

**TIME RELATED COVERAGE ERRORS AND THE DATA ADJUSTMENT FACTOR (DAF)**, by Jeff Bailey, Survey Quality Research Section, Survey Research Branch, Research Division, National Agricultural Statistics Service, United States Department of Agriculture, Washington, DC 20250-2000, May 1993, Report No. SRB-93-03.

**ABSTRACT**

The National Agricultural Statistics Service (NASS) conducts quarterly surveys to estimate crop acreage, grain stocks and hog inventories. Sample replicates from the stratified sample design are surveyed on a rotating basis to allow for quarter to quarter overlap while bringing other operations into the survey. With this design, farming operations may be enumerated from one to four quarters in a particular year's survey cycle.

Operations are sometimes reported as "out-of-business" in one of the quarterly surveys when they were in business during a previous quarter. While this is not a problem if the questionnaires are correctly coded, a review of survey data reveals a significant number of coding errors in one quarter or the other. This between-quarter discrepancy in an operation's business status can change the coverage of the population (particularly if the change is due to incorrect coding) and have a major impact on the resulting indications.

This study looked at the effect of the coverage change on the indications and the reasons for questionnaires being coded as "out-of-business". From this research we hope to determine: 1) the extent to which those "out-of-business" changes represent data collection errors rather than real operation changes, 2) how to reduce the number of operations incorrectly being coded "out-of-business" and, 3) whether the data are increasing for operations remaining in business to offset operations legitimately going "out-of-business".

**KEY WORDS**

Data Adjustment Factor (DAF), Coverage errors, Acreage reconciliation

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.

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## SUMMARY

The National Agricultural Statistics Service (NASS) conducts quarterly surveys to estimate crop acreage, grain stocks, and hog inventories. The replicated, stratified sample design results in sampled operations being surveyed in a rotating fashion, allowing for some quarter to quarter overlap while reducing respondent burden. A new sample begins in June with quarterly surveys in the following months of September, December, and March.

A dilemma arises as the year's survey cycle progresses beyond the June base survey, because the percentage of "out-of-business" operations increases. This creates a situation where the indications from the survey decrease and the population coverage may become incomplete. Observations show that approximately 4 to 6 percent of operations change from "in business" one quarter to "out of business" the next. Reviewing the questionnaires indicates that a substantial number of these were inaccurately coded or lacked complete information.

The Data Adjustment Factor (DAF) adjusts the data for duplication and eliminates data that should not be summarized. When an operation is "out-of-business" the DAF is zero. Calculations of the average DAF show that it continually decreases the further you get from June. The DAF reduced the December expansions relative to June by about 2 percent in 1991 and 1 percent in 1992. This drop from June is substantial, but how much of it reflects a legitimate change in the target population? What led to the reduction of the DAF impact in 1992 and how can we further reduce its effects?

During the December 1992 Agricultural Survey five states completed an Acreage Reconciliation Supplement for all area frame samples in the multiple frame survey. The purpose was to determine if we were obtaining larger reported total acres operated by operations that took over the "out-of-business" operations. The results show we actually received less reported acreage after we reconciled reporting differences and corrected June and December reported total land operated. However, the indicated change in the area frame expansions may not provide a good measure of change in farm size in general, since the December area frame samples represent only farms not on the NASS list sampling frames. These tend to be the smaller farms.

The DAF should continue to be monitored and efforts be made to reduce its artificial impact upon the survey indications. Some suggestions to reduce the DAF decline are more training, changes in coding old replications, and the use of historic data to confirm "out-of-business" operations. These suggestions will likely not completely eliminate the DAF problem and more ideas should be developed and studied to lessen and monitor the DAF impact.

## INTRODUCTION

The National Agricultural Statistics Service (NASS) conducts many surveys to estimate inventory and production of various agricultural commodities. As a part of its Agricultural Survey Program, NASS conducts quarterly surveys to estimate crop acreage, grain stocks and hog inventories. Analysis of December 1991 Agricultural Survey data showed that the December crop indications for planted acres were always lower than the June indications. Within a growing season the reported planted acreage of a crop should not change, unless intentions were reported in June and the crop was never actually planted. It was discovered that many operations which reported crops in June were now "out-of-business" in December.

Reviewing the data of these "out-of-business" operations focused attention on the Data Adjustment Factor (DAF). The DAF is used to adjust for duplication and to eliminate any data reported on an "out-of-business" operation. The value of the DAF is always inclusively between zero and one. The average DAF was calculated for successive quarterly surveys and found to decline as time passed. Several reasons can account for this and many ideas have been expressed.

This paper will begin with a description of the multiple frame surveys at NASS and how coverage errors can occur as time passes. The analysis of the DAF based on data collected on a supplemental acreage reconciliation questionnaire will be presented.

## NASS MULTIPLE FRAME SURVEYS

NASS conducts many surveys and for each it is necessary to define the sampling population or frame of units to sample. For most NASS surveys the target population is all operations with the agricultural commodities of interest. NASS maintains a list frame of names thought to be farm operators in each state for its sampling. Considerable time and resources are spent in the state offices updating and maintaining these lists. In addition to the samples drawn from these lists, samples are drawn from an area frame of all land in the U. S. from which estimates are generated to measure list incompleteness. Together the two frames form a multiple frame survey design which NASS uses in many of its surveys.

This study focuses on NASS's quarterly multiple frame Agricultural Surveys. The list sample is selected in the spring with the surveys conducted during June, September, December and March. During the base survey in June a complete area sample is enumerated. For this survey, every operation in the U. S. has a chance to be sampled either from the list and area frame or the area frame alone. Names found in the area frame during June that are not on the list frame (NOL) will be used in subsequent quarters to represent those operations which had no chance of list frame selection.

