COMPARABILITY OF DATA FROM THE CENSUSES OF AGRICULTURE

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1. INTRODUCTION

A frequently used basis for interpreting statistical data resulting from a periodic census or survey is to contrast the current value for a data item with the value at a previous time, measuring the change in the level between the two points. Such comparisons are valid in measuring real change when equivalent procedures are used over the time period covered by the census or survey. Because censuses are conducted less frequently than surveys, procedures are evaluated and changes are made from census to census. Sometimes the data items to be collected are changed -- as is their manner of presentation. These differences in the structure of a periodic census often handicap the user in comparing the data and in estimating real changes.

This paper discusses conceptual and procedural differences in the three previous censuses of agriculture: those that collected data for the 1974, 1978, and 1982 calendar years, respectively. Comparisons of statistical measures of the quality of published data, including the proportion of response from the mail list and the proportion of respondent supplied data, will be made. Measures of the coverage of the farm universe by the census mail list and, in 1978, by the mail list, including and excluding estimates derived from the area sample, will be given. Different methods for estimating the number of total farms from coverage estimates will be compared. Several possible methods of adjusting census data for the purpose of historical comparisons, taking into consideration quality, accuracy, and coverage, will be presented.

2. PROBLEMS WITH HISTORICAL DATA COMPARISON

Since August 1975 a census farm has been defined as an agricultural operation that sold or could have sold products whose total value was $1,000 or more. Prior to 1975 a farm operation qualified if it contained less than ten acres and had or could have had sales of $250 or more, or contained ten acres or more and had or could have had sales of $50 or more. Data from the 1974 census was published using both definitions -- preliminary data using the old definition, final data using the new definition. The 1978 Census of Agriculture collected data for all farm operations qualifying under both the old and the new definition, enumerated those farms that qualified under the old definition with sales less than $1,000,[1] but published data items at all geographic levels only with respect to farms whose sales were $1,000 or greater. The comparisons of data and procedures made in this paper will use the current definition of a farm.

The procedures first used in the 1969 census differed considerably from those used in previous censuses in that the 1969 census and those following were conducted by mail rather than by personal enumeration. A report form was designed with the objective that it be understandable to those receiving it -- whether or not they qualified as farm operators. A procedure was developed for constructing a mail list from multiple administrative record sources.[2] Ideally, this methodology would produce a list containing the addresses of all potentially qualifying farm operations, eliminating both duplicate addresses and addresses identifiable as those of non-qualifying farm operations. Publicity and follow-up procedures were designed to encourage mail response. These mail follow-up procedures have consisted of a sequence of reminder cards, letters, and additional mailed report forms (with a letter), extending over approximately four months. During the last four months of the eight month data collection period, both the 1978 and 1982 censuses supplemented the mailed reminders with telephone follow-up to addresses thought to have large or unique operations.[3]

Since 1945 an evaluation of the coverage of the farm universe by the published data has been conducted. The sample design for the coverage evaluation program has differed over the past three censuses, but each program has provided estimates of the number of farms not on the mail list, of farms classified as nonfarms, and of overcounted farms. The 1974 and prior evaluations had indicated that the number of farms missed on the mail list was proportionately higher for the farm operations whose value of sales was less than $2,500. To improve the coverage of small farms, the 1978 census had a dual-frame design -- a mailed census supplemented with state level estimates derived from a personally enumerated area sample of rural areas. Budget constraints in 1982 prevented a repeat of this dual-frame procedure. The significantly different data collection and estimation procedure used in 1978 for state and national data complicates comparisons of the 1978 census data with that from the 1974 and 1982 censuses.

Because the change made in the definition of a farm operation in 1975 and the use of a dual-frame estimation procedure for 1978 agricultural data, there are some inconsistencies in the published data from the three censuses being considered. In the published tables for 1974 and 1978 most data items are tabulated within a geographic area for "all farms" and for "farms whose sales are $2,500 or greater." These categories are generally comparable with the caveat that an inflationary effect would be expected. The 1982 preliminary reports, however, have been tabulated in the categories of "all farms" and "farms whose sales are $10,000 or greater." Major data items from the 1974 and 1978 census were also tabulated in the categories of farms whose sales were $2,500 to $4,999, $5,000 to $9,999, and $10,000 and greater, so that for these data items tables can be compiled from the 1974 and 1978 censuses that compare all farms and all farms whose total sales were $10,000 or greater. The final 1982 data will provide an additional breakout of farms whose sales are between $2,500 and $10,000 thus permitting more direct comparisons with the previous two censuses.

