbers. Farmers reported their SS number with relative ease. About 88 percent of the respondents reported their SS numbers. The individual rates were 87.4 percent for the area frame and 88.5 percent for the list frame. These rates were based on the number of reports with SS numbers reported, divided by the number of reports from farm operators. The sample from the ASCS list frame had about 15 percent nonfarm operators. These returns were handled separately and are noted in Table 1. Table 3 contains probability statements with associated standard errors about events from Tables 1 and 2. The lowest sampling errors were associated with reporting the correct number. This error was 1.6 percent for both states.

The accuracy of the reported SS number was determined by comparing the number reported on the questionnaire to the number obtained from the ASCS list for the corresponding person. This check could only be made on the list sample. The accuracy rate was 94.4 percent in Tennessee and 94.7 percent in Oklahoma. There were 22 reports that were different with seven having an error in one digit. There are several possible reasons for these one digit errors: either the ASCS list is wrong, the enumerator wrongly recorded the number, or the respondent erred in reporting the number. In one case, the ASCS listing was known to be in error. During the enumerator training school, an enumerator found his name on one of the ASCS printouts and noted that his recorded SS number was off by one digit. The inability to interview the correct respondents accounted for 9 other errors. It was possible that the farm operator's wife was listed on the ASCS list, but the interview took place with her husband. The husband considered himself as the farm operator and reported his SS number.

Table 1.--Reporting ability and accuracy of social security numbers by type of response, state and district, list sample

| State,<br>district, or<br>type of<br>response | All reports |                 |                          | Reports including social security number |                                  |                                     |                    |                    |
|---|-------------|-----------------|--------------------------|--|----------------------------------|-------------------------------------|--------------------|--------------------|
|   | Total       | Zero<br>report: | of<br>farm<br>operators: | Total                                    | Percent<br>of<br>all<br>reports: | Percent<br>of<br>farm<br>operators: | Number<br>correct: | Percent<br>correct |
|   | Number      | Number          | Number                   | Number                                   | Percent                          | Percent                             | Number             | Percent            |
| <u>TENNESSEE</u>                              |             |                 |                          |  |                                  |                                     |                    |                    |
| District 2                                    |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 86          | 12              | 74                       | 69                                       | 80.2                             | 93.2                                | 67                 | 97.1               |
| Interview                                     | 48          | 13              | 35                       | 28                                       | 58.3                             | 80.0                                | 26                 | 92.9               |
| Total   | 134         | 25              | 109                      | 97                                       | 72.4                             | 89.0                                | 93                 | 95.9               |
| District 4                                    |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 96          | 8               | 88                       | 84                                       | 87.5                             | 95.4                                | 79                 | 94.0               |
| Interview                                     | 49          | 11              | 38                       | 33                                       | 67.3                             | 86.8                                | 30                 | 90.9               |
| Total   | 145         | 19              | 126                      | 117                                      | 80.7                             | 92.9                                | 109                | 93.2               |
| District 2 & 4                                |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 182         | 20              | 162                      | 153                                      | 84.1                             | 94.4                                | 146                | 95.4               |
| Interview                                     | 97          | 24              | 73                       | 61                                       | 62.9                             | 83.6                                | 56                 | 91.8               |
| Total   | 279         | 44              | 235                      | 214                                      | 76.7                             | 91.1                                | 202                | 94.4               |
| <u>OKLAHOMA</u>                               |             |                 |                          |  |                                  |                                     |                    |                    |
| District 4                                    |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 81          | 16              | 65                       | 55                                       | 67.9                             | 84.6                                | 52                 | 94.5               |
| Interview                                     | 46          | 8               | 38                       | 35                                       | 76.1                             | 92.1                                | 33                 | 94.3               |
| Total   | 127         | 24              | 103                      | 90                                       | 70.9                             | 87.4                                | 85                 | 94.4               |
| District 6                                    |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 82          | 14              | 68                       | 60                                       | 73.2                             | 88.2                                | 56                 | 93.3               |
| Interview                                     | 48          | 0               | 48                       | 38                                       | 79.2                             | 79.2                                | 37                 | 97.4               |
| Total   | 130         | 14              | 116                      | 98                                       | 75.4                             | 84.5                                | 93                 | 94.9               |
| District 4 & 6                                |             |                 |                          |  |                                  |                                     |                    |                    |
| Mail  | 163         | 30              | 133                      | 115                                      | 70.6                             | 86.5                                | 108                | 93.9               |
| Interview                                     | 94          | 8               | 86                       | 73                                       | 77.7                             | 84.9                                | 70                 | 95.9               |
| Total   | 257         | 38              | 219                      | 188                                      | 73.2                             | 85.8                                | 178                | 94.7               |
| 2 State Total                                 | 536         | 82              | 454                      | 402                                      | 75.0                             | 88.5                                | 380                | 94.5               |

