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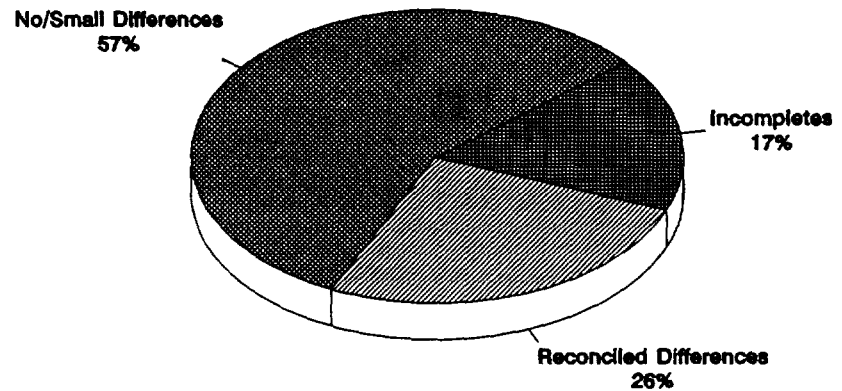
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Results of the December 1993 Acreage Reconciliation Study

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Acreage Reconciliation Supplement Results For Usable Agricultural Survey Samples



RESULTS OF THE DECEMBER 1993 ACREAGE RECONCILIATION STUDY, by Jeffrey T. Bailey, Survey Quality Research Section, Survey Research Branch, Research Division, National Agricultural Statistics Service, United States Department of Agriculture, Washington, DC 20250-2000, July 1994, Research Report No. SRB-94-07.

ABSTRACT

In the National Agricultural Statistics Service's (NASS) quarterly surveys it was observed that the survey indications declined in the quarters following the June survey. This research is a continuation of the study into this phenomenon. In previous research, the data adjustment factor (DAF) was determined to be a major factor in the decline of the indications. The main purpose of this study was to determine if the decline in the DAF is being offset by an increase in reported data. To ascertain this, a reconciliation survey was conducted with the 1993 December Agricultural Survey which was designed to distinguish true changes in acreage operated from reporting errors. The results showed that the decline in the DAF was partially offset by an increase in all land reported.

Additionally, three other areas were analyzed. First, for measurement error, the reconciliation data showed that the corrected acreage was more than the originally reported acreage in June and less than what was originally reported in December. Second, for the tract/farm weight effect upon the area portion of the multiple frame expansions, despite some large changes in the expansions none were statistically significant. The lack of statistical significance was due to the large area frame variances. Third, as NASS increases its usage of previously reported data (PRD), it will be necessary to ensure that enumerators can successfully reconcile the data and that respondents are willing to make corrections. The supplemental questionnaire indicated that about 20 percent of the reconciliation attempts failed for some reason, and that respondents were four times more likely to correct the previous response than they were the current response.

KEY WORDS

Data Adjustment Factor, Previously Reported Data, Historical Data, Consistency Check

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| <p>This paper was prepared for limited distribution to the research community outside the U.S. Department of Agriculture. The views expressed herein are not necessarily those of NASS or USDA.</p> |
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SUMMARY

The National Agricultural Statistics Service (NASS) conducts quarterly surveys to estimate crop acreage, grain stocks and hog inventories. Observations of the declining survey indications following the June quarter led to analysis and research into the Data Adjustment Factor (DAF). The source of the declining DAF was found to be the substantial number of operations that are coded as "out-of-business" in subsequent quarters.

The main purpose of this research was to determine if the decline in the DAF was being offset by an increase in the data reported. Since there are large variations between responses from quarter to quarter even for a relatively stable item like total acreage operated, a reconciliation of the data was needed to distinguish reporting differences from true changes. To do this, a supplemental questionnaire was added to the 1993 December Agricultural Survey.

In addition to studying the characteristics of the DAF, three other areas were analyzed. They were: 1) measurement errors associated with reporting total land operated, 2) the effect of total land operated upon the area portion of the multiple frame expansions, and 3) the general use of previously reported data (PRD). The following bullets discuss the results from the four areas of study.

- For the **DAF** portion of the research we had hoped to find an increase in total land operated as reported by the operations remaining "in business". The result was 1 percent more reported acreage, which partially offsets the DAF decline. The portion of the DAF not offset by additional reported acreage can be attributed to those operations that are coded as "out-of-business" in the current quarter who should have been "out-of-business" in the previous quarter, but were coded as "in-business" and reported land that was being reported by another operation.
- The **measurement errors** associated with reporting total land operated are difficult to determine. If one assumes that the corrected acreage is the truth, then the June total acreage was under reported by 1 percent and the December over reported by 1 percent. However, respondents corrected the June response four times more often than the December response, casting some doubt on whether the corrections are good proxies to the truth.
- The **tract/farm weight** effects upon the area portion of the June multiple frame expansion resulting from the changes to the reported June total land operated were sizable in a few states, but statistically insignificant due to the large variances. For corn planted acreage, only three out of 20 states had more than a 5 percent change in their NOL expansion. For hogs, only two out of 20 states had large changes, both of which were near 10 percent.
- Usage of **previous reported data (PRD)** is becoming more practical with the increased use of computer assisted interviews. While it is now easier to use PRD, it will not solve all data quality needs. First, only a portion of a survey sample will likely have any PRD. Secondly, reconciling differences during an interview appeared to be difficult in the acreage reconciliation survey and changes to current responses were made with disproportionate frequency to previous survey responses, indicating that more study may be needed.

INTRODUCTION

The National Agricultural Statistics Service (NASS) conducts quarterly surveys to estimate crop acreage, grain stocks and hog inventories. It has been observed that the indications from this survey series trend downward during the quarters following the June survey. This paper is a continuation of the analysis described in the report entitled "Time Related Coverage Errors and the Data Adjustment Factor (DAF)" (Bailey 1993) in which the downward push of the survey indications was attributed to the Data Adjustment Factor (DAF).

The major focus of this research was to determine if the land operated and other associated data that were previously reported by the now "out-of-business" operations was being accounted for. Since very few new operations are reported as taking over those "out-of-business" operations (i.e. as substitutions), then operations that were already "in business" must now be operating the land. If this is the case, then those operations remaining "in business" should report more land.

Several other analyses were done with the data collected in the acreage reconciliation survey and will be presented. They are as follows: 1) assessing the measurement error associated with reporting total land, 2) determining the effects of reporting errors in total land upon the area portion of the multiple frame expansions, and 3) evaluating the effectiveness of using previously reported data during an interview to improve responses.

DATA ADJUSTMENT FACTOR (DAF)

The Agricultural Surveys of NASS are a series of multiple frame surveys conducted in the months of June, September, December and March. The list portion of each quarter's sample consists of several replications which are selected each spring for use during the year. These replications are rotated in and out to provide quarter to quarter comparability and to relieve respondent burden. With the rotational scheme used, farming operations may be enumerated from one to four quarters in a particular year's survey cycle. To supplement the list sample, a stratified sample of area segments is chosen and enumerated in June. Operations found in the area frame that are not on the list frame (NOL) will be sampled in subsequent quarters to represent all operations that are not on the list.

To assess the relative importance of the DAF and other components of the survey indications, an analysis was done comparing the June to the December expansions. The effects of changes in the DAF, reported data, and the tract/farm weight factors were separated to assess the magnitude of each.

A percentage change in the June to December expansions resulting from each factor was computed by calculating the normal June expansion, then using the data reported in December to recalculate the June expansion. For example, the expanded data for an operation that was "in business" in June but not in December would be positive in June and zero for the recalculated June expansion with the December information. Comparable reports for a particular factor had to have usable factor information from both the June and December surveys.

Additionally, comparable reports for data and weight had to be "in business" both quarters. See Appendix A for a full explanation of the calculations and tables of the data.

Figure 1 shows the percent change in the expansions between June and December due to each factor. The DAF factor had the largest effect upon the expansions in all cases except for total hog inventory in 1992. One would hope that the reported data would be the primary factor affecting the survey expansions, but changes in the DAF

have had a much larger effect than changes in the data. We also see that tract/farm weight changes have had very little effect upon the overall expansions.