The 1978 census publications published 1982

census data for the U.S., regions, and states for farm operations represented on the mail list, together with estimates from the direct enumeration area sample for farms not on the mail list. Although 1974 data published in 1978 alongside the 1978 data was tabulated using the new definition, it is not directly comparable since it was compiled exclusively from farm operations represented on the mail list. Tabulations of 1978 data in the 1978 census publications for state, regional, and U.S. levels provide estimates of data items for the area sample (identified as "not on mail list" in tabulations), but do not provide explicit estimates for those data items for the mail list only. In the 1982 census publications, tabulations of 1978 mail list only data will be published alongside the 1982 data.

3. QUALITY OF CENSUS PUBLISHED DATA

Publishing quality data obtained from the census of agriculture is complicated because the census mail list contains a large number of addresses (nearly 1.4 million in 1982) that do not qualify as farm operations. In developing the mail list, a number of addresses whose farm status is unknown are retained in order to more adequately cover the farm universe. Because of this, the data collection procedures must be directed to questionable farm operators as well as actual farm operators. The report form must be understandable to both groups in order to obtain response and to ensure that the response is classifiable.

The quality of statistics derived from the census report form is affected by many factors. Among these are 1) the effectiveness of the data collection procedures in eliciting response from the surveyed list, 2) the comprehensibility of the report form and instructions -- for this influences the accuracy of respondent supplied information, 3) the accuracy of data processing in correctly classifying response as farms or nonfarms, 4) the proportion of the published data that is supplied by respondents, and not secondary sources, 5) the reliability of the methods used for estimating data for farm operator nonrespondents, and 6) the edit procedure used to validate or impute for single data items. Statistical measures that relate to these factors will be examined in this section in order to compare the quality of data from the three censuses.

The response rate for a survey is a standard measure of the effectiveness of the data collection in eliciting response from the surveyed universe. Examining various aspects of census response over time provided several different insights into the effectiveness of the agricultural census data collections. Published census response rates are calculated as the quotient of all receipts (including forms returned by the post office --Post Master Returns or PMR's) divided by the total number of addresses on the mail list. On this basis the response rate of 88.0 percent for the 1978 census is considerably higher than that of 85.4 percent for the 1982 census, and somewhat higher than the 1974 rate of 87.4 percent. Since there was a proportionately larger number of PMR's in 1978 than in 1974 or 1982, this definition of response somewhat overstates the effectiveness of the 1978 data collection effort in relation to 1974 and 1982. Removing the PMR's from receipts and from the total mail list gives response rates of 85.1 percent, 87.3 percent, and 87.1 percent for the 1982, 1978, and 1974 censuses respectively. Thus, there were approximately 2.1 percent more census nonrespondents in 1982 than in the previous two censuses.

Table 1: Census of Agriculture Mail List Response

	1982	1978	1974
Mail List Size	3,654,674	4,429,633	4,182,374
Post Master Returns	82,792	230,980	108,700
Mail List - Excluding Post Master Returns	3,571,702	4,198,653	4,073,674
Nonresponse (includes remails)	531,916	532,030	525,875
Receipts	3,039,966	3,666,623	3,547,799
In-scope	2,021,400	2,044,989	2,029,389
Out-of-Scope	978,264	1,511,218	1,487,351
Non-Classifieds	40,302	110,416	31,059
Total Mail List			
% Overall Response Rate	85.4	88.0	87.4
% Classified Respondents	82.1	80.3	84.1
% Other Respondents (PMRs, Non-classifieds)	3.3	7.7	3.3
% Nonrespondents	14.6	12.0	12.6
Mail List Excluding Post Master Returns			
% Overall Response Rate	85.1	87.3	87.1
% Classified Respondents	84.4	84.7	86.3
% Other Respondents (PMRs, Non-classifieds)	1.1	2.6	.8
% Nonrespondents	14.9	12.7	12.9

Farms, nonfarms, and non-classified responses at time of tabulation were included in the category of respondents at the final date on which a tabulation of the questionnaire response was compiled. Because non-classified response was considerably higher in 1978 than in 1982 and 1974, classified response (with PMR's removed) for 1982 did not differ nearly as much from 1978 (.7 percent less) as total response did (2.1 percent less). The difference in classified response for the 1982 and 1974 censuses was approximately the same (2.0 percent) as for total response. A component of non-classified response is represented by forms for which recipients have originated correspondence. The number of forms in this category in 1974 was several times larger than in 1978 or 1982. This reflected the relative complexity of the 1974 report form as contrasted with the much simpler (and similar) report forms used in 1978 and 1982.