Table 2.--Reporting social security number from the area frame, by resident and non-resident operator, by district within states

| State and area | Resident farm operator |                 |         | Non-resident farm operator |                 |         | Total  |                 |         |
|----------------|------------------------|-----------------|---------|----------------------------|-----------------|---------|--------|-----------------|---------|
|                | Tracts                 | Social security |         | Tracts                     | Social security |         | Tracts | Social security |         |
|                |                        | number reported | Percent |                            | number reported | Percent |        | number reported | Percent |
|                | Number                 | Number          | Percent | Number                     | Number          | Percent | Number | Number          | Percent |
| Tennessee      |                        |                 |         |                            |                 |         |        |                 |         |
| District 2     | 12                     | 12              | 100.0   | 34                         | 29              | 85.3    | 46     | 41              | 89.1    |
| District 4     | 22                     | 19              | 86.4    | 24                         | 15              | 62.5    | 46     | 34              | 73.9    |
| Total          | 34                     | 31              | 91.2    | 58                         | 44              | 75.9    | 92     | 75              | 81.5    |
| Oklahoma       |                        |                 |         |                            |                 |         |        |                 |         |
| District 4     | 7                      | 6               | 85.7    | 23                         | 23              | 100.0   | 30     | 29              | 96.7    |
| District 6     | 14                     | 14              | 100.0   | 23                         | 21              | 91.3    | 37     | 35              | 94.6    |
| Total          | 21                     | 20              | 95.2    | 46                         | 44              | 95.7    | 67     | 64              | 95.5    |
| 2 State Total  | 55                     | 51              | 92.7    | 104                        | 88              | 84.6    | 159    | 139             | 87.4    |

Table 3.--Probability statements for certain events from Tables 1 and 2, for Tennessee and Oklahoma

| Event   | Tennessee |                | Oklahoma  |                |
|---|-----------|----------------|-----------|----------------|
|   | $\hat{P}$ | $\hat{\sigma}$ | $\hat{P}$ | $\hat{\sigma}$ |
| Ability to report social security number                      |           |                |           |                |
| List mail response  | .944      | .018           | .865      | .030           |
| List non-response interview                                   | .836      | .044           | .849      | .039           |
| Area frame interview response                                 | .815      | .041           | .955      | .026           |
| Ability to report correct social security number - list frame | .944      | .016           | .947      | .016           |

RESPONDENT'S REACTION TO ASKING SOCIAL SECURITY NUMBER

The enumerators completed a "Respondent's Reaction" form (Appendix 1) following each interview. Tables 4, 5, 6, and 7 show the results of this form. About 83 percent of the respondents expressed no visible reaction when asked to report their SS number. About 10 percent showed some sort of hostility or hesitated in reporting their SS number. For this group of 31 reports, only 3 refused to report their SS number.