For the Agricultural Surveys, the DAF adjusts reported data for duplication on the list, and between frames and eliminates any positive data for operations that should not be summarized. Under normal situations the DAF is one, but it can have other values between zero and one. Common situations where the DAF is not one are: 1) an operation is duplicated in the same stratum

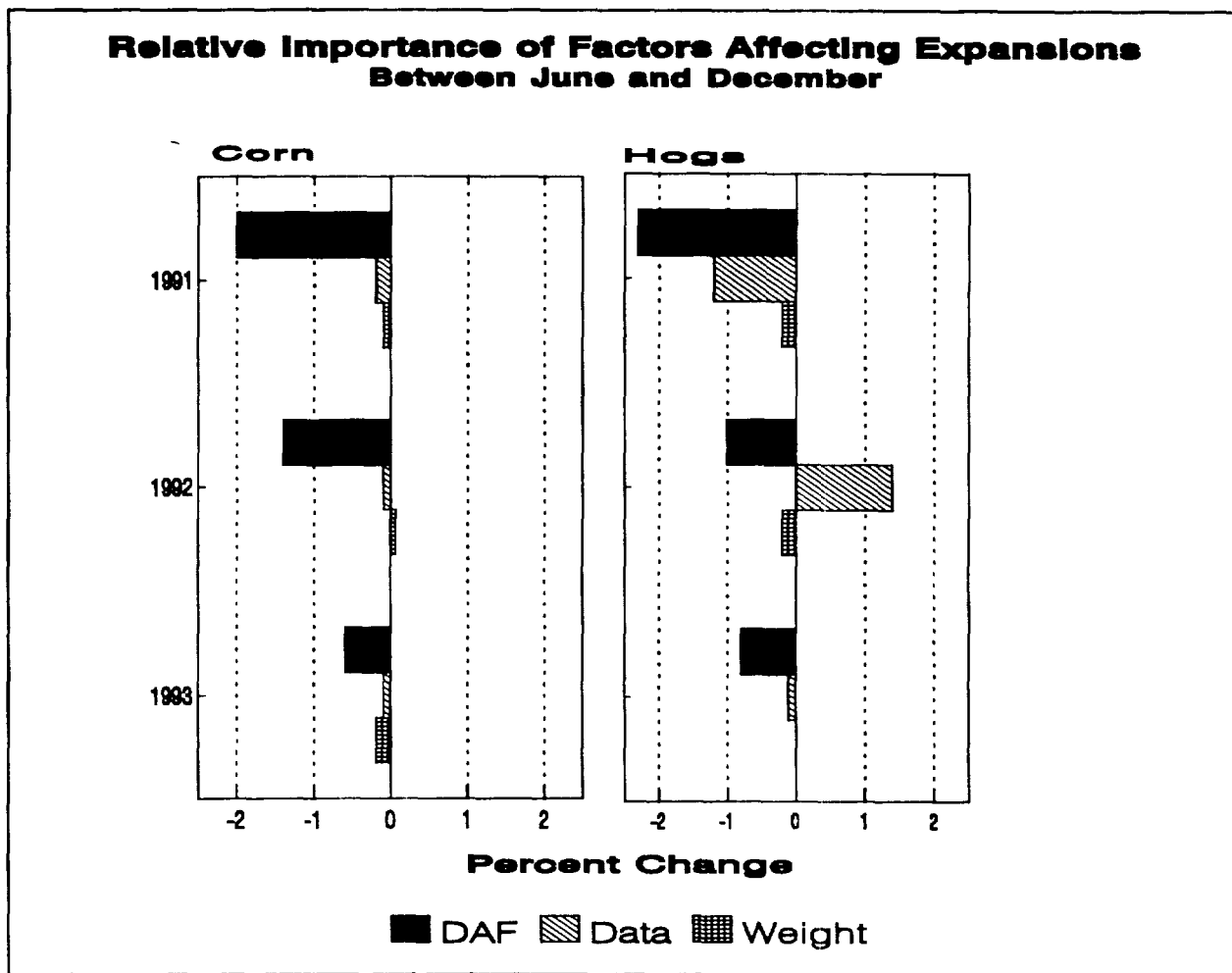


Figure 1

(DAF=0.5), 2) an operation is duplicated in a higher stratum (DAF=0), and 3) an operation is "out-of-business" (DAF=0).

Figure 2 shows the weighted (by the expansion factor for each design stratum) average of the DAF during the last three June to March cycles of the Agricultural Surveys. The pattern of decline from quarter to quarter is very clear. One would naturally expect to see some decline as operations go "out-of-business", but the amount of decline is of concern since it can have a large impact on the survey results. From the lines drawn, we can see that the

decline has lessened in 1992 and 1993. There is no clear explanation for this slight improvement, except that there has been increased emphases placed upon this problem, especially in training at the mid-year workshops in 1992 and 1993.

The survey design used in the Agricultural Survey results in about 60 percent of the current quarter's sample units coming from previous quarters. For these old replicate samples, only those operations that were "in business" (active) in the previous quarter will be surveyed in a subsequent quarter.

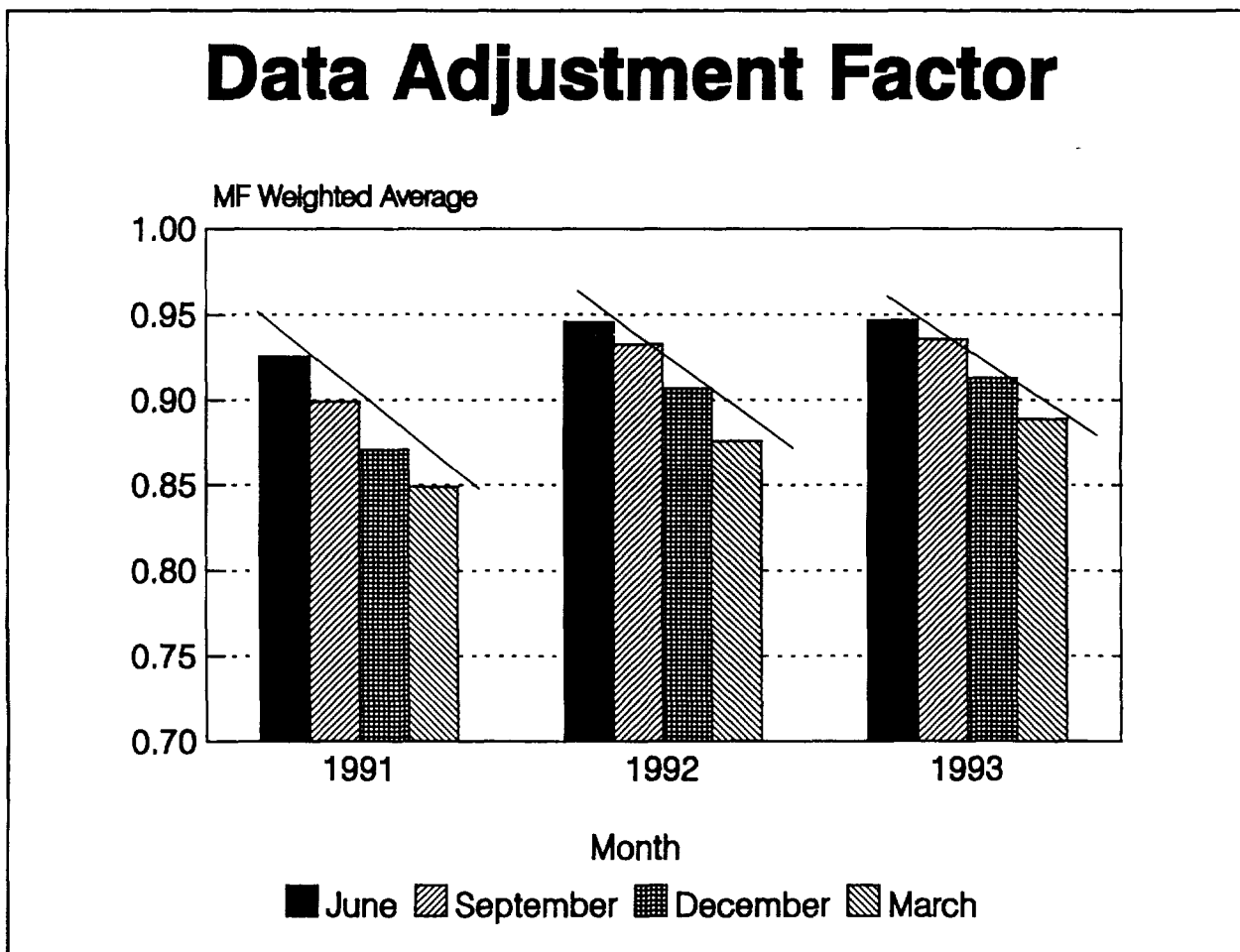


Figure 2

The previous research investigating the DAF showed the driving force behind the DAF decline was the large number of active old replicate operations coded as "out-of-business." Figure 3 shows the percentages of these samples. While over the course of time it is natural for some operations to go "out-of-business", the percentage actually observed is questionably high.