Once responses are received from mail list recipients they must be classified. The tabulations discussed in the previous paragraph gave a measure of responses that had not been classified at the end of the data collection period. The coverage evaluation conducted for the census has

provided two measures of error in classification -- a measure of actual farms classified as nonfarms (misclassified)[4], and a measure of nonfarms classified as farms (overcounted, including addresses counted more than once). Percentages obtained by dividing these measures of misclassification error by the estimated farm universe were compared using two estimates[5] of misclassification error. (See Table 3.) In the category of farms whose total sales were $2,500 or greater, farms classified as nonfarms (misclassified) decreased over these censuses. However, the percent of overcounted farms was greater in 1982 than in 1978 and 1974. For all categories of farms the estimated net classification error ("misclassified" minus "overcount"), subject to sampling error, decreased since 1974; and in some categories, changed sign from positive in 1974 and 1978 to negative in 1982.

Because there are many addresses on the mail list that do not represent farm operations, not all nonrespondent addresses represent farms. The agricultural census data estimating procedures adjust for farm nonrespondents by estimating the proportion of nonrespondents on the mail list that are farm operators for each state, imputing values for data items for that number of nonrespondents, and incorporating the imputed data into the estimation procedure for each published data item.[6] As information obtained from the respondent is generally believed to be more accurate than imputed data, the percent of the published data that is respondent supplied gives a measure of data quality. The percent of imputation of data for an entire farm operation was between 9 and 10 percent (Table 2) for the two recent censuses, but was 12.3 percent for 1974. As previously noted, although the response rate was higher in 1974, the proportion of published farm operations with imputed data was higher than in either 1978 or 1982.

Table 2
Percent Imputation in Census of Agriculture Data

	1982	1978	Mail List Only 1978	Mail List & Area Sample 1974
Published Farms				
% Mail List	90.2	90.7	82.5	87.7
% Area Sample	NA	NA	8.9	NA
% Imputed	9.8	9.3	8.6	12.3
Land in Farms				
% Respondent Supplied	94.4	95.3	95.4	94.1
% Imputed	4.6	4.7	4.6	5.9
Harvested Cropland				
% Respondent Supplied	94.1	93.4	93.5	93.8
% Imputed	5.9	6.6	6.5	6.2
Value of Agricultural Products Sold				
% Respondent Supplied	96.3	96.1	96.1	95.9
% Imputed	3.7	3.9	3.9	4.1

The proportion of respondent supplied data for other major data items -- land in farms, harvested cropland, and value of agricultural products sold -- has consistently been higher than for the published farm count. Because the census of agriculture has a more intensive follow-up procedure for mail list nonrespondents whose expected sales are large, most of the farm nonrespondents for which data is imputed have small farm operations. Due to the small size of these operations, this data has less impact on the values of these other agricultural statistics. The estimation properties of the imputation methodology used for census farm nonrespondents is also a factor in the quality of the published estimates. Studies of alternative imputation methods for entire farm operations and of the edit procedure used for validation or imputation of single data items are being planned.

4. COVERAGE OF THE FARM UNIVERSE BY THE CENSUS

In order to provide an independent measure of the number of farms not accounted for in census published data, a coverage evaluation program has been conducted for the census of agriculture since 1945. The 1978 and 1982 coverage evaluation samples were designed to provide regional level estimates of several components of census coverage rather than the state level estimates provided in 1974. These components were denoted in the 1974 and 1978 coverage evaluation publications [7] by farms "included in census,"[8] "overcounted in census,"[9] and "missed in census."[10]

Estimates of total farms in the universe were provided in the coverage evaluation documents where "estimated farms" was the sum of farms "included" and farms "missed" minus farms "overcounted."[11] Each of these estimates were calculated for three categories of farms -- all farms, farms whose total sales are under $2,500 (small farms), and farms whose total sales are $2,500 or greater. The estimate of these components for the three censuses under consideration is given in Table 3. For comparison purposes with the 1982 and 1974 coverage estimates separate coverage evaluation estimates have been calculated for the 1978 mail list data. The 1978 published coverage evaluation estimates were designed to measure the coverage of the dual-frame census estimates based on the mail list and area sample.