The list sample consists of several replications which are selected each spring for use during the course of the survey year. These replications are rotated in and out from survey to survey to

provide quarter to quarter comparability and to relieve respondent burden. With the rotation scheme used, farming operations may be enumerated from one to four quarters in a particular year's survey cycle (See Appendix A, Agricultural Survey Replications).

### **TIME RELATED COVERAGE ERRORS**

The samples for the Agricultural Survey are selected in the spring of each year. Before some samples are surveyed they will go "out-of-business". If an "out-of-business" operation is taken over by a new operation, this new operation must have a chance of selection. Any new operations taking over an "out-of-business" operation before June 1, will have a chance of inclusion in the area frame sample during the June Agricultural Survey. New operations starting up after June 1 can only be accounted for by substitution procedures, since there is no complete area frame survey done after June.

These substitution procedures provide a means to give everyone a chance of being selected to assure population coverage. Substitutions should be made when sampled units are "out-of-business" and the new operator was not farming on June 1, but there is concern that the procedures are not always executed properly and all needed substitution is not being done (Jones 1988). Furthermore, substitution only occurs when an operation is completely "out-of-business". If an operation sells off only part of its land to a new operator, that operation is not eligible for substitution and does not have a chance of selection (Dillard 1993). The Survey Quality Research Section is currently researching how effectively substitution procedures are being followed and the impact of the substitution process on survey indications.

For the follow-on quarterly surveys of September, December, and March, about 40% of the sample is from new replicates, with the remaining from old replicates that were surveyed in a previous quarter. For old replicate samples only those operations that were in business in the previous quarter will be surveyed in a following quarter. See Appendix A, Agricultural Survey Replications for a detailed description of the replicate rotation.

Figure 1 shows the percentage of active samples from old replications that were coded "out-of-business". While over the course of time it is natural for some operations to go "out-of-business", the percentage coded as "out-of-business" is questionably high. It is doubtful that all operations so coded actually went "out-of-business" since the earlier quarter contact; some may be miscoded and others may have been refusals in a previous quarter. (See Tables 1 and 2 in Appendix B for individual state percentages).

This study looked at the errors of reporting and coding "business" status and their effect on coverage. While some operations legitimately go "out-of-business" between quarters, and these can be substituted for, a substantial number of changes from quarter to quarter are errors in coding. For example, an operation is coded as "out-of-business" in a current quarter but "in business" for a previous quarter, when in fact it should have been recorded as "out-of-business" during the first quarter because the sample unit was a landlord. The converse can also happen when an operation is coded as "out-of-business" when it is really in business, since it continues to have potential for agricultural production.

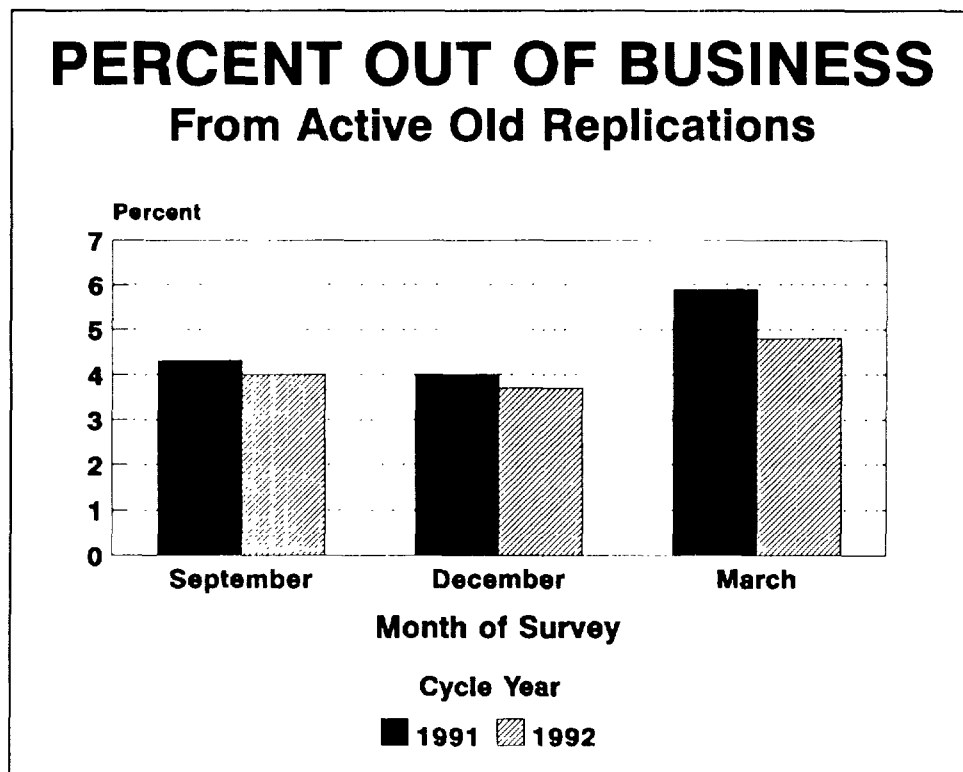


Figure 1



In addition to being coded as "out-of-business", questionnaires are coded as to whether the sampled operation has changed since June 1. When an operation has gone "out-of-business" since June 1 item code box 923 on the face page of the questionnaire is coded a 1. Figure 2 shows the surprisingly low percentage of "out-of-business" operations from active old replicates that were coded as a change since June 1. Since all old replicates were reported in business during a previous quarter, we would expect nearly all current survey "out-of-business" reports to be changes since June 1. Therefore, if the current survey coding is correct, most operations were reported erroneously during the previous quarter. However, it is believed that code box 923 is frequently left uncoded. The coding of this box may be overlooked for old replications in part because it does not need to be coded for new replications. (See Tables 1 and 2 in Appendix B for individual state percentages).