Table 4.--Respondent's reaction to the social security number question, list and area sample interviews, Tennessee

| Reactions                    | List sample |                    | Area sample |                    | Total     |                    |
|------------------------------|-------------|--------------------|-------------|--------------------|-----------|--------------------|
|                              | Frequency   | Relative frequency | Frequency   | Relative frequency | Frequency | Relative frequency |
|                              | Number      | Percent            | Number      | Percent            | Number    | Percent            |
| Hesitated                    | 6           | 7.9                | 9           | 12.3               | 15        | 10.1               |
| Showed hostility             | 1           | 1.3                | 2           | 2.7                | 3         | 2.0                |
| Irrelevant conversation      | 3           | 4.0                | 3           | 4.1                | 6         | 4.0                |
| Laughed, joked               | --          | --                 | 2           | 2.7                | 2         | 1.3                |
| Questioned reason for asking | 8           | 10.5               | 8           | 11.0               | 16        | 10.8               |
| No visible reaction          | 56          | 73.7               | 45          | 61.7               | 101       | 67.8               |
| Other                        | 2           | 2.6                | 4           | 5.5                | 6         | 4.0                |
| Total answers                | 76          | 100.0              | 73          | 100.0              | 149       | 100.0              |



Table 5.--Respondent's reaction to social security number question, list and area sample interviews, Oklahoma

| Reactions                    | List sample |                    | Area sample |                    | Total     |                    |
|------------------------------|-------------|--------------------|-------------|--------------------|-----------|--------------------|
|                              | Frequency   | Relative frequency | Frequency   | Relative frequency | Frequency | Relative frequency |
|                              | Number      | Percent            | Number      | Percent            | Number    | Percent            |
| Hesitated                    | 9           | 11.3               | 1           | 1.4                | 10        | 6.6                |
| Showed hostility             | 2           | 2.5                | 1           | 1.4                | 3         | 2.0                |
| Irrelevant conversation      | --          | --                 | --          | --                 | --        | --                 |
| Laughed, joked               | --          | --                 | --          | --                 | --        | --                 |
| Questioned reason for asking | --          | --                 | 4           | 5.5                | 4         | 2.6                |
| No visible reaction          | 69          | 86.2               | 66          | 91.7               | 135       | 88.8               |
| Other                        | --          | --                 | --          | --                 | --        | --                 |
| Total answers                | 80          | 100.0              | 72          | 100.0              | 152       | 100.0              |

Table 6.--Reasons given for not reporting social security number, mail response and interview, Tennessee

| Area and type<br>of response | Not reporting social security number |             |         |               |         |             |         |            |              |        |         |        |         |
|------------------------------|--------------------------------------|-------------|---------|---------------|---------|-------------|---------|------------|--------------|--------|---------|--------|---------|
|                              | Total                                | Non-farm    |         | Refused to    |         | Refused to  |         | Different  | Did not know |        | Left    |        |         |
|                              |                                      | zero report |         | give any data |         | give SS No. |         | respondent | number       |        | blank   |        |         |
|                              | Number                               | Number      | Percent | Number        | Percent | Number      | Percent | Number     | Percent      | Number | Percent | Number | Percent |
| District 2                   |                                      |             |         |               |         |             |         |            |              |        |         |        |         |
| Mail response                | 17                                   | 12          | 70.6    | --            | --      | --          | --      | 1          | 5.9          | --     | --      | 4      | 23.5    |
| Interview                    | 24                                   | 13          | 54.2    | --            | --      | --          | --      | 6          | 25.0         | 4      | 16.7    | 1      | 4.2     |
| Total                        | 41                                   | 25          | 61.0    | --            | --      | --          | --      | 7          | 17.1         | 4      | 9.8     | 5      | 12.2    |
| District 4                   |                                      |             |         |               |         |             |         |            |              |        |         |        |         |
| Mail response                | 12                                   | 8           | 66.7    | --            | --      | --          | --      | --         | --           | --     | --      | 4      | 33.3    |
| Interview                    | 27                                   | 11          | 40.7    | --            | --      | 2           | 7.4     | 9          | 33.3         | 2      | 7.4     | 3      | 11.1    |
| Total                        | 39                                   | 19          | 48.7    | --            | --      | 2           | 5.1     | 9          | 23.1         | 2      | 5.1     | 7      | 17.9    |
| District 2 & 4               |                                      |             |         |               |         |             |         |            |              |        |         |        |         |
| Mail response                | 29                                   | 20          | 69.0    | --            | --      | --          | --      | 1          | 3.4          | --     | --      | 8      | 27.6    |
| Interview                    | 51                                   | 24          | 47.1    | --            | --      | 2           | 3.9     | 15         | 29.4         | 6      | 11.8    | 4      | 7.8     |
| Total                        | 80                                   | 44          | 55.0    | --            | --      | 2           | 2.5     | 16         | 20.0         | 6      | 7.5     | 12     | 15.0    |