Table 3 presents each of the coverage components as a percent of the coverage estimates of the census total. During this period the coverage sample estimate of the percent of farms "included in census" for all farms and for small farms was higher for the 1978 dual-frame census. However, for farms whose total sales were $2,500 or greater, the 1982 coverage sample estimate of percent of farms "included in census" was higher than the 1978 dual-frame estimate. For mail list data only, this percent estimate was higher in 1982 for farms in all categories than for 1978 and 1974 with the exception that, for small farms, the 1974 estimate of 74.1 percent for "included in census" was slightly higher than the 1982 estimate of 73.7 percent. The percent estimate of farms "not on the census" (not on mail list or the area sample in 1978) was much lower for all classes of farms for the 1978 dual-frame than for the other censuses. The classification error estimates -- both farms classified as nonfarms (misclassified) and nonfarms classified as farms (overcounted) -- were higher in 1982 than in 1978 for all classes except

misclassified farms with sales of $2,500 or more.

A measure for comparing the relative impact of these components of coverage is the net coverage -- the number of farms "missed" minus the number of farms "overcounted." The percent net coverage for the 1978 dual-frame estimates was lower for the category of all farms (3.4 percent) and much lower for small farms (6.5 percent). However, because of a relatively larger estimate of overcount in 1982, the corresponding percent net coverage for farms whose total sales were $2,500 or greater was less in 1982 than for all previous censuses (-.3 percent). In all categories, the percent net coverage for 1982 was less than for 1978 mail list only.

In preparation for the 1982 coverage evaluation publication the estimator based on direct sample weighting used in the previous coverage evaluation publications was reviewed. The use of this estimator in both 1978 and 1974 had resulted in sample coverage estimates considerably lower (approximately 200,000) than the census published estimates. This large difference caused confusion for data users in relating sample based coverage estimates to census data. The properties of several other estimators were reviewed and a coverage error model estimator was selected [12] that estimates the universe total (T) for a characteristic of all farms in the universe as T = C + U - O where C is the census published number for that characteristic, U is the undercount for that characteristic, and O is the overcount for that characteristic. The undercount can be broken into two components -- the part of the universe of farms not on the census mail list (M), and the part of the universe for farms on the census mail list that were misclassified as nonfarms (MCF): T = C + M + MCF - O. The estimates of the overcount, O, and the total of some characteristic for farms on the census mail list misclassified as nonfarms, MCF, are direct sample weighted estimates. The estimate [13] for the total of some characteristic for farms not on the census mail list, M, is based on a capture-recapture model.[14]

Coverage error model estimates of the universe total number of farms T for the past three censuses were derived using the capture-recapture estimator[15] for farms not on the census mail list. Estimates for 1978 were prepared using data from the dual-frame census and from the mail list only. The estimated percent net coverage[16] was in the same general range for the pre-1982 estimator and the coverage error model estimator for all three categories of farms. (See Table 3.) The estimates of total farms based on the capture-recapture model estimator were greater than both the census published estimates and the pre-1982 coverage estimates based on direct sample weighting.

5. ALTERNATIVE ADJUSTMENTS TO CENSUS OF AGRICULTURE DATA

Because of the difference in frame between the 1978 and the 1982 censuses, data users have inquired as to what adjustments might be made to either 1978 or 1982 data to make data from the two censuses more comparable. This same question was raised in 1978 as the frame of the 1978 census was similarly different from that of 1974. Two methods of comparing adjusted data from these censuses were suggested in 1978 Census of Agriculture publications. Published state, regional, and U.S. level estimates of number of farms in 1978 based on the mail list and the area sample were compared with 1974 estimates at those respective levels adjusted for the net coverage.[17] This coverage adjusted estimate was derived by dividing the census published number of farms at a given level by the estimate of the proportion included at that level, (N_j/N_1).