From the way questionnaires are coded we should know how many of these "out-of-business" codings represent legitimate changes. The "Change" box (item code

923) is coded a "1" anytime a change has occurred since June 1 of that survey cycle. Thus any coding of a "1" in the "Change" box for an "out-of-business" operation indicates a legitimate change. In practice, however, the coding of the "Change" box is very suspect, and the previous research report made a recommendation that was subsequently adopted to improve the coding. It was apparent from that study that many times the "Change" box was ignored and thus left blank when it should have been coded a "1." The recommendation was to require the coding of the "Change" box for all "out-of-business" operations by adding a

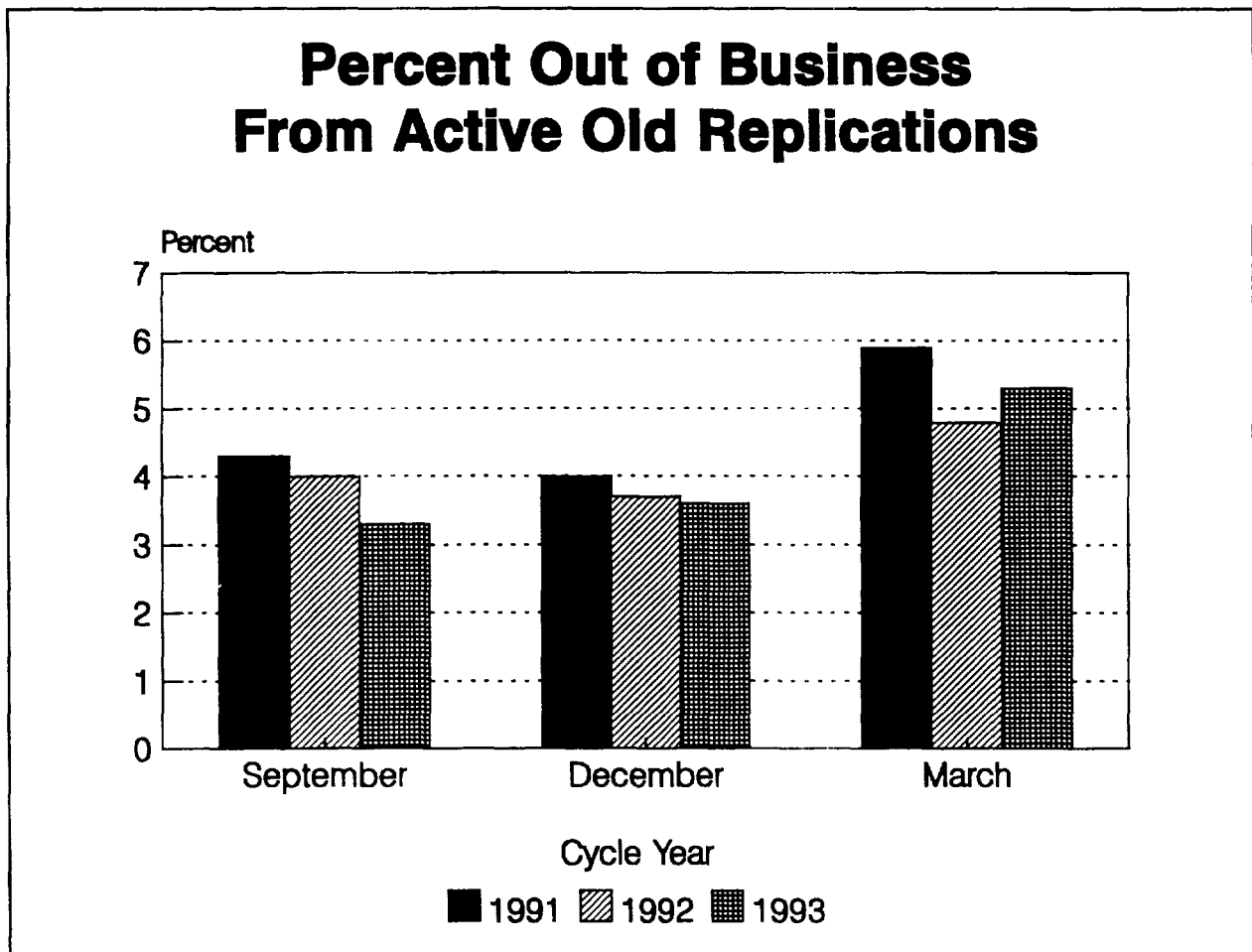


Figure 3

code "2" for those operations incorrectly coded as "in-business" in a previous quarter.

Figure 4 shows the counts of changes since June. Clearly the new coding that began in December 1993 has made a significant difference in the percentage of operations coded as changes since June and we now have a better indication of the number of legitimate changes since June. Based upon the December 1993 and March 1994 survey data, we can say that about one half of the "out-of-business" operations were legitimate changes since June and the other half were

errors that should have been coded as "out-of-business" in a previous quarter.

Figure 12 in Appendix B shows data on the coding of this "change" box for all states for December 1993. The length of the horizontal bars shows the percentage of "out-of-business" operations from active old replications. The proportion of the "out-of-business" operations coded as **valid** changes ("change" box=1) and **errors** ("change" box=2) is shown by the shading of the bars. The large variation between states may indicate inconsistent coding.

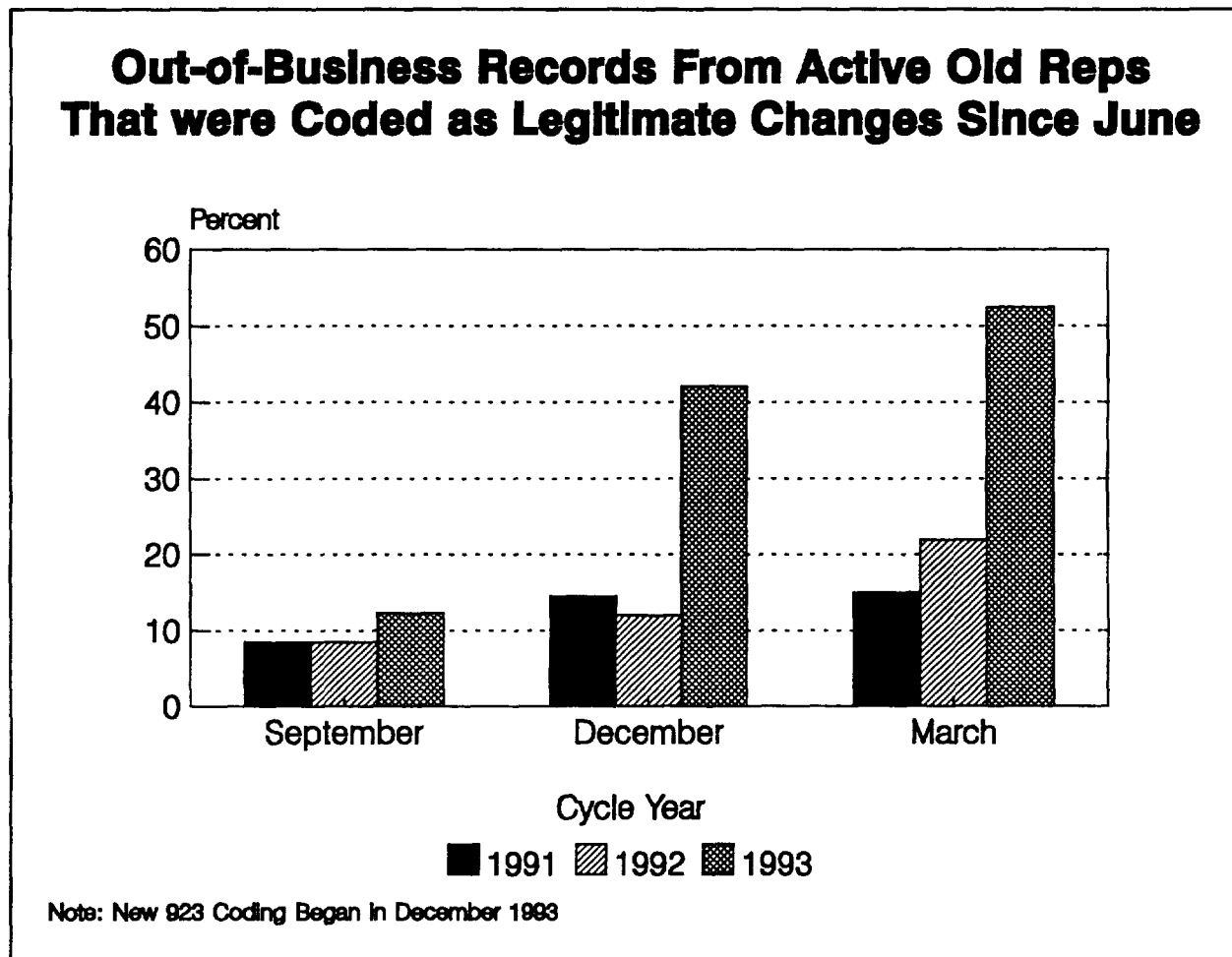


Figure 4

DECEMBER ACREAGE RECONCILIATION SUPPLEMENT

The main objective of the December Acreage Reconciliation Supplement was to obtain corrected June and December acreage for total land operated. With these corrected acreage numbers, we could assess whether reported data increased to offset the loss of data from those operations that went "out-of-business." Additionally, we could assess the measurement error associated with reporting total land, how total land affects the tract/farm weight in the NOL expansions and the effectiveness of using previously reported data during an interview to improve responses.