Any operation that is reported as "out-of-business" is not surveyed again during that year's survey cycle. By NASS's definition, an "out-of-business" operation does not have any agricultural commodities and has no potential for agriculture during the rest of the year. Therefore, if correctly reported, it will have nothing to report in the following quarters and need not be surveyed. Each quarter more of these known zeros are accumulated, which creates problems when an operation is misreported as "out-of-business." State Statistical Offices (SSO) are instructed to review the known zero operations, but since not all are enumerated again some previous survey errors may go undetected. Any undetected misreporting of business status will cause a downward bias in the indications.

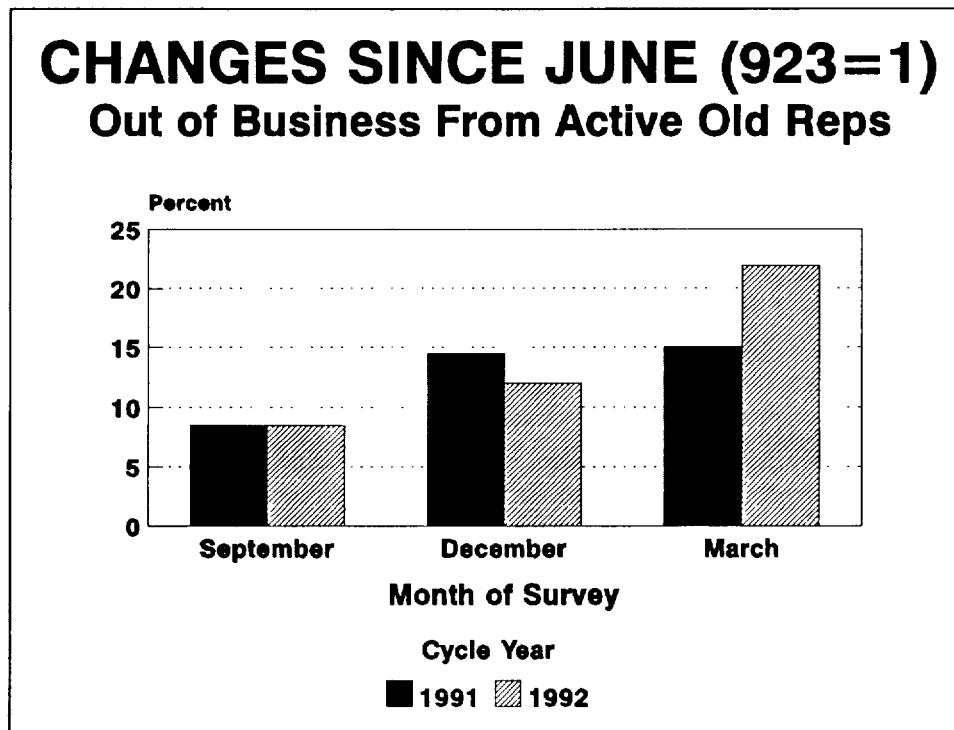


Figure 2

## ANALYSIS OF THE DATA ADJUSTMENT FACTOR (DAF)

In NASS's Agricultural Surveys, the Data Adjustment Factor (DAF) adjusts reported data for duplication 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 (DAF=.5), 2) an operation is duplicated in a higher stratum (DAF=0), and 3) an operation is "out-of-business" (DAF=0). Table 1 shows the weighted (by the expansion factor for each design stratum) average of the DAF during the last two cycles of the Agricultural Surveys. The pattern of a decline is clear. One would 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 survey results.

**Table 1. Average Data Adjustment Factor**

Cycle Year	Month of Survey			
	June	September	December	March
1991	.926	.899	.871	.849
1992	.946	.933	.907	.876

To determine the effect of the DAF on the expanded data, analysis was done comparing June to December expansions (Tables 2 & 3). The effects of the DAF, reported data, and the tract/farm weight factors were separated to assess the magnitude of each. This was done by calculating the normal June expansion, then using the information from those reporting 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. For the corn planted acreage expansion the area data and tract/farm weight factors can not be separated, because in June only tract data are reported while in December only farm data are reported. For total hogs, farm data are reported in both June and December, so comparisons between June and December of both data and weights can be made. For a complete explanation of how these calculations were done and a look at the resulting expansions, see Appendix C.

From Tables 2 & 3, we can see that in 1991 the DAF factor had a greater impact upon the difference in expansions between June and December than did the data or the weight. For example, the DAF factor resulted in a decrease in the U. S. expansion of 2 percent for corn

planted acreage while the list/area data and weight factors decreased the expansion by only 0.2 and 0.1 percent, respectively. The situation for total hog inventory was similar, with the DAF decreasing the hog expansions by 2.3 percent. The size of the decrease due to the DAF factor is larger than the coefficient of variation for both estimates, illustrating the substantial effect the DAF has.