The other method used data at the regional and U.S. level [18] from both censuses adjusted by the above procedure for net coverage. Comparisons between data from the two censuses were made using percent change from adjusted 1974 data to 1978 unadjusted and adjusted. The change in the estimated number of farms in the U.S. using 1974 adjusted data and 1978 unadjusted data was -5.6 percent. Using adjusted data for both 1974 and 1978 the change was -2.3 percent. The difference of 3.3 percent reflects the undercoverage of the dual-frame census.

Three other proposals for comparing 1982 and 1978 data were made in a paper by Storm and Prochaska.[19] One of the alternatives suggested -- publication of 1978 data from the mail list only in the 1982 publications, providing for a direct comparison of 1978 and 1982 mail list data, was implemented. Although the data from the mail list from these two censuses would seem to be the most comparable, the difference in percent net coverage using either coverage estimator was more than 5 percent. Because 1982 census data based on the mail list had a lower percent net coverage than the 1978 mail list data, the difference in published data values of number of farms between the two censuses does not adequately reflect the differences in coverage of the total number of farms for these years.

When data on other characteristics are available from the 1982 coverage evaluation program, other comparisons can be made using coverage error model estimates. This approach, however, is limited in several respects. Coverage evaluation data will only be available at the regional (not state) and U.S. levels with Alaska and Hawaii excluded from the Western region and U.S. totals. The overcount was only estimated for number of farms. Thus, estimates of total and net coverage for any other characteristic using the coverage error model cannot be made.

The other methods suggested in the Storm paper called for comparing 1978 dual-frame data to 1982 data adjusted by using either the area sample data from 1978 or an appropriate area sample from 1982. The coverage error model used, in fact, provides for this type of estimate using the area segment sample of the 1982 coverage evaluation program. On the basis of the coverage error model estimates obtained for 1982 data and 1978 dual-frame data, comparisons between estimates of total number of farms in the universe for both 1982 and 1978 would be a more appropriate method to use to measure change. This method is limited by the scope of the coverage evaluation program in that estimates are only available

at the regional level, the overcount is only measured for number of farms. For similar reasons adjusting 1982 data with 1978 area sample data and comparing it with 1978 dual-frame data would not appropriately measure change in the total farms in the universe as reflected by the coverage error model estimates for data from 1978 and 1982.

Since measurement of change between data for these censuses seems most appropriate when the data is adjusted for coverage, the question arises as to what estimator should be used. Estimates of universe total adjusted for coverage [20] as in the 1974 and 1978 publications are presented in Table 4 along with estimates of universe total derived from the coverage error model estimator. These two estimators are within 1 percent of each other for all three censuses for farms whose total sales are $2,500 or greater. Percent change between censuses is given using both estimators.

On the basis of this analysis of several proposed methods for adjusting agriculture census published data, the use of the coverage error estimator for each census year being compared is recommended. This will permit comparisons of data adjusted on a comparable basis. The 1982 coverage error model estimator is preferred since it uses the capture-recapture model for the "not on the mail list" component of coverage. Estimates from this method, however, will only be possible for number of farms in the three categories given in Table 4, and will only be available at the regional level. Any type of adjustments to state data without a coverage sample designed to provide state level estimates is not recommended.

6. CONCLUSIONS

The measures presented in this paper taken in conjunction with each other indicate that the 1978 dual-frame census had better quality and more complete coverage than either the census immediately preceding or following it. This result is due primarily to the use of the area sample. If the 1978 census had been based only on the mail list, by most measures, the 1982 census had more complete coverage but was of lesser quality -- more classification errors, lower response rate, slightly more imputed data. In the category of farms with total sales of $2,500 or greater the percent estimate of those farms not on the mail list in 1982 was almost half of those not on the 1978 mail list. For this category of farms, if the classification errors in processing can be reduced from the 1982 levels, the use of an area sample will not have as great an impact on census coverage as it did in 1978.

With limited resources the availability of an expanded and reliable coverage sample at the state level might be more valuable for assessing the completeness and quality of the data and for providing a means by which change between censuses can be measured. However, if an objective of the census is to measure farms with sales of less than $2,500, an area sample is needed. Should an area sample be designed at the state level, then the coverage evaluation sample should also be at the state level.

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NOTES AND REFERENCES

[1] 1978 Census of Agriculture, U.S. Summary and State Data, Vol 1, Pt 51, Appendix B, Page B-1.