The supplement was completed in 14 State Statistical Offices (SSO). These 14 SSO's cover 20 states since the New Hampshire SSO also covers the states of Connecticut, Massachusetts, Maine, Rhode Island, and Vermont and the Maryland SSO covers the state of Delaware. The sample consisted of the sample units with a usable response in the 1993 December Agricultural Survey and a respondent of operator or spouse in either the June or September surveys. For the western state of Oregon, those who reported public, industrial, or grazing association land (PIGA) in a previous survey were excluded from the sample. This research study was an extension of the previous year's pilot study which included only five states and only the NOL samples.

The questionnaire was very similar to that used for the December 1992 acreage reconciliation study, comparing an operation's just reported December total land operated to their previous June response. The only changes were: 1) improved routing and, 2) references to

"June" were changed to "previous" since September was also used to check the December response. (See Appendix C for the paper version.) Since a large portion of the survey data was collected by computer assisted telephone interviews (CATI), questions were designed for this method of collection as well.

The previous response used was from either June or September, whichever fit the usability criteria. If both June and September responses were available, then June's was used. When the difference was more than 10 acres, the supplemental questions were to be completed. Three midwestern states, Kansas, Nebraska and North Dakota used a 5 percent limit for operations reporting more than 200 acres.

Respondents were asked the following question. "We are doing a study on total acres operated. In our previous survey, we recorded xxx acres and for December zzz acres. Can you help me explain the reasons for the difference?" The possible reason for the difference could be any combination of the following reasons:

1. A change was made in total acres operated since the previous survey (i.e. operator bought or sold land, rented land, rented out land, etc.)
2. The acreage was recorded incorrectly on the previous survey.
3. The acreage was recorded incorrectly on the December survey.

Table 1 shows that a total of 13,841 samples in the December 1993 Agricultural Survey had previous data which could be used to check the December response.

Across all states, 82.3 percent of these were completed for the regular December survey leaving 11,395 completed reports that were actually checked against previously reported total acreage operated.

Figure 5 shows the results of the supplement for the usable Agricultural Survey samples. Of the usable Agricultural Survey samples, 57 percent reported total land within the prescribed edit limits and did not need to be reconciled, 26 percent were successfully reconciled and 17 percent had an incomplete reconciliation. The number of incomplete reconciliations was much higher than expected. We could have forced

reconciliations with editing checks in CATI and the batch edit, but this would have likely created contrived data. This points to the difficulty the enumerators face in reconciling the differences. They may have difficulty because they don't thoroughly understand the concepts or the respondent is unable, for whatever reason, to provide the corrections.

For the completed reconciliations, Figure 6 shows the percentage that responded with each of the three available options. For the 14 SSO's, 46 percent corrected the previous acreage, 13 percent corrected December, and 46 percent reported that there had been

Table 1: Counts for December Acreage Reconciliation Supplement

| State | Total Sample | Refusals & Inaccessibles | | Out-of-Business | | Usable Reports | |
|------------------|--------------|--------------------------|---------|-----------------|---------|----------------|---------|
| | | Number | Percent | Number | Percent | Number | Percent |
| AL | 715 | 103 | 14.4 | 21 | 2.9 | 591 | 82.7 |
| IL | 1,487 | 302 | 20.3 | 28 | 1.9 | 1157 | 77.8 |
| KS | 1,437 | 241 | 16.8 | 35 | 2.4 | 1,161 | 80.8 |
| KY | 1,166 | 96 | 8.2 | 56 | 4.8 | 1,014 | 87.0 |
| LA | 788 | 123 | 15.6 | 23 | 2.9 | 642 | 81.5 |
| MD ^{1/} | 588 | 85 | 14.5 | 13 | 2.2 | 490 | 83.3 |
| MI | 991 | 173 | 17.5 | 23 | 2.3 | 795 | 80.2 |
| NE | 1,519 | 225 | 14.8 | 46 | 3.0 | 1,248 | 82.2 |
| NH ^{2/} | 1,110 | 162 | 14.6 | 17 | 1.5 | 931 | 83.9 |
| NY | 736 | 133 | 18.1 | 16 | 2.2 | 587 | 79.8 |
| ND | 1,221 | 151 | 12.4 | 21 | 1.7 | 1,049 | 85.9 |
| OR | 693 | 92 | 13.3 | 7 | 1.0 | 594 | 85.7 |
| PA | 857 | 113 | 13.2 | 11 | 1.3 | 733 | 85.5 |
| SC | 533 | 103 | 19.3 | 27 | 5.1 | 403 | 75.6 |
| Total | 13,841 | 2,102 | 15.2 | 344 | 2.5 | 11,395 | 82.3 |

^{1/} Includes Delaware.

^{2/} Includes Connecticut, Massachusetts, Maine, Rhode Island, and Vermont.

Acreage Reconciliation Supplement Results For Usable Agricultural Survey Samples

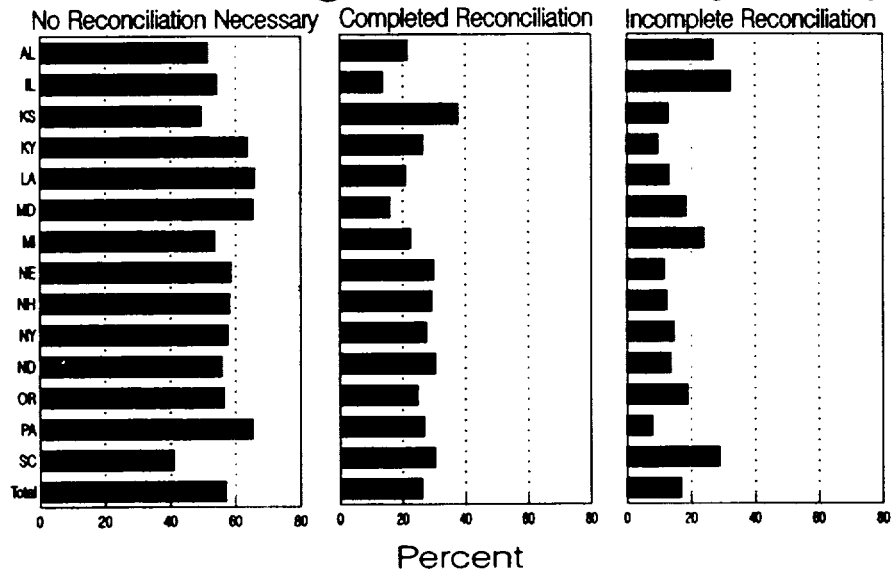


Figure 5

Reasons for Differences In Completed Reconcillations

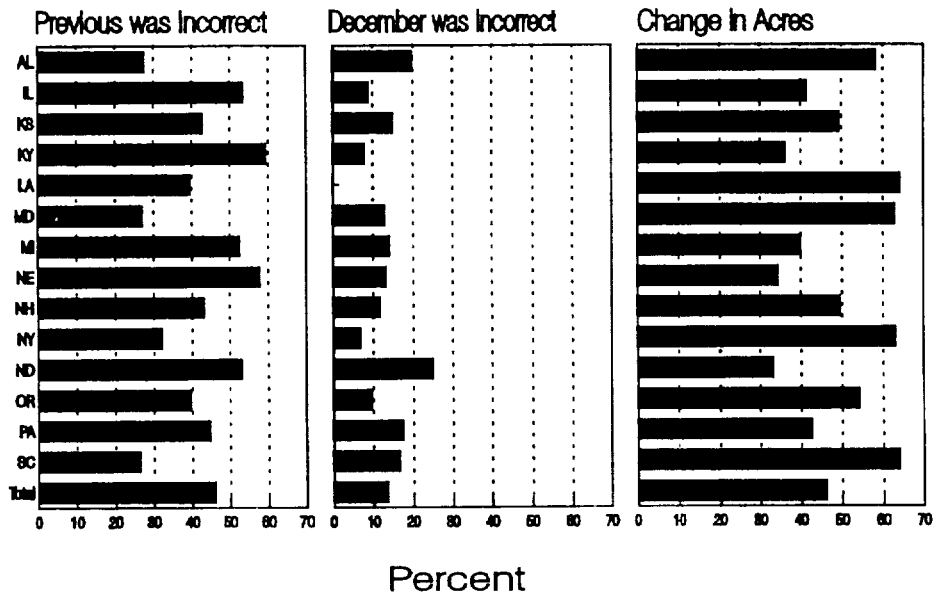


Figure 6

an actual change in their acres operated. Since respondents could have provided multiple reasons for a particular difference, the percentages add to more than 100.