**Table 2: Data Adjustment Factor (DAF) Effect on the Corn Planted Acreage Expansion for Survey Years 1991 and 1992.**

Factor	June to December Comparable Reports for Factor					
	1991			1992		
	Ratio June to Dec.	Difference June - Dec. (000)	Difference as % of US	Ratio June to Dec.	Difference June - Dec. (000)	Difference as % of US
DAF	.95	-1,554	-2.0	.96	-1,108	-1.4
List Data	.99	-192	-0.2	1.00	-63	-0.1
Area Data and Weight	.99	-95	-0.1	1.07	464	0.6

**Table 3: Data Adjustment Factor (DAF) Effect on the Total Hog Inventory Expansion for Survey Years 1991 and 1992.**

Factor	June to December Comparable Reports for Factor					
	1991			1992		
	Ratio June to Dec.	Difference June - Dec. (000)	Difference as % of US	Ratio June to Dec.	Difference June - Dec. (000)	Difference as % of US
DAF	.95	-1,271	-2.3	.98	-615	-1.0
Data	.97	-685	-1.2	1.03	807	1.4
Area Weight	.99	-122	-0.2	.99	-99	-0.2

When we look at the 1992 analysis in Tables 2 & 3, we see that the effect of the DAF is about one half the size it was in 1991. This is encouraging, but the reason for the change in results is hard to determine. It is possible that training to make people aware of the DAF concerns has had a positive impact. One possible reason for the drop is the new list sampling unit/reporting unit association procedures, which half of the states used in 1992. These new procedures for associating reported data

with sampled list names are called "operator dominant," as compared to the previous procedures which are referred to as "operation dominant." To see if this procedural change reduced the DAF impact, the effect of the DAF was compared between the two groups of states.

Tables 4 & 5 show that the DAF factor caused a 1.3 percent drop in the expansion for corn planted acreage in the operator dominant group and a 1.6 percent drop for the operation dominant group. For total hogs the DAF factor caused a drop of 1.0 and 1.1 percent, respectively. From this there is only slight evidence that the DAF effect was smaller in the group with the new list dominant procedures.

**Table 4: 1992 DAF Effect on the Corn Planted Acreage Expansion by Type of List Sampling Unit/Reporting Unit Association Procedure.**

Factor	Comparable Reports for Factor					
	Operator Dominant			Operation Dominant		
	Ratio June to Dec.	Difference June - Dec.	Difference as % of Total	Ratio June to Dec.	Difference June - Dec.	Difference as % of Total
DAF	.97	-573	-1.3	.96	-535	-1.6
List Data	1.00	17	0	.99	-80	-0.2
Area Data and Weight	1.10	338	0.7	1.04	126	0.4

**Table 5: 1992 DAF Effect on the Total Hog Inventory Expansion by Type of List Sampling Unit/Reporting Unit Association Procedure.**

Factor	Comparable Reports for Factor					
	Operator Dominant			Operation Dominant		
	Ratio June to Dec.	Difference June - Dec.	Difference as % of Total	Ratio June to Dec.	Difference June - Dec.	Difference as % of Total
DAF	.98	-319	-1.0	.98	-297	-1.1
Data	1.03	413	1.4	1.03	394	1.4
Area Weight	.99	-53	-0.2	.99	-46	-0.2

To learn why operations were being coded as "out-of-business" we began to collect reasons. Observations made in Missouri during June 1992 were used to compile a preliminary list of these reasons. This list was used in Kansas during the December 1992 Agricultural Survey to code all questionnaires for which the reporting unit was coded "out-of-business" (i.e. item code 921=9). All old replications so coded were in business a previous quarter, while new replicates had not been surveyed. The reasons to be used in the coding were designed to differentiate between the situations expected between old and new replicate samples. The resulting list of reasons compiled in Table 6, while a starting point, turned out to be inadequate since too many reasons were grouped as "other."

**Table 6: List of Reasons Why Questionnaires Were Coded as "Out-of-Business"**

Count	Replication	Reason
29	New	Other..for new replications.
25	New	"Out-of-business" before June 1.
25	New	"Out-of-business" since June 1 and new operator farming on June 1.
13	New	Operator is a landlord only
6	New	Major name change
25	Old	Other...for old reps.
10	Old	Major name change since June 1 and other "out-of-business".
6	Old	"Out-of-business" since June 1 and new operator farming on June 1.
4	Old	Operator is the landlord only and wasn't coded "out-of-business" before.
3	Old	Previous operation status was unable to be determined
2	Old	Other "out-of-business" and new operator status unknown.
1	Old	"Out-of-business" since June 1 and new operator started after June 1.

To improve upon the reason coding, listings were sent to selected states after the December 1992 Agricultural Survey. State office personnel were to write out the reasons that operations changed their business status to "out-of-business". Table 7 is a compiled list of the reasons from four states. The most common reason was that incomplete information was obtained during the prior survey, because the respondent either refused or did not provide information about a partner involved in the operation.

Several of the reasons for operations being coded as "out-of-business" are related to the (small) size of operations and to whether they have agricultural potential. NASS defines as "out-of-business" an operation which has no potential for agricultural inventory or production during the remainder of the survey year. With this definition, no operation with potential for agricultural commodities should be coded as "out-of-business". While these operations may have nothing to report for any particular quarter they may have agricultural inventory or production during a subsequent quarter.

From the Table 7 list we can not tell directly whether the change in business status occurred after June 1 or was simply not picked up during a previous quarter. We can presume that some reasons, like 'landlord only', reflect situations which were not picked up in a previous quarter. Others, like 'sold farm', may or may not represent actual changes since June 1. If the change occurred after June 1 then the selected unit would be a candidate to be substituted for. If there is not an actual operation change, then there is a mistake in one quarter or the other. This may result from the respondent failing to answer correctly, some recording error, erroneous office coding, or one of many other possibilities.