Table 7.-- Reasons given for not reporting social security number, mail response and interview, Oklahoma

| Area and type<br>of response | Not reporting social security number |                         |                             |                           |                         |                        |               |        |         |        |         |        |         |
|------------------------------|--------------------------------------|-------------------------|-----------------------------|---------------------------|-------------------------|------------------------|---------------|--------|---------|--------|---------|--------|---------|
|                              | Total                                | Non-farm<br>zero report | Refused to<br>give any data | Refused to<br>give SS No. | Different<br>respondent | Did not know<br>number | Left<br>blank |        |         |        |         |        |         |
|                              | Number                               | Number                  | Percent                     | Number                    | Percent                 | Number                 | Percent       | Number | Percent | Number | Percent | Number | Percent |
| District 4                   |                                      |                         |                             |                           |                         |                        |               |        |         |        |         |        |         |
| Mail response                | 26                                   | 16                      | 61.5                        | --                        | --                      | --                     | --            | 2      | 7.7     | --     | --      | 8      | 30.8    |
| Interview                    | 12                                   | 8                       | 66.7                        | 1                         | 8.3                     | 2                      | 16.7          | --     | --      | --     | --      | 1      | 8.3     |
| Total                        | 38                                   | 24                      | 63.2                        | 1                         | 2.6                     | 2                      | 5.3           | 2      | 5.3     | --     | --      | 9      | 23.7    |
| District 6                   |                                      |                         |                             |                           |                         |                        |               |        |         |        |         |        |         |
| Mail response                | 22                                   | 14                      | 63.6                        | --                        | --                      | --                     | --            | 1      | 4.5     | --     | --      | 7      | 31.8    |
| Interview                    | 11                                   | --                      | --                          | 2                         | 18.2                    | 1                      | 9.1           | 2      | 18.2    | 4      | 36.4    | 2      | 18.2    |
| Total                        | 33                                   | 14                      | 42.4                        | 2                         | 6.1                     | 1                      | 3.0           | 3      | 9.1     | 4      | 12.1    | 9      | 27.3    |
| District 4 & 6               |                                      |                         |                             |                           |                         |                        |               |        |         |        |         |        |         |
| Mail response                | 48                                   | 30                      | 62.5                        | --                        | --                      | --                     | --            | 3      | 6.3     | --     | --      | 15     | 31.3    |
| Interview                    | 23                                   | 8                       | 34.8                        | 3                         | 13.0                    | 3                      | 13.0          | 2      | 8.7     | 4      | 17.4    | 3      | 13.0    |
| Total                        | 71                                   | 38                      | 53.5                        | 3                         | 4.2                     | 3                      | 4.2           | 5      | 7.0     | 4      | 5.6     | 18     | 25.4    |

## MATCHING AREA FRAME TRACTS TO THE LIST UNIVERSE

Three independent matches were made between the tract operators in the area frame and the list frame operators. The matches were (1) using the name and address section of the segment identification sheet against the same items from the list, (2) using Section E of the tract questionnaire against the list, and (3) using the reported SS number against the list. The segment identification sheet asked for the tract operator's name and mailing address and four screening questions to determine if he was a farm operator or not. Section E of the questionnaire obtained more detail for farm operator identification. Items asked were the farm operator's name, nickname (if any), mailing address, ranch or farm name (if any), county, and telephone number. The matching criteria for the first two methods were:

- (1) Good match - name and address were the same.
- (2) Possible match
  - (a) Same name but incomplete mailing address on either the list or questionnaire.
  - (b) Same name but different mailing address with similar zip code. The respondent lives between two communities and gave the enumerator one city as a mailing address and the ASCS another.
  - (c) Same address but different or incomplete name - middle name or initial left out, or Mrs. A. B. Jones and Stella Jones.
  - (d) Same address, name incorrectly spelled.
- (3) No match - None of the above criteria can be met.