Figure 7 shows the reasons for the 17 percent of the sample that had incomplete reconciliations. For the 14 SSO's in the study, 16 percent of the samples were returned by mail, and SSO's were told not to bother with any return calls to reconcile these. There were 33 percent that completed the Agricultural Survey but

refused to complete acreage reconciliation supplement. The reasons for the remaining incompletes is unknown. There were 32 percent of the incompletes which had no data for any boxes on the supplement. The reason for such a large number is unclear. A large part of the problem could be that there was no record keeping system for the supplement, which was a separate sheet of paper. Also the enumerator may have entered "missing" values in the CATI instrument. There were also 19 percent where the reconciliation was attempted, but the reconciled values did not match.

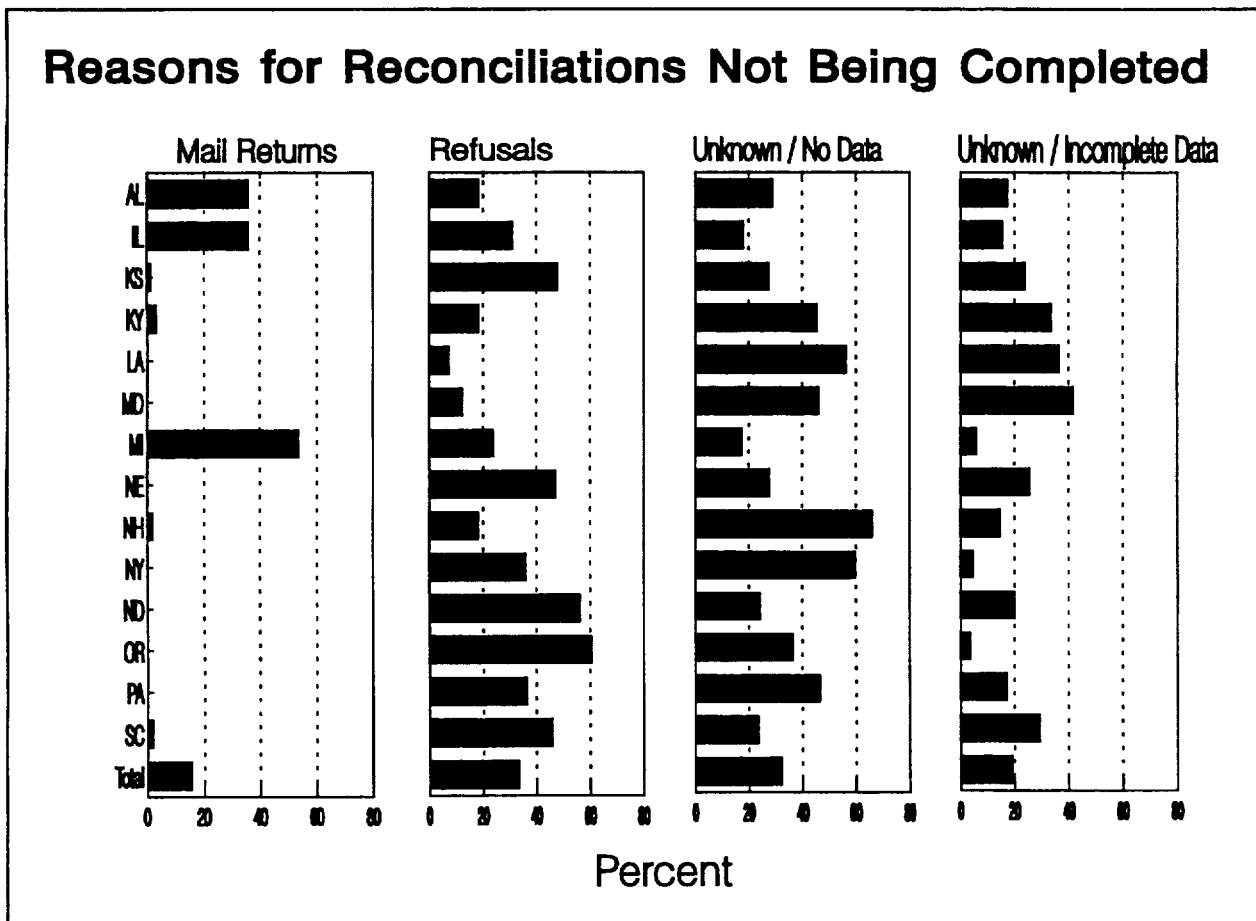


Figure 7

RESULTS

DAF Results

The main purpose of this study was to assess whether the data from "out-of-business" operations were being accounted for by those operations which were already "in business". Specifically, we hoped to find that operations surveyed in June would report more land in December, because some would have taken over the "out-of-business" operations. Since there is so much variability between what operations report from survey to survey, we needed to

obtain "better" responses. With the reconciled data from the December supplement, we have data which should provide a good indication of the true change in total acreage operated.

Ratios of the corrected December to corrected June responses were calculated using the Survey Processing System (SPS). A reweighted list and modified weighted area estimator was used to calculate the ratio for the matched reports between June and December. Figure 8 shows the percent change in each state's multiple frame expansions. The ratio for all 20 states was

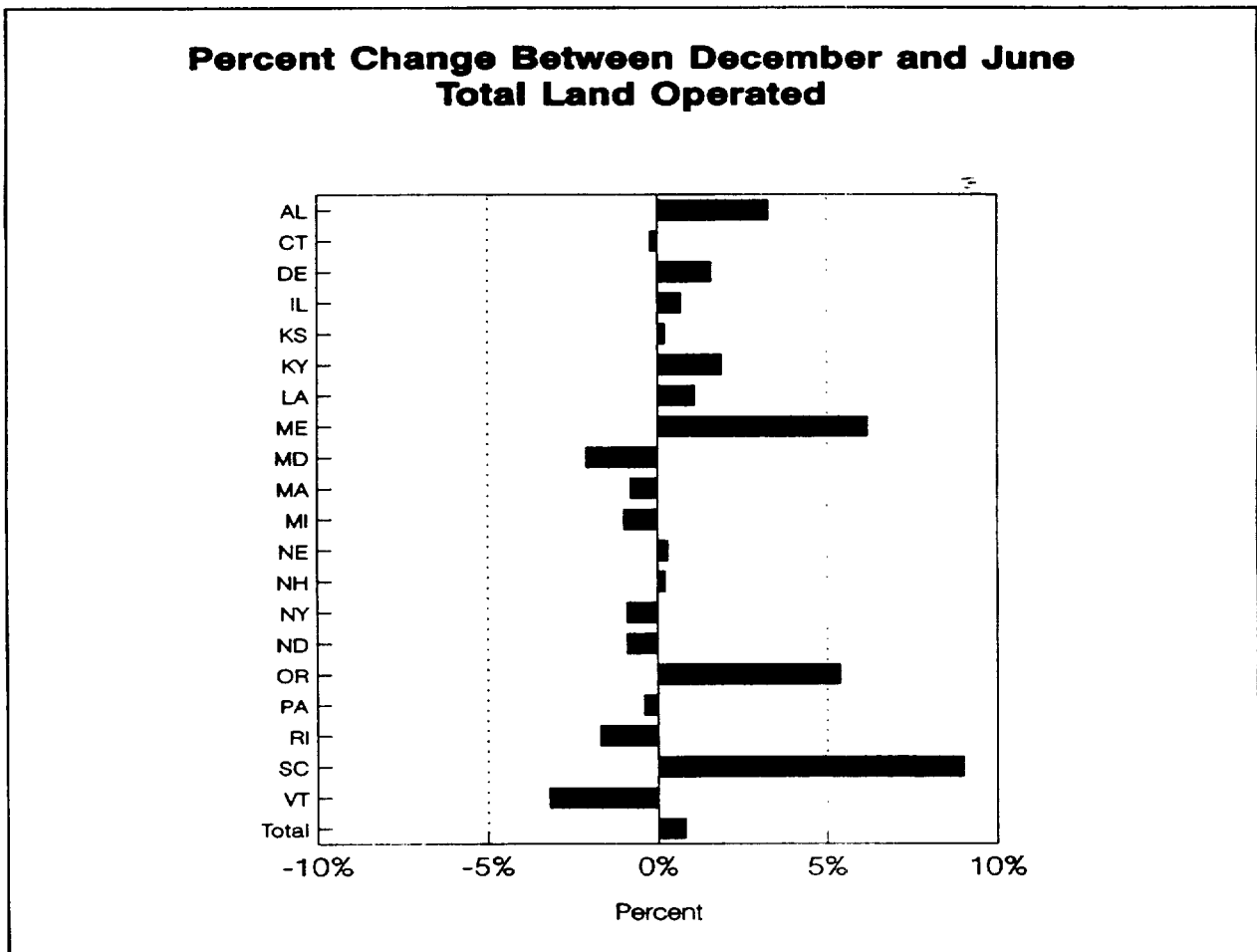


Figure 8

1.01, saying that the respondents reported 1 percent more land in December than in June, which is what was expected. This provides some evidence that the land that was operated by the now "out-of-business" operations is being accounted for by those remaining "in-business." However, when the DAF factor is considered the ratio is 0.99 indicating that not all of the DAF decline is being offset.

