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ANALYSIS OF RESPONSE BIAS IN THE JANUARY 1992 CATTLE ON FEED REINTERVIEW PILOT STUDY AND THE JULY 1992 CATTLE ON FEED REINTERVIEW STUDY

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ABSTRACT

Reinterview studies were conducted for the January 1992 and July 1992 Agricultural Surveys as the first two steps in a three-phase plan for implementing a reinterview program for cattle on feed inventories in the five farm-feeder states in January 1993. The states involved were Iowa for the January study and Iowa and Minnesota for the July study. The purpose was to evaluate the quality of the survey data through response bias estimation and to gather cognitive information on reporting problems associated with cattle on feed inventories.

The procedures for these two studies were based on previous reinterview surveys conducted from December 1987 through December 1990. For each study, a subsample of respondents reporting for the parent survey was recontacted for face-to-face reinterviews in which a subset of the original questions was re-asked. Differences between the reinterview response and the original parent survey response were reconciled to determine a final "proxy to the true value" which was used to measure response bias. These two reinterview studies also contained several cognitive questions to investigate problems associated with reporting cattle on feed inventory. Also included were sections on terminology and the use of records in reporting data. One major change from previous reinterview studies is that for the July 1992 study, both the CATI and non-CATI domains were eligible for reinterview sample selection (only the CATI domain was eligible in prior studies).

This paper presents the results for both the January and July studies. The results pertaining to the cognitive aspects of these two reinterview projects will be presented in a subsequent paper. Although no bias estimates or other statistics were possible for the January pilot study, useful cognitive information was collected and the logistics for conducting a cattle on feed reinterview study were worked out. Although overreporting of cattle on feed inventories has been suspected, with the small sample in July no significant bias was detectable. However, there did appear to be reporting problems associated with cattle on feed and cattle in general. "Definitional" reasons accounted for 37% of the differences for cattle on feed and were responsible for the majority of the response bias in both Iowa and Minnesota. Differences due to definitional reasons are perhaps more preventable with improvements in questionnaire design and enumerator training. "Other" reasons accounted for 25% of the differences and also contributed a substantial amount to the bias, while "estimation" reasons contributed the least to the bias for cattle on feed (as well as for the other survey items). Significant differences between the two versions of the cattle on feed capacity question were detected, with "definitional" reasons contributing a substantial proportion of the total bias along with "other" reasons, while "estimation" reasons contributed the least. The reader should keep in mind that the July reinterview survey was a semi-operational study with a small sample size and the magnitude and direction of the response bias estimates could be determined by just a few observations. The results of the January 1993 reinterview study, with an increased sample size and the addition of three states, should provide a clearer picture on the reporting problems associated with cattle on feed inventories.

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SUMMARY

As the first two steps of a three phase plan for implementing an operational reinterview program for cattle on feed inventories, reinterview studies were conducted during the January and July 1992 Agricultural Surveys. The purpose of these studies was to estimate and to determine reasons for response bias for cattle on feed inventory. Of equal importance was the collection of cognitive information to help identify underlying problems that may be contributing to response errors. A report on the cognitive aspects of these two reinterview studies will follow at a later date.

The January 1992 survey was a pilot study conducted in Iowa, in which a small non-random subsample of Computer Assisted Telephone Interviewing (CATI) respondents to the January Agricultural Survey was recontacted for face to face reinterviews using supervisory and experienced enumerators. The July 1992 reinterview survey was a larger semi-operational study that expanded the number of samples eligible for reinterview beyond the CATI domain. All previous reinterview surveys for the Ag Survey Program had been limited to samples whose parent survey data collection was by CATI.

For both January and July, the reinterview questionnaire re-asked only a portion of the questions on the parent Ag Surveys. While the wording of the questions was similar to the parent survey questions in most cases, the questions for cattle on feed inventory and capacity were reworded to be more appropriate for farmer-feeder respondents (as opposed to commercial feedlots). The reason for the rewording of questions was to ensure that the reinterview/reconciliation process obtained the best "proxy to truth". If there is a cognitive problem with the current operational wording of some questions, simply re-asking the question the same way may not uncover an underlying response bias.

The questions as asked on the July survey were worded based on the "expert opinion" of headquarters personnel as to the wording that would most likely obtain a correct response to the underlying question. The omission of the "include heifers that had calved" phrase for the "cow" inventory questions was a result of the January reinterview survey in which several respondents (out of only 32) indicated that including the phrase tended to confuse them. This had resulted in a double counting of heifers.