**Table 7: Detail of Reasons for Old Replications Coded as "Out-of-Business"**

Number Times Occurred	Reason
37	Previously refusal and status not determined
15	Partner reported in higher strata
12	Partner reported in same strata
11	June with potential only.
8	Landlord only: incorrectly reported in previous quarter
7	Turned over to someone else
7	Sold farm
6	Name on label does not farm
5	Reported crops or livestock earlier, and reported none now
4	Minor crops or a few livestock only in previous survey
4	Turned over to son
4	Deceased
4	Retired
3	Land is now idle
3	Valid "out-of-business" (reason unknown)
3	Box 921 coded in error in current survey
3	Land is now rented, operated it previous quarter
2	CRP operator which should not be coded "out-of-business"
2	Miscoded multiple operations
2	Operator lied on previous report
2	Farm operated by someone else
2	Previously reported as 2 operations, actually only 1
2	Name correction on area frame, now OL
2	Partner strata boxes coded incorrectly
1	Chicken contractor only
1	Works on another farm only
1	Wrong name collected on June tract
1	Grain Co. only

## USE OF THE ACREAGE RECONCILIATION SUPPLEMENT

The concern about the decline in the DAF would be unwarranted if the data reported by other operations increased to offset the lost data for those that went "out-of-business". A large portion of operations that go "out-of-business" are taken over by another operation that is already in business. If the currently existing operation that takes over an "out-of-business" operation reports all the livestock data and crop acres, then there are no coverage errors and the decline in the DAF will not have an adverse effect upon the expansions.

To determine if the decline in the DAF is offset by increased data reporting we can measure the differences between reported data for stable items like acreage that should not change during the growing season. This should be a simple task, but due to the substantial amount of response variation it is not possible to know whether a reporting difference in a data item is an actual change. During the December 1992 Agricultural Survey a supplemental questionnaire was used for the NOL (Not On the List) area sample in 5 states (See questionnaire in Appendix D). For those sampled, the June reported total land operated was recorded on the supplement. When the difference between the June and December reported total land operated was 5 or more acres, respondents were asked "We are doing a study on total acres operated. In our June Survey, we recorded xxx acres and for December xxx acres. Can you help me explain the reason for the difference?" The possible reasons for differences could be any combination of the following reasons:

1. A change occurred in total acres operated (bought or sold land, rented land, rented out land, etc.)
2. June acreage was recorded wrong.
3. December acreage was recorded wrong.

Table 8 provides some counts from the survey showing that 113 out of 849 (13.3 percent) indicated that there had been an actual change in total land operated. The absolute average change made in total acres operated was 100.6 acres with a net decrease of 6.3 acres. This is the opposite of what we would hope to find if there was any offsetting of the DAF decline. One reason for not getting an increase in acreage is that the NOL sample is not a representative sample of all farms, since NOL operations are normally small farms which are less likely to take over existing operations.

**Table 8: December Acreage Reconciliation Supplement 1/**

Groups	Reports in Group		Difference in Reported Acres <u>2/</u>	Absolute Average Difference in Reported Acres
	Number	Percent		
Difference < 5 Acres	436	51.4	-	-
Change in Acres Operated	113	13.3	-6.3	100.6
Corrected June Acres	140	16.4	7.3	422.7
Corrected December Acres	17	2.0	28.7	441.8
"Out-of-Business"	33	3.9	-256.2	256.2
Refusal or Inaccessible	114	13.4	-	-

- 1/ Three reports corrected both June and December acreage and two reports indicated a change and corrected June acres.
- 2/ The difference in unexpanded, reported acres for "out-of-business" operations is the average total land for those operations in June.

In addition to determining those operations that had made a valid change in acres operated, respondents could correct the June or December recorded total acres operated. Table 8 shows that 140 (16.4 percent) respondents corrected the June report and 17 (2.0 percent) corrected December. The absolute average correction made was 422.7 acres in June with a net increase of 7.3 acres. For December the absolute average change was 441.8 acres with a net increase of 28.7 acres. It is interesting that by a nearly 10 to 1 proportion, respondents changed the previous response (June) rather than the current (December) reported acreage. This is surprising since the June data were collected by face-to-face interviews while the December data were collected mostly by telephone. Because face-to-face interviewing is generally thought to produce better results, one would expect the June response to be more accurate.

The original June reported total land operated is used operationally in the calculation of the NOL expansions for follow-on quarters. A weight consisting of the ratio of June reported tract acres to June reported total land operated is applied to entire farm data reported to prorate them back to the tract. With the new corrected June total land operated, the expansions for corn planted and total hogs were recalculated to assess the effect of the adjusted weight upon the December expansions.

Tables 9 and 10 show the expansions with both the original and corrected June weight along with their differences and the associated P-values. From these tables we see that none of the corrections had a significant impact upon the expansions. While statistically insignificant, however, there were some substantial changes in the NOL expansions with the adjusted weights, especially for total hog inventory in Kentucky. The failure to show significance in some cases was due mainly to the large variances associated with the NOL samples.



**Table 9: NOL Expansion for Total Hogs Inventory, December 1992 Ag Survey**

State	Total Hog NOL Expansion		Difference (Corrected - Original)	P-value of Test in Difference
	Original June Tract/Farm Weight	Corrected June Tract/Farm Weight		
AL	50,823	50,823	0	-
KS	76,226	81,444	5219	0.12
KY	55,065	125,288	70,223	0.32
OR	7334	7334	0	-
PA	159,406	157,557	-1849	0.17
US	348,854	422,446	73,593	0.29

**Table 10: NOL Expansion for Corn Planted Acreage, December 1992 Ag Survey**

State	NOL Expansion, Corn Planted Acres		Difference (Corrected - Original)	P-value of Test in Difference
	Original June Tract/Farm Weight	Corrected June Tract/Farm Weight		
AL	73,730	73,812	82	0.34
KS	289,853	303,672	13,818	0.25
KY	302,845	300,943	-1903	0.53
OR	1650	1650	0	-
PA	296,772	294,528	-2244	0.38
US	964,851	974,604	9754	0.44

The reasons that respondents made corrections were obtained to gain an understanding of why they misreported the first time and to try to improve the questions. Tables 11 and 12 provide a list of reasons the June and December answers were corrected. This information is valuable for analyzing question wording and studying the related cognitive issues. One common reason, "Did not include woodland, farmstead, waste, pasture, etc." is a definitional problem that is not new. In June the questionnaire even verifies that the reported acreage does include woodland, farmstead, waste, and pastureland.