The remaining DAF decline can be accounted for by errors in data collection. Based upon the count of errors, nearly one half of the operations that are coded as "out-of-business" were not "in business" in a prior quarter, and thus their land would have already been reported by the current operator. Also, many of the other valid "out-of-business" operations may have been small operations or marginal farms that were small and never taken over by other operations.

Measurement Errors

Measurement error is the difference between the reported value and the truth. For this analysis we were looking to determine if there was a systematic measurement error or bias. Finding true values is usually very difficult, if not impossible. In this study one would expect the reconciled numbers to be at least as good and hopefully better than the original reported numbers. However, it is nearly impossible to determine if this is the case.

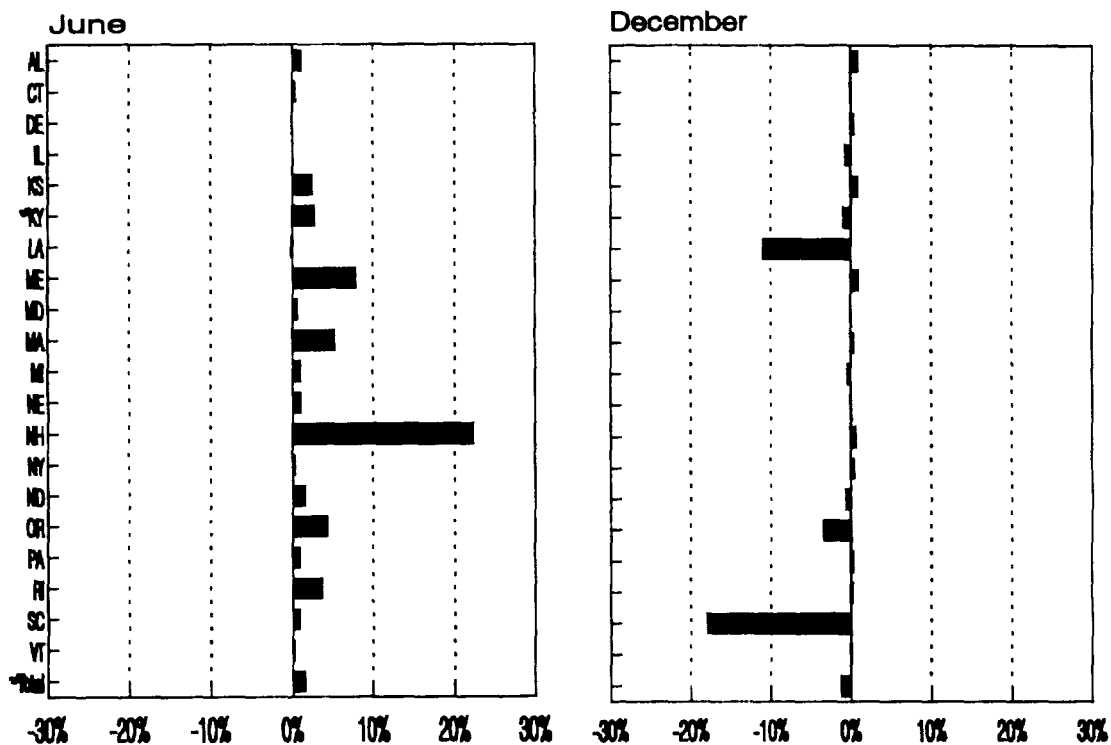
When comparing the data collected for Agricultural Surveys in each of the quarters, the percentage of data collected by each of the data collection modes changes only moderately. In most states, large operations

are personally enumerated, while many of the smaller operations are called by phone from the SSO's. Also, for the follow-on quarters in the 1993 cycle, certain questions were skipped in a subsequent quarter if the operator had responded in a previous quarter. When questions for total land operated were asked on the first contact three different questions were asked. They are land owned, rent out to others, and rented from others. On the subsequent contacts only one question ("total land operated") is asked.

With this background on the data collection, one could reasonably expect from the similar collection modes between quarters that corrections to their previous acreage and the current acreage in the December reconciliation study would be equally likely. Also with the "skipped" questions one would expect the detailed questions asked in the first contact to provide the best response. But as was shown in Figure 6, by nearly a four to one ratio, their previous acreage was corrected. This could be explained by the fact that it is easier for the current respondent to say that someone gave the wrong answer on the previous survey. But this does not provide evidence that we have obtained a good proxy to the truth.

To compare the corrected acreage with the original report, the SPS summary was used to calculate ratios of the corrected to the original for both June and December. Figure 9 shows the percent change in total acreage operated for each of these quarters. The data imply that total land operated was under reported by 1.5 percent in June and over reported by 1.2 percent in December. For June, the percentage change is statistically significant for the 20 state total

Percent Change in Total Acreage Operated with the Corrected Data Collected During December 1993 Acreage Reconciliation Survey



*June Ratio significantly different than one.

Figure 9

and for the state of Kentucky. Several other states had larger percentage changes, but they also had large variability resulting in their differences being statistically insignificant.

The reasons for corrections were collected and are presented in Table 2. The most common reasons for corrections are estimation, an incorrect response, or a misunderstanding. The definitional reasons which seem correctable are in bold type in

the table. The most common definitional reason is "didn't include rented acres." The second most common definitional reason is "didn't include pasture land."

Figure 10 shows the results of reconciliation by respondent groupings. The chart does show what one would naturally expect, that operators were more likely to correct a response that was given by another respondent. Over 75 percent of the samples were completed by the operator in both the previous and current surveys.

Table 2: List of Reasons for Correcting Acreage

| <u>COUNT</u> | <u>REASON 1/</u> |
|--------------|--|
| 399 | Figure was estimated or guessed |
| 296 | Gave wrong answer or added wrong |
| 137 | Some misunderstanding or miscommunication occurred |
| 117 | Didn't include acres rented |
| 111 | Respondent doesn't know where previous answer came from |
| 103 | Didn't include pasture |
| 96 | Respondent has no explanation |
| 87 | Didn't include woodland |
| 63 | Included acres that are rented out |
| 62 | Didn't include land that should have been for other reasons |
| 60 | Didn't include waste |
| 49 | OTHER - Reason given |
| 48 | Included acres in another operation |
| 36 | Didn't include CRP land |
| 34 | Didn't include separate parcel of land |
| 23 | Included land that should not have been for other reasons |
| 18 | Didn't include farmstead |
| 16 | Didn't include set aside |
| 5 | Didn't include land in another state |
| 3 | Did not report as of reference date |
| ===== | |
| 1763 | |

1/ Definitional reasons are in bold type face.

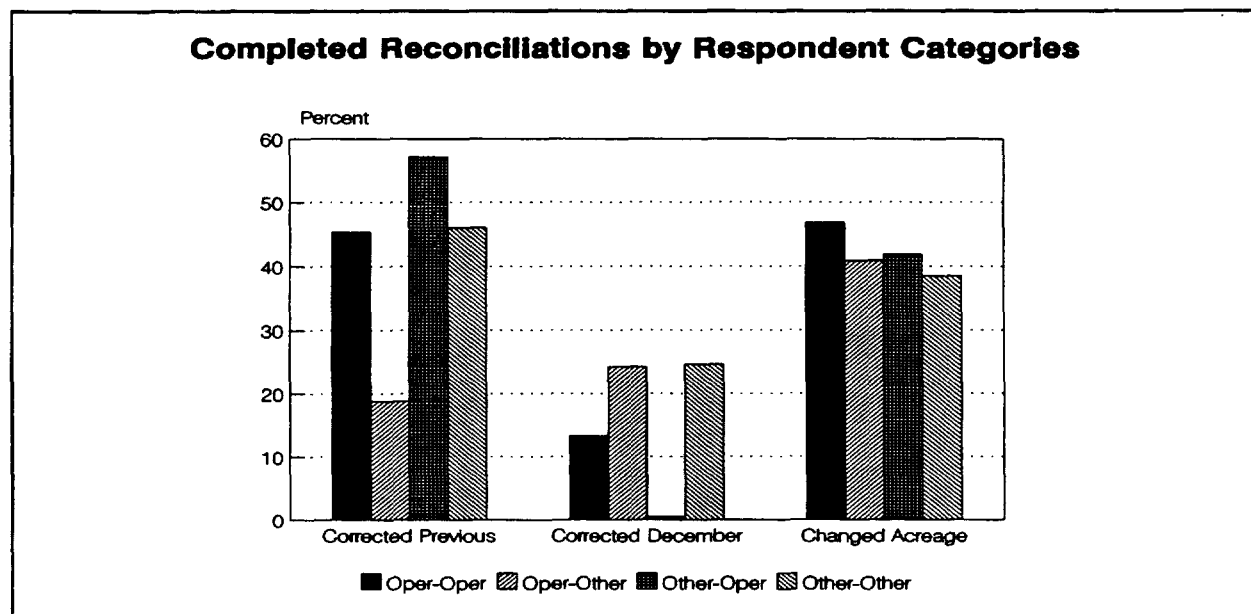


Figure 10

Tract/Farm Weight

Figure 11 shows the effect upon the NOL expansions of changing total land (and consequently the tract/farm weight). The changes in the expansions ranged from 11 percent to none for the majority of the states, with none of the changes being significant. The failure to show significance is due mainly to the large variances associated with the NOL samples. Though statistically insignificant, there were some substantial changes in the NOL expansion. For example, in Pennsylvania one report which gave the reason for the change of "no explanation" caused an 11 percent drop in the NOL hog expansion, resulting in a 4

percent lower multiple frame expansion. As was the case in Pennsylvania, the changes in most states were caused by only one or two reports.