[2] Dea, Jane Y., Tommy W. Gaulden, D. Dean Prochaska, "Record Linkage for the 1982 Census Mail List of Agriculture Development Using Multiple Sources," 1984 Proceedings of the Section on Survey Research Methods, American Statistical Association.

[3] Ruggles, Donna R., Jane Y. Dea, Flora Kwok, Cindy A. Carman, "Evaluation of the Effectiveness of Data Collection Procedures for the 1982 Census of Agriculture," 1984 Proceedings of the Section on Survey Research Methods, American Statistical Association.

[4] Tabulated as a component of farms "missed in the census" in published coverage evaluation publications for 1974 and 1978.

[5] Discussed in next section.

[6] Ruggles, Donna R., et al.

[7] 1974 Census of Agriculture, Vol. IV Special Reports, Part 3, Coverage Evaluation and 1978 Census of Agriculture, Vol. V, Special Reports, Part 3, Coverage Evaluation.

[8] Direct expansion estimate of number of coverage sample addresses where either a sample farm matches a mail list address (farm, nonfarm, or PMR) or a sample address (farm or nonfarm) matches a mail list farm.

[9] Direct expansion estimate of number of sample nonfarms classified as farms on the census and number of sample farms counted more than once on the census.

[10] Sum of the direct expansion estimates of sample farms classified as nonfarms (denoted by "misclassified") and sample farms not on the census mail list (or area sample for 1978). The 1974 and 1978 coverage evaluation publications provide estimates of each of these components.

[11] The algebraic formulation of this estimator is given in the Appendix that is available upon request.

[12] Davie, William C., Emily Lorenzen, D. Dean Prochaska, "Coverage Evaluation for the 1982 Census of Agriculture," 1984 Proceedings of the Section on Survey Research Methods, American Statistical Association.

[13] The algebraic formulation of this estimator is given in the cited paper by Davie, Lorenzen, and Prochaska as well as in the Appendix.

[14] Wolter, Kirk M., "Coverage Error Models for Census and Survey Data," 1983 Proceedings of the International Statistical Institute, Madrid, Spain.

[15] The capture-recapture estimate for all farms at the U.S. level was derived as the sum of the capture-recapture estimates for farms with sales less than $2,500 and farms with sales of $2,500 or greater, both at the U.S. level.

[16] The net coverage D is defined as the number of farms in the universe minus the published census number of farms: D = T - C. An estimate of D is obtained as the sum of the number of farms not on the census and the number of farms misclassified on the census as nonfarms minus the number of overcounted farms on the census.

[17] 1978 Census of Agriculture, Vol. 1, Summary and State Data, Part 51, United States, Appendix C, page C-2.

[18] 1978 Census of Agriculture, Vol. 5, Special Reports, Part 3, Coverage Evaluation, Appendix A, page A-1.

[19] Storm, Richard R. and D. Dean Prochaska, "Data Comparability Between the 1978 and 1982 Censuses of Agriculture," 1983 Proceedings of the Section on Survey Research Methods, American Statistical Association.

[20] The algebraic formulation of this estimator is given in the Appendix.