The criteria using the SS number as the matching agent are:

- (1) Perfect match - nine digits agree.
- (2) No match
  - (a) SS number given but not on list.
  - (b) SS number not obtained from interview.

Tables 8 thru 11 compare the results of two of the matching methods. Tables 8 and 10 show data for the overlap domain for each state by match status. Tables 9 and 11 show the non-match or non-overlap portion. They are the compliments of Tables 8 and 10. For this particular survey, the gains in using the more detailed information from Section E of the questionnaire were minimal and not summarized separately. The matching shown is for the

name and address match only, SS number match only, and a composite match of both. All of the possible matches using the name and address method were assigned to the overlap domain. There were 49 tracts in Tennessee, and 31 tracts in Oklahoma in this category.

Of the possible matches, 96 percent were actually confirmed as being positive matches using the SS number, therefore, eliminating the judgment decision. Out of the 80 possible matches, 73 gave SS numbers of which 70 were matched from the ASCS list. The possible matches require a judgment decision and, depending on the situation, could have been included or excluded in the overlap domain using current procedures.

Table 8.--Actual and expanded data for the overlap domain from the area frame, by match status, Tennessee

| Item                           |          | Composite     | Name and      | Social         |
|--------------------------------|----------|---------------|---------------|----------------|
|                                |          | match         | address match | security match |
|                                |          | <u>Number</u> | <u>Number</u> | <u>Number</u>  |
| Tracts                         | - Actual | 73            | 72            | 63             |
|                                | Expanded | 97,647        | 96,435        | 83,808         |
| Hogs and pigs                  | - Actual | 419           | 411           | 396            |
|                                | Expanded | 564,002       | 554,306       | 529,534        |
| Cattle and calves              | - Actual | 708           | 707           | 584            |
|                                | Expanded | 1,007,701     | 1,006,489     | 826,460        |
| Hens and pullets of laying age | - Actual | 517           | 502           | 402            |
|                                | Expanded | 712,871       | 694,691       | 544,831        |
|                                |          | <u>Acres</u>  | <u>Acres</u>  | <u>Acres</u>   |
| Corn                           | - Actual | 279           | 279           | 269            |
|                                | Expanded | 343,880       | 343,880       | 331,760        |
| Sorghum                        | - Actual | 18            | 18            | 18             |
|                                | Expanded | 21,816        | 21,816        | 21,816         |
| Soybeans                       | - Actual | 489           | 489           | 453            |
|                                | Expanded | 597,209       | 597,209       | 549,278        |
| Cotton                         | - Actual | 230           | 230           | 219            |
|                                | Expanded | 278,862       | 278,862       | 266,894        |
| Wheat                          | - Actual | 55            | 55            | 5              |
|                                | Expanded | 66,660        | 66,660        | 6,060          |

Table 9.--Actual and expanded data for the non-overlap domain from the area .  
frame, by match status, Tennessee

| Item                                 |          | Composite<br>non-match | Name and<br>address<br>non-match | Social<br>security<br>non-match |
|--------------------------------------|----------|------------------------|----------------------------------|---------------------------------|
|                                      |          | <u>Number</u>          | <u>Number</u>                    | <u>Number</u>                   |
| Tracts                               | - Actual | 19                     | 20                               | 29                              |
|                                      | Expanded | 27,041                 | 28,253                           | 40,880                          |
| Hogs and<br>pigs                     | - Actual | 18                     | 26                               | 41                              |
|                                      | Expanded | 26,115                 | 35,811                           | 60,583                          |
| Cattle and<br>calves                 | - Actual | 103                    | 104                              | 227                             |
|                                      | Expanded | 150,630                | 151,842                          | 331,871                         |
| Hens and<br>pullets of<br>laying age | - Actual | 7,022                  | 7,037                            | 7,137                           |
|                                      | Expanded | 10,232,638             | 10,545,648                       | 10,695,508                      |
|                                      |          | <u>Acres</u>           | <u>Acres</u>                     | <u>Acres</u>                    |
| Corn                                 | - Actual | 0                      | 0                                | 10                              |
|                                      | Expanded | 0                      | 0                                | 12,120                          |
| Sorghum                              | - Actual | 0                      | 0                                | 0                               |
|                                      | Expanded | 0                      | 0                                | 0                               |
| Soybeans                             | - Actual | 0                      | 0                                | 36                              |
|                                      | Expanded | 0                      | 0                                | 47,931                          |
| Cotton                               | - Actual | 6                      | 6                                | 17                              |
|                                      | Expanded | 8,151                  | 8,151                            | 20,119                          |
| Wheat                                | - Actual | 0                      | 0                                | 50                              |
|                                      | Expanded | 0                      | 0                                | 60,600                          |