Previously Reported Data Use

This study also provides some insight into the usage of previous reported data (PRD) during the interview. With the increase in the use of computer assisted interviews, we now have greater capabilities to check responses during interviews in a "behind the scenes" manner. These real time edit checks make it possible to correct errors easily and quickly while we have the respondent on the phone.

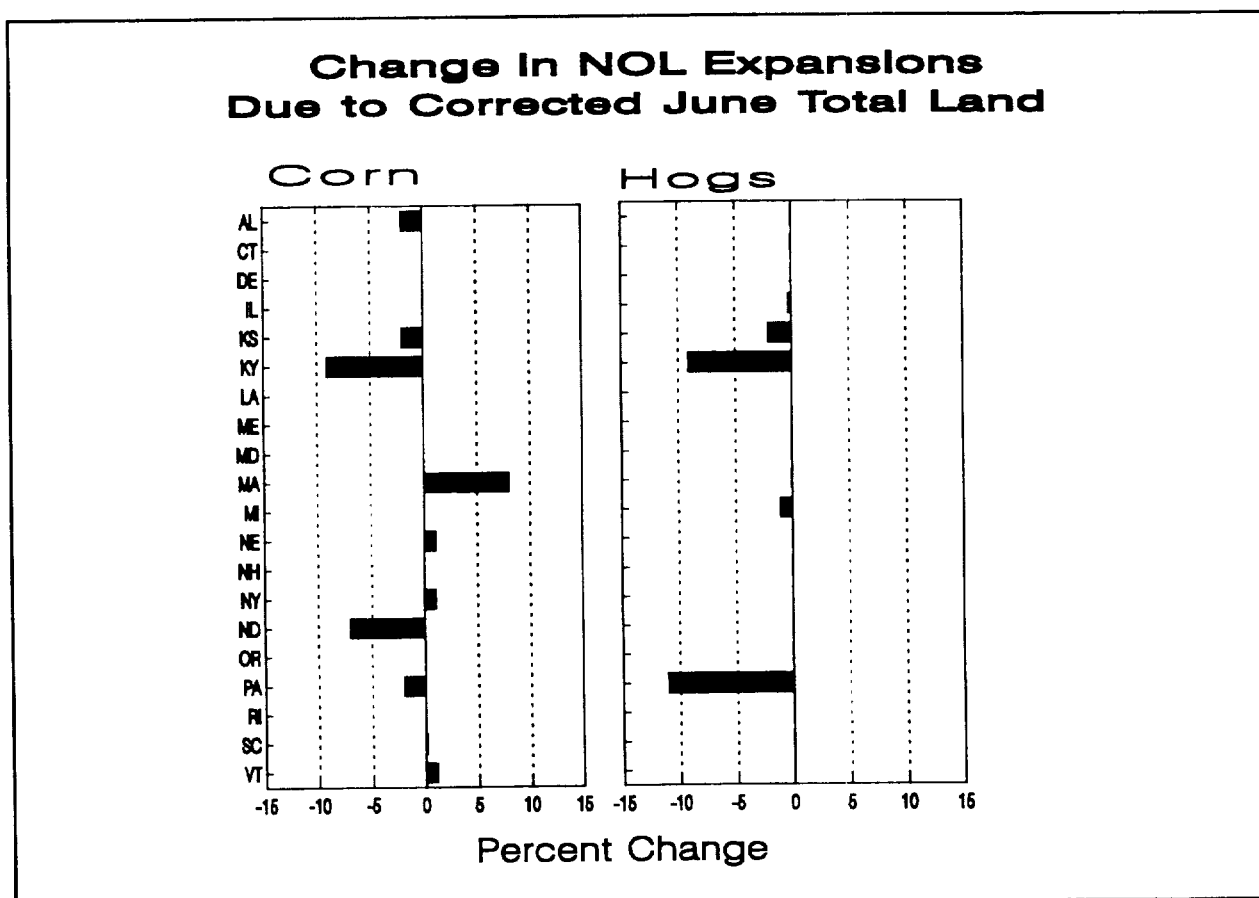


Figure 11

While the potential benefits appear great, this study shows some of the problems with PRD, and makes it clear that it is not a cure-all to data quality problems. A common situation in the NASS surveys which was apparent in this survey, is that only about 60 percent of the sample was surveyed in a prior quarter, and 20 percent of those were not reported by the operator. Therefore, only about one half of the sample has any PRD as a reference.

A surprising occurrence in the December survey was the number of unreconciled reports. There are many reasons for this: some were mail responses, refusals, and misplaced forms since it was a separate supplement. But over 50 percent of the unreconciled had no data or were incompletely reconciled. The batch edit did not force states by critical error to correct unreconciled reports, so the final data closely represents what was actually collected. The large number of incomplete reconciliations points to the difficulty that the enumerators have in reconciling the data.

In many cases when the enumerators have failed to reconcile the data, the farmer may have been uncooperative and difficult to interview. Sometimes it is difficult to get them to understand what we want by our definitions. Also, from the written reasons on the questionnaires it is apparent that the enumerators don't always understand the definition or the farmer's situation.

RECOMMENDATIONS

Recommendation 1: Ask the detailed owned, rented from and rented out questions for

only those that are outside the PRD edit limit.

Since there is some difficulty in reconciling responses, it might help eliminate enumerator and respondent confusion to use different questions to get at the desired acreage. With our current "skip" situation we could skip the detailed questions when the total acreage response is within the expected range. When it is outside we could ask the detailed questions. By asking the detailed questions after a response is outside the edit limit, respondents may answer more reliably since we have put the respondent on the alert to a discrepancy, but also provided an easy out since they may not have fully understood our definition.

Recommendation 2: Explore the possibility of using either the latest reported acreage of total land from another survey or recent list frame control data as PRD.

Since a large portion of many samples do not have any PRD, if we used data from another survey or the list frame it would allow the real-time edit checks to be made on virtually all records. The phrasing of the probe might need to be different. Perhaps we might only say "that is more acreage than our records show, let me ask you about just the land you own, etc." and not actually say what the PRD number is.

Recommendation 3: Continue the use of the new ratio to adjust for errors made in a previous survey.

It seems clear that over one half of the DAF decline is due to errors in reporting an operation's "business" status, indicating there are not many operations which validly

go "out-of-business." Therefore, we can not expect the DAF to be totally offset by substitution or more data reported by old operations. It seems that we only fully learn of an operation's business status after multiple visits and we always need to adjust in some way for errors in a previous survey.

Factor (DAF)." National Statistics Service, United States Department of Agricultural, May 1993.

Recommendation 4: Emphasize in training to enumerators the importance of reading the questions as written, especially emphasizing the inclusions and exclusions in the total land operated questions.

With many of the definitional reasons for correcting responses already incorporated into the questions, it would be good to ensure that we are asking all questions as written. We should let enumerators know that respondents are misreporting total land operated so they will be more aware and prepared to probe the respondent, if needed.

Recommendation 5: Conduct a cognitive interview in conjunction with the use of PRD in a survey.

A study of the cognitive characteristics of the interview might help us to better understand the overall reconciliation process. Insight could be gained into the reasons for misreporting, what the respondent thinks about our checking against PRD, how to make them more willing to correct a number, and why reconciliation attempts fail. This could be done as a phone follow-up to a survey where PRD was used during the original interview.