Reinterviews for both January and July were conducted with supervisory and experienced enumerators within 10 days of the original survey. After the reinterview was completed, differences between original and reinterview responses were reconciled to determine a proxy to the true value for measuring response bias and to determine reasons for the differences.

No bias estimates or other statistics were produced for the small non-random sample of the January pilot study, nor was this the purpose of this first step. Logistics for conducting a reinterview survey for cattle on feed were worked out and cognitive information was gathered. For July, response bias estimates for total cattle on feed, total cattle and calves, cattle on feed capacity, calves, steers and all heifers were generated at both the state and the two-state combined levels. No significant differences were found except for capacity, for which significant differences for Iowa, Minnesota and the two states combined were attributable to the change in the wording of the question. There was wide variability in the response bias estimates between the two states in both magnitude and direction (i.e., positive or negative) for all items except total cattle and calves.

Reasons for differences between the original and reinterview responses were grouped into three categories - estimation, definitional and other reasons - as has been done in previous reinterview studies [4, 5, 7]. A significant relationship between reason category and relative bias was detected for all six items. Estimation

reasons were associated with smaller biases, while definitional and "other" reasons tended to be associated with larger biases. The contribution of each category to the total bias as well as the contribution of specific reasons to the total bias were calculated. Definitional and "other" reasons accounted for most of the bias, as they did in previous reinterview studies [4, 7].

Respondent combinations were generated based on who responded on the original and reinterview surveys. These combinations were grouped into one of three categories - "operator-operator", "other-operator" and "other combinations". The operator was the respondent in both interviews in 74% of the cases, which is comparable to prior studies [4]. Unlike previous studies, however, no significant relationship between respondent category and relative bias was observed for any item. Bias estimates were generated for the cross-classifications of respondent category by reason category. Definitional and "other" reasons accounted for most of the bias for the six items. There was no significant relationship between the reason and respondent categories for any item.

The third and final step of the implementation plan calls for an operational reinterview survey in the five farm-feeder states (Iowa, Minnesota, Illinois, Nebraska, and South Dakota) in January 1993. Both CATI and non-CATI parent survey domains will be eligible for the reinterview sample selection. Real time response bias estimates will be made at the five state aggregate level and will be provided for Agricultural Statistics Board use. For the July 1992 reinterview survey, the precision of the bias estimates was probably too low for the estimates to be considered in making any adjustments to the survey indications. Analysis of specific reasons for the differences between the original and reinterview responses should be used to identify underlying problems that contribute to response bias in order to improve our survey procedures, training and instruments, including questionnaire wording and terminology. The focus should be on the definitional reasons since they were associated with larger biases for all six items, and compared to estimation and "other" reasons, definitional reasons may be the most fixable.

INTRODUCTION

The National Agricultural Statistics Service (NASS) has conducted a series of reinterview studies to evaluate the quality of its agricultural surveys. From December 1987 to 1990, annual reinterview surveys were conducted specifically for crop acreage, grain stocks and hog inventories. In March 1988 and June 1990 special-purpose reinterview surveys were conducted by NASS to deal with grain storage [4] and acreage reporting [3] concerns. The main objectives of these reinterview surveys were to measure response bias for selected agricultural commodities, and to help identify reasons for reporting errors, such as misinterpretation of survey questions, problems with survey definitions, terminology and concepts, as well as simple mistakes in data reporting.

In January 1992, a new series of reinterview studies was begun to assess the quality of Agricultural Survey (AS) data for cattle on feed inventories. The objectives of this reinterview program are to estimate response bias and to determine reasons for reporting biases to improve survey instruments, procedures and training. The main focus of this reinterview program is cattle on feed reporting by farmer-feeders, as opposed to commercial feedlots [1]. A three phase plan was designed to integrate a reinterview program for cattle on feed into the operational program at NASS. The first step was a pilot study conducted in Iowa in January 1992. The second step was a two state semi-operational survey conducted in July 1992. The third step will be a fully operational reinterview survey in January 1993 that will include all five farm-feeder states (Iowa, Minnesota, South Dakota, Illinois and Nebraska). This paper will discuss the setup and results of the first two steps.

JANUARY 1992 PILOT STUDY

In January 1992 a reinterview pilot study was conducted in Iowa during the January Ag Survey. The objective of this first step of the three-phase implementation plan was to work out the logistics of conducting a reinterview study for cattle on feed and to test the newly designed reinterview questionnaire and reconciliation form.