Table 10.--Actual and expanded data for the overlap domain from the area frame, by match status, Oklahoma

| Item                                 |          | Composite<br>match | Name and<br>address match | Social<br>security<br>match |
|--------------------------------------|----------|--------------------|---------------------------|-----------------------------|
|                                      |          | <u>Number</u>      | <u>Number</u>             | <u>Number</u>               |
| Tracts                               | - Actual | 43                 | 42                        | 39                          |
|                                      | Expanded | 32,049             | 31,460                    | 28,901                      |
| Hogs and<br>pigs                     | - Actual | 0                  | 0                         | 0                           |
|                                      | Expanded | 0                  | 0                         | 0                           |
| Cattle and<br>calves                 | - Actual | 1,111              | 1,083                     | 1,067                       |
|                                      | Expanded | 895,507            | 879,037                   | 852,140                     |
| Hens and<br>pullets of<br>laying age | - Actual | 96                 | 96                        | 96                          |
|                                      | Expanded | 79,517             | 79,517                    | 79,517                      |
|                                      |          | <u>Acres</u>       | <u>Acres</u>              | <u>Acres</u>                |
| Corn                                 | - Actual | 0                  | 0                         | 0                           |
|                                      | Expanded | 0                  | 0                         | 0                           |
| Sorghum                              | - Actual | 207                | 207                       | 117                         |
|                                      | Expanded | 121,757            | 121,757                   | 68,819                      |
| Soybeans                             | - Actual | 0                  | 0                         | 0                           |
|                                      | Expanded | 0                  | 0                         | 0                           |
| Cotton                               | - Actual | 215                | 215                       | 190                         |
|                                      | Expanded | 126,522            | 126,522                   | 111,817                     |
| Wheat                                | - Actual | 342                | 342                       | 342                         |
|                                      | Expanded | 201,164            | 201,164                   | 201,164                     |

Table 11.--Actual and expanded data for the non-overlap domain from the area frame, by match status, Oklahoma

| Item                                 |          | Composite<br>non-match | Name and<br>address<br>non-match | Social<br>security<br>non-match |
|--------------------------------------|----------|------------------------|----------------------------------|---------------------------------|
|                                      |          | <u>Number</u>          | <u>Number</u>                    | <u>Number</u>                   |
| Tracts                               | - Actual | 24                     | 25                               | 28                              |
|                                      | Expanded | 22,064                 | 22,653                           | 25,212                          |
| Hogs and<br>pigs                     | - Actual | 10                     | 10                               | 150                             |
|                                      | Expanded | 8,267                  | 8,267                            | 69,076                          |
| Cattle and<br>calves                 | - Actual | 424                    | 452                              | 29                              |
|                                      | Expanded | 404,780                | 421,250                          | 17,058                          |
| Hens and<br>pullets of<br>laying age | - Actual | 249                    | 249                              | 0                               |
|                                      | Expanded | 220,379                | 220,379                          | 0                               |
|                                      |          | <u>Acres</u>           | <u>Acres</u>                     | <u>Acres</u>                    |
| Corn                                 | - Actual | 0                      | 0                                | 0                               |
|                                      | Expanded | 0                      | 0                                | 0                               |
| Sorghum                              | - Actual | 60                     | 60                               | 10                              |
|                                      | Expanded | 59,136                 | 59,136                           | 8,267                           |
| Cotton                               | - Actual | 4                      | 4                                | 468                             |
|                                      | Expanded | 2,353                  | 2,353                            | 448,147                         |
| Wheat                                | - Actual | 0                      | 0                                | 249                             |
|                                      | Expanded | 0                      | 0                                | 220,379                         |