Table 3: Census of Agriculture Coverage Evaluation Estimates*

Coverage Evaluation	Pre-1982 Estimator				1982 Coverage Error Model Estimator				
	1982	Mail List Only 1978	Mail List & Area Sample 1978	1974		1982	Mail List Only 1978	Mail List & Area Sample 1978	1974
ALL FARMS					ALL FARMS				
Coverage Estimate	1,800,403	2,318,867	2,279,470	2,101,838	Coverage Estimate	2,466,355	2,643,973	2,561,570	2,613,568
Census Published	2,235,958	2,253,082	2,473,949	2,310,702	Census Published	2,235,958	2,253,082	2,473,949	2,310,702
Included	92.8	87.1	96.6	89.3	Census	90.6	85.2	96.6	88.4
Not on Census	9.3	11.4	1.9	7.5	Not on Census	10.9	13.5	2.1	9.0
Misclassified	4.2	2.5	2.5	5.2	Misclassified	3.1	2.2	2.2	4.2
Overcounted	6.3	1.0	1.0	2.0	Overcounted	4.6	.9	.9	1.6
Net Coverage	7.2	12.9	3.4	10.7	Net Coverage	9.4	14.8	3.4	11.6
FARMS: TVP < $2,500					FARMS: TVP < $2,500				
Coverage Estimate	508,439	553,126	540,848	601,948	Coverage Estimate	756,789	728,798	654,858	871,458
Census Published	534,606	461,263	612,381	650,572	Census Published	534,606	461,263	612,381	650,572
Included	73.7	66.3	93.5	74.1	Census	70.6	63.3	93.5	74.7
Not on Census	26.2	31.0	3.8	16.7	Not on Census	29.3	34.7	4.3	19.0
Misclassified	10.1	3.2	3.3	10.6	Misclassified	6.8	2.4	2.7	7.3
Overcounted	10.0	.5	.6	1.4	Overcounted	6.7	.4	.5	1.0
Net Coverage	26.3	33.7	6.5	25.9	Net Coverage	29.4	36.7	6.5	25.3
FARMS: TVP ≥ $2,500					FARMS: TVP ≥ $2,500				
Coverage Estimate	1,291,964	1,765,741	1,738,622	1,499,890	Coverage Estimate	1,709,566	1,915,175	1,906,712	1,742,110
Census Published	1,699,419	1,791,819	1,861,568	1,660,130	Census Published	1,699,419	1,791,819	1,861,568	1,660,130
Included	100.3	93.7	97.6	95.3	Census	99.4	93.6	97.6	95.3
Not on Census	2.6	5.3	1.3	3.8	Not on Census	2.8	5.4	1.4	4.0
Misclassified	2.9	2.2	2.3	3.0	Misclassified	1.5	2.1	2.1	2.6
Overcounted	4.9	1.2	1.2	2.1	Overcounted	3.7	1.1	1.1	1.9
Net Coverage	-.3	6.3	2.4	4.7	Net Coverage	.6	6.4	2.4	4.7

Table 4: Coverage Estimates*

					Percent Change Between Censuses				
	1982	Mail List & Area Sample 1978	Mail List Only 1978	1974	1982-1978 (1978: Mail List Only)	1978-1974 (1978: Mail List Only)	1982-1978 (1978: Mail List and Area Sample)	1978-1974 (1978: Mail List and Area Sample)	1982-1974
ALL FARMS									
Census Published Number	2,234,025	2,473,949	2,253,082	2,310,702	- .8%	- 2.5%	- 9.7%	7.1%	- 3.3%
Pre-1982 Estimator	1,800,403	2,279,470	2,318,867	2,101,838	-22.4%	-10.3%	-21.0%	8.5%	-14.3%
Coverage Adjusted Estimator	2,409,437	2,561,023	2,586,776	2,587,572	- 6.9%	- .0%	- 5.9%	- 1.0%	- 6.9%
Coverage Error Model Estimator	2,466,355	2,561,570	2,643,973	2,613,568	- 6.7%	1.2%	- 3.7%	- 2.0%	- 5.6%
FARMS: TVP < $2,500									
Census Published Number	534,606	612,381	461,263	650,572	15.9%	29.1%	-12.7%	5.9%	-17.8%
Pre-1982 Estimator	508,439	540,848	553,126	601,948	- 8.1%	- 8.1%	- 6.1%	-10.2%	-15.5%
Coverage Adjusted Estimator	725,381	654,953	695,721	877,965	- 4.3%	-20.8%	10.7%	-25.4%	-17.4%
Coverage Error Model Estimator	756,789	654,858	728,798	871,458	3.8%	-16.4%	15.6%	-29.7%	-13.2%
FARMS: TVP ≥ $2,500									
Census Published Number	1,699,419	1,861,568	1,791,819	1,660,130	- 5.2%	7.9%	- 8.7%	12.1%	2.4%
Pre-1982 Estimator	1,291,964	1,738,622	1,765,741	1,499,890	-26.8%	17.7%	25.7%	15.9%	-13.9%
Coverage Adjusted Estimator	1,694,336	1,907,344	1,912,293	1,742,004	-11.4%	9.8%	-11.2%	9.5%	- 2.7%
Coverage Error Model Estimator	1,709,566	1,906,712	1,915,175	1,742,110	-10.7%	9.9%	-10.3%	9.5%	- 1.9%

* Data and estimates given in Tables 3 and 4 are for the Continental United States.

Source: U.S. Bureau of the Census