REINTERVIEW PROCEDURES

Survey procedures for the pilot study were similar to those used in previous reinterviews and are discussed in more detail in the section on the July reinterview survey. The reinterview questionnaire and reconciliation form that were used in January were almost identical to the forms used in July. The forms for the July reinterview survey can be found in Appendix A.

A non-random subsample of respondents to the January Ag Survey who were initially contacted by CATI, were selected for face to face reinterviews. The subsample was roughly concentrated within a hundred mile radius of the Iowa SSO in Des Moines. Samples eligible for reinterview were those that reported positive cattle on feed capacity on the initial CATI interview. Of the 32 completed reinterviews, twenty-six reported both cattle on feed capacity and inventory, while six reported capacity but no inventory.

A reinterview workshop for the enumerators and office staff involved in the reinterview was held by headquarters staff prior to the reinterview study at the Iowa SSO. A self-study guide was developed for the enumerators involved in the reinterview study. The self-study guide, designed to be read prior to the reinterview training school, introduced the concepts of reinterview studies and of reconciliation, explained the purpose of this particular study, and included a quiz. Reading the reinterview questionnaire exactly as

worded during the reinterview was stressed both in the study guide and during training.

The questionnaire used for the reinterview was similar to the AS questionnaire, however, not all of the questions in the initial interview were re-asked. The Cattle and Calves section consisted only of the major inventory categories (i.e., beef cows, milk cows, etc...) and did not ask for calf crop or deaths. The Cattle on Feed section was concerned only with total inventory and capacity. The reinterview questionnaire contained slightly different wording for the cattle components and total cattle on feed inventory and markedly different wording for capacity. The difference in wording was designed to ensure that the reinterview/reconciliation process produced the best "true" value for items where cognitive problems were suspected.

This reinterview questionnaire was different than previous reinterview questionnaires in that it contained questions that did not appear on the parent survey. Several cognitive questions were included to gain insight on how respondents were interpreting the questions and to see if we were getting the data we thought we were asking for. Also, this questionnaire contained a section on terminology to see if the farm operators understood the terms and wording in the questionnaires and to determine what terms are most meaningful to the respondents. The reinterview questionnaire also contained a section on record usage. This section was concerned with whether or not respondents used written records when answering either survey. Analysis of record usage may provide some information on our use of historic data and help us to predict when the original and reinterview responses will be the same.

Reconciliation forms containing the original CATI information were generated each morning prior to conducting reinterviews. This process was tedious, since samples completed by CATI the previous day had to be screened for positive cattle on feed capacity and proximity to the Iowa SSO, before a SAS program could be run to pull off the necessary data for the reconciliation forms. The CATI data were merged with the reconciliation forms and the forms printed via WordPerfect. The reconciliation forms were then sealed in an envelope and were not to be opened until after the reinterview was completed, to ensure the independence between the CATI and reinterview responses.

Supervisory enumerators, SSO staff and headquarters staff teamed up to conduct the face-to-face reinterviews. After the reinterview was completed, the enumerator opened the envelope containing the reconciliation form and compared the reinterview and CATI responses. For each difference, the enumerator, with the help of the respondent, determined what the correct response was, the source of the error and the reason why the difference occurred. (For a more detailed explanation of reinterview procedures in general, see [5] Pafford, March 1989.)

RESULTS

No response bias estimates or other statistics were possible for this small non-random sample, nor was this the purpose of this pilot study. We did accomplish our goals of working out the logistics of the reinterview and gaining information on the problems of reporting cattle and cattle on feed data. Some specific results are listed below, as presented by Dale Atkinson at the March 1992 PPC Meeting.

- Cattle were often misclassified. The reference to **heifers** in three of the six breakdowns seemed to confuse the CATI respondent as to which category should be used, often resulting in some animals being counted twice.

- Collecting data by phone can be difficult, especially when a question contains multiple categories, such as the cattle breakdowns consisting of six possible categories. The respondent cannot see all the possible choices at one time, thus he does not know what his options are and may include animals in one category that should be included in a later category. Several respondents said they would not have had to adjust their numbers as often if they had known all the choices beforehand.

- Weight categories were difficult for both CATI and reinterview respondents. There appeared to be a lot of guessing as to whether or not cattle were over 500 pounds.

- Total cattle inventories were often misreported due to incorrect classification of animals and by the placement of animals into more than one category.