**Table 11: Reasons Cited for Correcting the June Response for Total Acres Operated**

No. of Times Reason Given	Reason
24	No explanation
18	Figure was estimated or guessed
18	Some misunderstanding or miscommunication occurred
17	Gave wrong answer or added incorrectly
14	Did not include woodland, farmstead, waste, pasture, etc.
11	Respondent doesn't know where answer came from
11	Did not include acres rented from someone else
9	Included acres in another operation
5	Included acres that were rented out
4	Forgot a field or parcel of land
3	Either could be right - both answers are estimates
3	Respondent thought they had reported this the first time
1	Used records or actually counted for a response
1	Respondent doesn't remember previous interview
1	Did not report as of reference date
===== 140	

**Table 12: Reasons Cited for Correcting the December Response for Total Acres Operated**

No. of Times Reason Given	Reason
7	Figure was estimated or guessed
3	Did not include woodland, farmstead, waste, pasture, etc.
2	Both answers were guesses
1	Forgot a field or parcel of land
1	Did not include acres rented from someone else
1	Some misunderstanding or miscommunication occurred
1	Used records or actually counted for a response
1	Rounding
===== 17	

## DISCUSSION AND RECOMMENDATIONS

There are many causes for the DAF decline. Some of the decrease is valid and expected since operations will always be going "out-of-business", but some is due to survey error. The many causes increase the complexity of determining what needs to be done. The evidence suggests that the DAF decrease is large, meriting further analysis. Education and awareness can reduce errors. Procedural changes in coding to distinguish the difference between reporting errors and valid changes may provide better indications. Collecting more reasons for operations coded as "out-of-business" may give further insight, while measuring and adjusting for the DAF and the use of ratio estimates based on operations whose DAF did not change may need to continue.

There already have been efforts to educate people about the DAF. During the 1991 Midyear Survey Training, a session was conducted which provided DAF averages and comparisons between June and December expansions. This awareness may have made a difference since the decrease in the DAF in 1992 was about one half what it was in 1991.

Based on these results, we recommend continued, enhanced training with each state to examine their unique problems and further reduce the DAF dilemma. This education could be done during the advanced mid-year workshops. Statisticians in each state office could compile a list of reasons why some of their operations were coded "out-of-business". This list could then be the subject of small group discussions, probing for solutions.

In February 1992, states were instructed to use the equal DAF ratio (instead of the standard ratio using all comparable usable reports) to set crop estimates after the March Agricultural Survey (Witzig). The equal DAF ratio is the ratio of current to previous data for only those operations where the DAF did not change. It provides a measure of the change for matched reports, but it does not account for any operations going into or out of business. A better ratio that would account for operations going into or out of business would be to use the standard ratio with those operations that were coded in error during a previous quarter excluded from the calculation. This type of procedure might provide at least a partial solution to the DAF problem since reporting and coding errors affecting the DAF will likely never be totally eliminated. The procedure would, however, require better identification of the operations to exclude.

We recommend that the operation change box (item code 923) be coded for all list samples like it is coded for the NOL samples. For NOL samples this item is coded a "1" when an operation has gone out of business since a previous quarter and a "2" when there was an error in a previous quarter. For list samples when there is a change in an operation since June 1, the item is still coded a "1" as it is for NOL samples, but it is left blank for all other cases. When the operation change box is uncoded we do not know if it was ignored or if there was an error in a previous quarter. Starting with the September 1992 survey, a warning message was generated in the computer edit to flag any operation that was in business a previous quarter but currently "out-of-business" with the operation change box uncoded. The accuracy of the coding of the operation change box remains questionable. Since new replications that have never been surveyed do not have to be coded, perhaps some samples from old replicates are not being coded.

A proposed addendum to the Agricultural Survey Specifications to revise the coding of the operation change box as specified above was sent on May 6, 1993. No action has been taken at this time on the proposal.

Another way to reduce the number of old replicate samples inappropriately being coded as "out-of-business" is by using historic data. When a respondent responds that they do not have the items of interest, we could then verify that they no longer have the items reported previously. This would be especially beneficial on CATI/CAPI.

Plans were made and included in the June 1993 - March 1994 Agricultural Surveys Specifications to collect reasons for operations being coded as "out-of-business" for all samples across the U. S. in December 1993. I see limited value in obtaining these reasons and recommend that we do not collect them for the following reasons: 1) from the Kansas coding of "out-of-business" questionnaires it appears that it would be best to collect these reasons after the survey is completed since the coding affects what errors are made, 2) the reasons for "out-of-business" operations in each state are unique and SSO personnel could learn the most from reviewing their own "out-of-business" operations and, 3) with the plans to revise the coding of the operation change box (item code box 923) it would be best to wait for any other coding.

The current plan is to expand the acreage reconciliation questions to all samples (NOL and list) in the December 1993 Agricultural Survey. These questions will help determine how much of the DAF decline was offset by additional reported data from operations remaining in business. Additionally, we can assess the measurement error associated with reporting total land and evaluate the ability of using historical data to improve responses.

I recommend we look more closely at the "out-of-business" operations and assess whether data compensation is being realized through the use of the current substitution procedures. This is the thrust of a separate research activity currently being addressed in the Survey Quality Research Section.