Table 12.--Matching area tract operators to the list frame, expressed as a percent of total tracts, by matching method, by state

| Method   | Tennessee      | Oklahoma       | Total          |
|--|----------------|----------------|----------------|
|  | <u>Percent</u> | <u>Percent</u> | <u>Percent</u> |
| A. Name and address matching   |                |                |                |
| 1. Positive matches  | 25.0           | 16.4           | 21.4           |
| 2. Possible matches  | 53.3           | 46.3           | 50.3           |
| 3. Probability of a positive match<br>given a possible match               | 95.3           | 96.7           | 95.9           |
| 4. Line 2 X line 3   | 50.8           | 44.8           | 48.2           |
| 5. Total expected matches<br>line 1 + line 4                               | 75.8           | 61.2           | 69.6           |
| B. Social Security matching followed by<br>name/address matching           |                |                |                |
| 1. Positive match from SS No.  | 68.5           | 58.2           | 64.2           |
| 2. Positive match from name and address:<br>(SS No. not given or in error) | 2.2            | 3.0            | 2.5            |
| 3. Possible match<br>(SS No. not given or in error)                        | 8.7            | 3.0            | 6.3            |
| 4. Probability of a positive match<br>given a possible match               | 95.3           | 96.7           | 95.9           |
| 5. Line 3 X line 4   | 8.3            | 2.9            | 6.0            |
| 6. Total expected matches<br>line 1 + line 2 + line 5                      | 79.0           | 64.1           | 72.7           |
| C. Gains from Social Security number                                       |                |                |                |
| Difference between the two methods   | 3.2            | 2.9            | 3.1            |

Table 12 shows the results, on a percentage of total tracts basis, in matching area tracts. Part A of the table represents the current matching methods. Part B represents the tracts matched by SS numbers first and then using the name and address information for the remaining tracts. This composite matching method results in about a three percent gain from using name and address only. It might be concluded that the three percent gain resulting in the use of SS numbers is nominal; however, from an operational standpoint the matching process would almost be instantaneous. From the survey 64.2 percent of the tracts were categorized as positive matches without any need for further verification. The remaining 35.8 percent of the tracts would be matched using the name and address information.

#### ENUMERATOR EFFECTS PROVE TO BE SIGNIFICANT

The secondary objective of testing enumerator differences in obtaining SS numbers proved to be significant at the five percent level. The nested analysis of variance is given in Tables 13 and 14.

The corresponding tabular F values are as follows: (1) List frame, 2.40 at the five percent level and 3.40 at the one percent level with (4, 183) degrees of freedom, and (2) area frame, 2.67 at the five percent level and 3.97 at the one percent level with (4, 32) degrees of freedom. We can conclude that the enumerator component of variance is significant at the five percent level in the list sample and is significant at the one percent level in the area frame sample. The difference can be traced back to one enumerator who failed to make contact with the proper respondents. The respondent in many cases was a neighbor or the farm operator's wife. This type of situation could be corrected by placing greater emphasis requiring the enumerator to make contact with the farm operator.

U. S. Department of Agriculture  
 Statistical Reporting Service  
 Data Collection Branch

RECORDING FORM FOR RESPONDENT'S REACTION TO SOCIAL SECURITY NUMBER QUESTION

Segment \_\_\_\_\_ Tract \_\_\_\_\_

or List Sample-Number \_\_\_\_\_

Complete this form as soon as you have left the respondent.

1. Respondent's reaction to social security number question (Check one or more):

- Hesitated
- Showed hostility
- Irrelevant conversation
- Laughed, joked
- Questioned reason for asking
- No visible reactions
- Other (describe) \_\_\_\_\_

2. Respondent's answer to social security number question (Check one or more if appropriate).

- Didn't know the number
- Didn't have a social security number
- Referred to card in billfold
- Gave from memory

- easily
- with difficulty
- other description \_\_\_\_\_

Referred to other record (describe) \_\_\_\_\_

- Consulted other person
- Refused to answer (reasons given) \_\_\_\_\_

Enumerator \_\_\_\_\_