- There was great variability in the definition of a calf among the respondents for this survey. Some respondents used weight as a criterion, while others specified age.

- Reported feedlot capacity for cattle on feed probably indicates the maximum number an operation **could ever** hold, not the maximum number that **would normally** be fed for the slaughter market. (A more extensive discussion on capacity is included in the July 1992 results.)

JULY 1992 CATTLE ON FEED REINTERVIEW SURVEY

INTRODUCTION

The July 1992 Cattle on Feed Reinterview Survey was the second step in the three-phase plan for implementing a reinterview program for cattle on feed (COF) inventories. In accordance with the implementation plan, this survey was a pseudo-operational study designed to get additional NASS units involved in the reinterview process to facilitate the transition from a research activity to an operational program in January 1993. Other objectives of this survey were to provide real-time response bias estimates for Agricultural Statistics Board use, to expand the domain of samples eligible for reinterview beyond CATI, and to continue collecting cognitive information to improve both the reinterview and operational survey instruments.

Reinterviews were conducted on a subsample of the July Ag Survey respondents originally contacted by CATI in Iowa and Minnesota. A small subsample of non-CATI respondents were also selected for reinterviews in Iowa. Making non-CATI samples eligible for reinterview was an innovation for reinterview studies at NASS. The non-CATI domain was included because it continues to represent a significant amount of our Ag Survey data collection, particularly during the January Ag Survey for which the reinterview program is designed.

Results are presented for inventories of cattle on feed, cattle on feed capacity, total cattle and calves, all heifers, calves, and steers. Major results for four of the six items (cattle on feed, cattle on feed capacity, total cattle and calves, and all heifers) are presented with the exclusion of an outlier. The same report was responsible for the outlier data found in each of the four survey items. The effect of these data is discussed later.

METHODS

Survey Procedures

Enumerator Training

Supervisory and experienced enumerators, most of whom had been involved with at least one of the previous reinterview surveys conducted by NASS, were used for this reinterview study. Enumerators were trained by headquarters personnel in a half-day state training school. They were instructed on how to approach a potential reinterview respondent, how to conduct the reinterview, and how to handle reconciliation when a difference occurred. Several examples were included in the training. The importance of reading the reinterview questions exactly as worded and in the order that they appear was emphasized repeatedly, since questionnaire wording was a key element of the study.

Manuals

A self-study guide and an interviewer's manual were developed for the enumerators involved in the reinterview study. The self-study guide, which was provided for the enumerators to read prior to the reinterview training school, introduced the concepts of reinterview studies and reconciliation, explained the

purpose of this particular study and included a quiz. The interviewer's manual for the reinterview survey, along with the Agricultural Survey Interviewer's Manual, provided the necessary instructions for completing the July reinterview survey.

Forms

Two forms were used during the reinterview process -- a reinterview questionnaire and a reconciliation form. The reinterview questionnaire was used to collect a second independent response for comparison to the original response. In general, the reinterview questionnaire was similar to but shorter than the questionnaire for the July Agricultural Survey. The face page, acres operated, partnership, change in operator, and conclusion sections were the same as those of the parent survey. Questions on cattle and calves were also similar except for the omission of "calf crop and deaths" questions. For cattle on feed, only total cattle and calves on feed and capacity were asked on both questionnaires. The reinterview questions for cattle on feed inventory and capacity were worded differently and the heifer category in the "Cattle and Calves" section did not include the breakdowns into "beef cow replacement", "milk cow replacement" or "other heifers 500 pounds or more" that are on the parent survey. Some questions were reworded to ensure that the reinterview/reconciliation process obtained the best "proxy to truth". If there is a cognitive problem with the current operational wording of some questions, simply re-asking the question the same way might not uncover an underlying response bias.

The reinterview questionnaire contained additional questions on cattle and calves and cattle on feed that were not asked on the parent survey. These "cognitive" questions will be used to evaluate the survey definitions, concepts and questionnaire wording. There were also probing questions to determine if all cattle on feed were reported correctly, and if the respondents interpret our questions as we meant them to be interpreted. Finally, there was a section for "Terms and Record Usage". In this section, we hoped to gather information about what key terms used in the operational questionnaire mean to the respondents. We also collected information on whether the original and/or reinterview respondent used written records during the interviews. These data may be useful in studying the use of historic data in surveys, and in helping to anticipate when the original and reinterview responses will be the same. The ability to anticipate a zero vs. a non-zero difference might be useful in improving the precision of the response bias estimates.