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## APPENDIX A - AGRICULTURAL SURVEY REPLICATIONS

### Rotation Schedule for June, September, December, and March Agricultural Surveys

Number of Replications per Strata	Replications Used During the Survey			
	June 1992	September 1992	December 1992	March 1993
11	1-5	3-7	4-6,8,9	6-8,10,11
9	1-5	5-6	3-7	4,6-9
7	1-3	2-4	1,3-6	4,6,7
6	1-4	4-5	3,4,6	3,5
4	1-4	4	3,4	3
1	1	1	1	1

**APPENDIX B - "OUT-OF-BUSINESS" COUNTS**

**Table 1: "Out-of-Business" Counts for the June 1991-March 1992 Survey Cycle**

State	Percent of Previously In Business Old Replicate Samples Coded as Going "Out-of-Business"			Percent of These Samples Coded as Being a Change Since June 1		
	September 1991	December 1991	March 1992	September 1991	December 1991	March 1992
AL	3.1	5.0	7.0	0.0	6.5	12.8
AZ	4.6	5.2	4.4	41.2	73.7	75.0
AR	4.4	6.0	8.5	2.0	2.9	17.2
CA	3.9	4.5	6.2	10.3	22.4	5.8
CO	4.5	3.0	3.4	4.7	63.3	50.0
CT	5.9	1.7	5.0	0.0	0.0	0.0
DE	3.9	2.7	3.6	0.0	0.0	16.7
FL	4.6	4.0	3.5	0.0	5.0	0.0
GA	4.4	2.2	5.1	2.0	16.0	17.2
ID	3.9	2.8	5.5	0.0	22.2	25.5
IL	3.3	3.5	6.0	1.9	5.5	10.8
IN	4.7	5.1	7.1	3.0	2.9	8.2
IA	3.2	3.6	5.2	11.8	8.9	15.9
KS	3.3	3.5	4.6	5.8	3.7	14.1
KY	8.8	3.9	6.0	54.5	2.8	8.6
LA	11.4	6.1	9.3	1.5	6.3	28.8
ME	3.6	1.8	5.5	0.0	20.0	6.7
MD	5.0	4.0	6.0	0.0	0.0	25.0
MA	4.3	6.1	4.4	16.7	0.0	0.0
MI	3.8	3.4	4.2	0.0	2.9	5.0
MN	3.3	2.3	4.4	3.7	7.9	25.4
MS	5.2	5.8	8.6	4.5	0.0	6.9
MO	4.8	5.2	5.6	17.5	69.6	4.1
MT	2.8	2.4	4.1	33.3	42.3	11.6
NE	9.0	10.3	10.7	0.6	1.1	2.6
NV	2.5	6.6	3.4	33.3	75.0	75.0
NH	1.9	1.8	2.9	0.0	0.0	0.0
NJ	2.7	7.0	3.9	12.5	13.6	9.1
NM	7.1	4.9	8.9	2.4	67.9	16.3
NY	3.4	3.1	4.4	20.8	91.7	61.3
NC	4.2	4.4	6.6	6.8	2.2	28.6
ND	2.1	2.2	4.3	7.4	6.7	37.7
OH	4.9	5.0	8.0	5.4	5.5	15.6
OK	3.4	2.8	4.7	0.0	3.0	9.6
OR	1.5	2.9	4.9	12.5	5.6	30.8
PA	3.2	3.0	5.0	16.7	4.3	35.1
RI	0.0	6.7	0.0	0.0	0.0	0.0
SC	9.2	7.2	9.3	0.0	51.4	8.9
SD	2.5	2.4	5.7	8.6	8.8	13.6
TN	4.5	5.0	7.3	11.4	0.0	7.0
TX	3.1	3.1	4.8	3.8	3.8	14.1
UT	3.2	2.4	4.2	38.5	20.0	11.8
VT	3.4	3.8	3.8	0.0	0.0	0.0
VA	4.0	4.0	4.8	0.0	0.0	7.1
WA	4.3	2.7	5.2	2.9	18.2	10.0
WV	3.9	4.1	4.1	0.0	29.4	6.3
WI	3.0	2.4	5.7	2.6	0.0	8.2
WY	3.6	4.2	3.8	0.0	11.8	13.3
US	4.3	4.0	5.9	8.4	14.5	15.0