REFERENCES

Bailey, Jeffrey T. (1993) "Time Related Coverage Errors and the Data Adjustment

APPENDIX A - DATA ADJUSTMENT FACTOR (DAF) ANALYSIS

To determine the effect of the DAF on the direct expansion indications, an effort was made to isolate the factors that affect the expansions. The three factors were DAF, data, and tract/farm weight. For corn planted acreage it is not possible to totally separate the factors, because in June only tract data are reported while in December only farm data are reported which is then multiplied by the weight. After the normal June expansions were calculated for corn planted acreage and total hog inventory, new information obtained in December was used to recalculate the June expansions. Below are the formulae used to calculate the expansions. In June, the DAF variable serves a dual purpose for the area frame. It will have values of "2" for overlap (OL) non-extreme operators and "3" for OL extreme operators. These area frame samples are not used in the multiple frame expansions since the operations were represented on the list frame.

| Corn Planted | Expansions |
|----------------------|---|
| DAF | June Expansion = June Acres * June Expansion * June DAF Recalculated = June Acres * June Expansion * December DAF |
| List Data | June List Expansion = June List Data * June Expansion * June DAF Recalculated = December List Data * June Expansion * June DAF |
| Area Data and Weight | June Area Expansion = Tract Acres * June Expansion * June DAF Recalculated = Farm Acres * June Corrected Tract/Farm Weight * June Expansion * June DAF |
| Total Hogs | |
| DAF | June Expansion = June Hogs * June Expansion * June DAF Recalculated = June Hogs * June Expansion * December DAF |
| List and Area Data | June Expansion = June Hogs * June Expansion * June DAF Recalculated = December Hogs * June Expansion * June DAF |
| Tract/Farm Weight | June Area Expansion = Farm Hogs * June Tract/Farm Weight * June Expansion * June DAF Recalculated = Farm Hogs * June Corrected Tract/Farm Weight * June Expansion * June DAF |

Table 1: Corn Planted Acreage - June Reweighted Multiple Frame Expansion (000)

| Year/Factor | Matched Reports for Factor | | Ratio (Col 2/ Col 1) | Differ- ence (Col 2 - Col 1) | Difference as % of US Expansion |
|-------------------------|---------------------------------|--|----------------------------|--|--|
| | June Comparable Expansion | June Expansion with December Information | | | |
| 91 DAF | 29,692 | 28,138 | 0.95 | -1,554 | -2.0 |
| List Data | 21,094 | 20,902 | 0.99 | -192 | -0.2 |
| Area Data and Weight | 6,356 | 6,261 | 0.99 | -95 | -0.1 |
| 92 DAF | 30,797 | 29,686 | 0.96 | -1,108 | -1.4 |
| List Data | 22,444 | 22,381 | 1.00 | -63 | -0.1 |
| Area Data and Weight | 6,444 | 6,908 | 1.07 | 464 | 0.6 |
| 93 DAF | 23,245 | 22,783 | 0.98 | -462 | -0.6 |
| List Data | 15,576 | 15,481 | 0.99 | -95 | -0.1 |
| Area Data and Weight | 588 | 477 | 0.81 | -111 | -0.2 |

Table 2: Total Hog Inventory - June Reweighted Multiple Frame Expansion (000)

| Year/Factor | Matched Reports for Factor | | Ratio (Col 2/ Col 1) | Differ- ence (Col 2 - Col 1) | Difference as % of US Expansion |
|----------------------|---------------------------------|--|----------------------------|--|--|
| | June Comparable Expansion | June Expansion with December Information | | | |
| 91 DAF | 27,479 | 26,208 | 0.95 | -1,271 | -2.3 |
| List & Area Data | 25,564 | 24,879 | 0.97 | -685 | -1.2 |
| Tract/Farm Weight | 9,035 | 8,913 | 0.99 | -122 | -0.2 |
| 92 DAF | 28,598 | 27,983 | 0.98 | -615 | -1.0 |
| List & Area Data | 27,221 | 28,028 | 1.03 | 807 | 1.4 |
| Tract/Farm Weight | 10,102 | 10,003 | 0.99 | -99 | -0.2 |
| 93 DAF | 24,473 | 24,009 | 0.98 | 464 | -0.8 |
| List & Area Data | 23,048 | 22,966 | 1.00 | -82 | -0.1 |
| Tract/Farm Weight | 6,625 | 6,621 | 1.00 | -4 | 0.0 |

APPENDIX B - OUT OF BUSINESS OPERATIONS BY STATE

**December 1993 Out of Business Operations
From Active Old Replications**

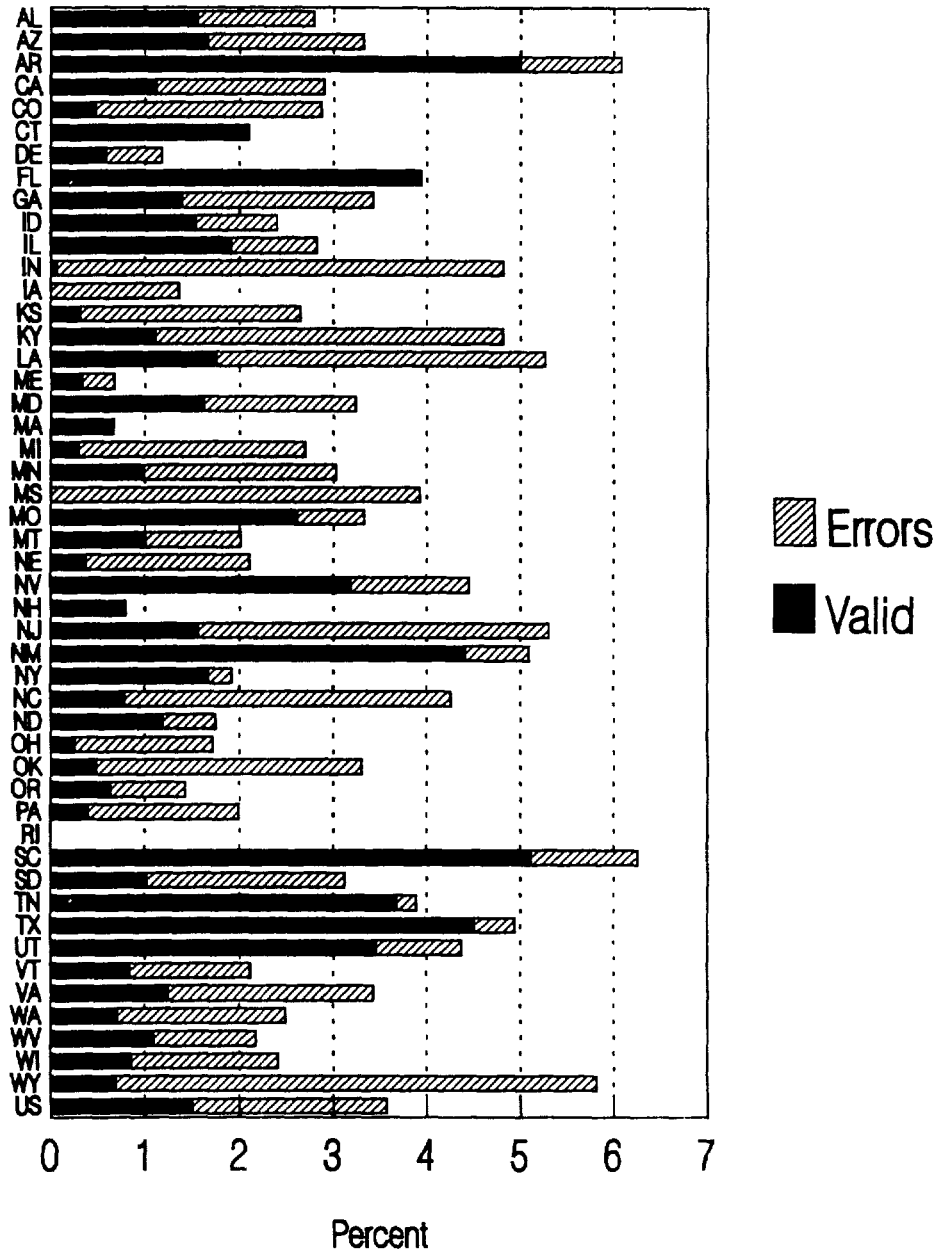


Figure 12

APPENDIX C - ACREAGE RECONCILIATION SUPPLEMENT

AGRICULTURAL SURVEY
DECEMBER 1, 1993

Acreege Reconciliation
Supplement

| Strata | ID | Tract | Subtract |
|--------|----|-------|----------|
| | | | |

1 [Enter total acres operated (IC 900) from Section 2: _____]

2. [Is the difference between Item 1 and previous total acres operated (on label) _____ more than 10 acres?]

YES NO [Enter Code 1 and conclude interview.] 696

a. We are doing a study on total acres operated. In our previous survey, we recorded (on label) _____ acres, and for December (Item 1) _____ acres.

Can you help me explain the reason for the difference?

[Check and complete information for situation(s) that apply. Read definition if necessary.]

Total Acres Operated: All land under this operating arrangement including farmstead, all cropland, woodland, pastureland, wasteland, and government program land.

Change made in total acres operated since previous survey. (bought or sold land, rented land, rented out land, etc.) [Enter Code 1.] 697

Acreage recorded wrong on previous survey. What was the previous total acres operated? [Enter acres and write out reason for difference below.] 698

Office Use

699

Acreage recorded wrong on December survey. What was the December 1 total acres operated? [Enter acres and write out reason for difference below.] 700

Office Use

701