**Table 2: "Out-of-Business" Counts for the June 1992-March 1993 Survey Cycle**

State	Percent of Previously In Business Old Replicate Samples Coded as Going "Out-of-Business"			Percent of These Samples Coded as Being a Change Since June 1		
	September 1992	December 1992	March 1993	September 1992	December 1992	March 1993
AL	6.7	5.3	6.0	2.6	9.7	3.1
AZ	4.3	6.1	4.6	20.0	36.4	68.8
AR	6.4	6.0	6.2	34.8	2.9	86.2
CA	3.7	3.1	7.6	16.7	15.0	8.0
CO	4.1	2.8	4.0	2.6	3.7	8.3
CT	1.6	3.0	5.6	0.0	0.0	0.0
DE	1.8	1.1	4.3	0.0	0.0	28.6
FL	1.1	3.2	1.5	0.0	0.0	0.0
GA	2.7	4.7	4.3	9.7	7.7	15.2
ID	2.7	3.3	3.7	0.0	0.0	19.4
IL	3.6	1.4	4.7	0.0	0.0	10.8
IN	5.3	4.0	8.0	3.8	10.2	4.9
IA	2.3	2.6	4.7	0.0	4.9	14.7
KS	3.1	3.3	4.2	8.0	7.7	30.3
KY	5.6	3.8	5.5	1.7	7.9	9.1
LA	7.6	5.7	9.2	0.0	0.0	57.6
ME	1.8	1.7	2.2	0.0	0.0	0.0
MD	5.0	4.4	6.3	14.3	23.1	16.7
MA	0.8	2.1	1.5	0.0	0.0	0.0
MI	3.2	2.6	3.5	3.3	28.0	63.6
MN	3.1	2.3	4.4	6.1	18.9	21.7
MS	7.5	5.0	5.3	1.4	2.1	8.2
MO	3.7	3.8	4.2	4.1	3.8	3.5
MT	2.7	2.0	2.5	6.9	18.2	19.2
NE	8.4	10.0	9.3	1.3	1.6	4.0
NV	2.0	2.0	2.8	33.3	0.0	25.0
NH	1.0	1.8	1.0	0.0	0.0	0.0
NJ	6.2	3.9	6.0	0.0	23.1	26.3
NM	6.8	4.9	5.3	2.4	10.3	13.3
NY	1.8	4.9	6.5	41.7	89.5	39.1
NC	4.5	4.0	5.4	8.2	2.3	15.3
ND	2.6	2.1	2.8	48.6	23.3	23.7
OH	3.2	2.5	6.2	0.0	7.1	23.0
OK	3.5	2.6	2.8	17.1	6.3	37.5
OR	2.4	2.8	4.5	7.7	5.9	16.7
PA	3.9	2.1	3.4	0.0	13.3	8.3
RI	1.9	3.6	0.0	0.0	0.0	0.0
SC	9.3	8.9	7.5	31.7	81.4	60.6
SD	2.3	2.6	4.2	30.3	21.6	18.3
TN	5.7	3.8	5.1	3.8	0.0	4.3
TX	3.4	3.9	3.0	3.5	3.8	64.2
UT	1.8	1.7	1.0	28.6	71.4	75.0
VT	4.1	2.7	2.3	0.0	0.0	0.0
VA	4.1	1.8	6.5	4.3	9.1	15.4
WA	4.6	2.7	2.9	13.9	4.5	68.2
WV	2.0	4.4	3.2	25.0	10.5	0.0
WI	2.7	2.0	3.8	2.9	7.7	12.5
WY	2.9	5.9	3.4	16.7	12.0	35.7
US	4.0	3.7	4.8	8.5	12.0	21.9



## APPENDIX C - 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. 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	$\text{June Expansion} = \text{June Acres} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{June Acres} * \text{June Expansion} * \text{December DAF}$
List Data	$\text{June List Expansion} = \text{June List Data} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{December List Data} * \text{June Expansion} * \text{June DAF}$
Area Data and Weight	$\text{June Area Expansion} = \text{Tract Acres} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{Farm Acres} * \text{June Corrected Tract/Farm Weight} * \text{June Expansion} * \text{June DAF}$
Total Hogs	
DAF	$\text{June Expansion} = \text{June Hogs} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{June Hogs} * \text{June Expansion} * \text{December DAF}$
List and Area Data	$\text{June Expansion} = \text{June Hogs} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{December Hogs} * \text{June Expansion} * \text{June DAF}$
Tract/Farm Weight	$\text{June Area Expansion} = \text{Farm Hogs} * \text{June Tract/Farm Weight} * \text{June Expansion} * \text{June DAF}$ $\text{Recalculated} = \text{Farm Hogs} * \text{June Corrected Tract/Farm Weight} * \text{June Expansion} * \text{June DAF}$

**Table 1: Corn Planted Acreage - June 1991 Reweighted Multiple Frame Expansion (000)**

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			
DAF	29,692	28,138	.95	-1,554	-2.0
List Data	21,094	20,902	.99	-192	-0.2
Area Data and Weight	6,356	6,261	.99	-95	-0.1

**Table 2: Total Hog Inventory - June 1991 Reweighted Multiple Frame Expansion (000)**

Factor	Matched Reports for Factor		Ratio (Col 2/ Col 1)	Differ- ence (Col 2 - Col 1)	Differences as % of US Expansion
	June Comparable Expansion	June Expansion with December Information			
DAF	27,479	26,208	.95	-1,271	-2.3
List & Area Data	25,564	24,879	.97	-685	-1.2
Tract/Farm Weight	9,035	8,913	.99	-122	-0.2

**Table 3: Corn Planted Acreage - June 1992 Reweighted Multiple Frame Expansion (000)**

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			
DAF	30,794	29,686	.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

**Table 4: Total Hog Inventory - June 1992 Reweighted Multiple Frame Expansion (000)**

Factor	Matched Reports for Factor		Ratio (Col 2/ Col 1)	Differ- ence (Col 2 - Col 1)	Differences as % of US Expansion
	June Comparable Expansion	June Expansion with December Information			
DAF	28,598	27,983	.98	-615	-1.0
List & Area Data	27,221	28,028	1.03	807	1.4
Tract/Farm Weight	10,102	10,003	.99	-99	-0.2

APPENDIX D - ACREAGE RECONCILIATION SUPPLEMENT

Agricultural Survey Supplement  
Acreage Reconciliation

December 1, 1992

State	Stratum	Segment	Tract	Subtr.
		00000		

1. [Enter total acres operated (IC 900) from page 2: \_\_\_\_\_]

2. [Is the difference between item 1 and June total acres operated (on label) \_\_\_\_\_ less than 5 acres?]

YES - [Enter code 1 and conclude interview.]

696

NO - [Continue.]

a. We are doing a study on total acres operated. In our June 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  
(bought or sold land, rented land, rented out land, etc.)  
[Enter CODE 1.]

697

June acreage recorded wrong.  
What was the June 1 total acres operated?  
[Enter acres and write out reason for difference below.]

698

Office Use

699

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

700

Office Use

701