The reconciliation form was used by the enumerators to compare the original and reinterview responses, to reconcile any differences, to indicate the reconciled "true" value and to record the source of the difference. The reconciliation forms contained the original responses from the parent survey (pre-printed for the CATI sample and hand copied by supervisory enumerators for the non-CATI sample) and cells to enter the reinterview response, to indicate which response was correct, to identify the source of the discrepancy and to code the reason for any difference. There was space provided at the bottom of each page and a full page at the end of the form for the enumerators to furnish detailed written explanations for each difference. Reconciliation forms were generated each morning after the previous night's CATI calls were certified. The CATI data were pulled from the CATI data files before any SPS editing and merged onto the reconciliation forms, which were mailed immediately to the supervisory enumerators to distribute among their enumerators. For the non-CATI samples, blank reconciliation forms were mailed to supervisors. As soon as an original non-CATI telephone questionnaire was completed, it was mailed to a supervisor who hand-copied the necessary information onto the reconciliation form. The reinterview assignment was then carried out by a different enumerator than the one who completed the parent survey enumeration.

Enumerator Procedures

Enumerators were instructed to complete face-to-face reinterviews within 10 days from the date of the original interview. This was done to reduce recall bias by making the time between the reference date (July 1) and the reinterview as narrow as possible. Enumerators were allowed to begin data collection as soon as they received the reconciliation forms. The importance of not opening the reconciliation forms until after the reinterview was completed to maintain independence between the two responses was emphasized.

The enumerators were instructed to approach potential reinterview respondents with an appropriate opening statement which stressed NASS' concern for the quality of our survey data. After this opening statement, the enumerators were to conduct the reinterview following the questionnaire order and wording exactly so that the effects of specific wordings could be studied. The July 1 reference date was to be stressed. After the reinterview was completed, the enumerator informed the respondent that he/she had the responses to the original interview and asked if the respondent would help in reconciling any differences between the original and reinterview responses. For each difference, the enumerator was instructed to record which response was correct, the source of the difference and a written explanation discussing the discrepancy.

Sample Design

This survey was different from previous NASS reinterview surveys in that the domain of parent survey samples eligible for reinterview for the July 1992 survey included those not initially contacted by CATI. The reinterview sample was a subsample of the CATI list sample for both states plus a small subsample of the non-CATI list sample for Iowa. EO and special handling samples were excluded from reinterview eligibility. No non-CATI samples were selected in Minnesota since they designated only special handling and EO samples for non-CATI enumeration in July. A stratified simple random sample with stratum sampling rates similar to the parent survey stratum rates was allocated for reinterview. There was a total of 440 samples selected for reinterview, with 220 in each state. Of these, only completed parent survey samples, including those coded out-of-business, were eligible for reinterview. Parent survey refusals and inaccessibles were ineligible for reinterview.

State	Sample Size[1]	CATI	non-CATI	Expected # of Usables[2]
IA	220	190	30	180
MN	220	220	0	180
Total	440	410	30	360

[1] Selected for reinterview
[2] Includes completed and out-of-business reports but excludes refusals and inaccessibles.

Around 10% of the samples were expected to be lost during the parent survey to nonresponse (i.e. refusals and inaccessibles) and another 10% during the reinterview survey.

Why CATI? The CATI domain accounts for a large percentage of the AS data collected and it is increasing. Also CATI data from the parent survey is easily attainable for use in generating the reconciliation forms.

Why non-CATI? A significant amount of AS data continues to be collected by non-CATI field contacts, much of which is done by telephone. About 41% of the data collected during the 1992 January Ag Survey

in the five farm feeder states was by non-CATI telephoning. For the 1992 July Ag Survey, that percentage was 23% for Iowa and Minnesota combined and 25% for all five states. Since our ultimate goal is to conduct cattle on feed reinterviews in the January time frame (which will be done operationally in January 1993), the January percentages are those most representative of what we expect to find with an operational cattle on feed reinterview survey. Reinterview sample sizes and response rates for the July 1992 Cattle Reinterview Survey are shown below in Table 1.

Table 1. Sample Sizes and Response Rates for July 1992 COF Reinterview.

	Completed[1]		Refusal		Inacc.		Did not Qualify[2]		Did not get to[3]		Sample size
	n	%	n	%	n	%	n	%	n	%	
Iowa	154	70.0	3	1.4	13	5.9	35	15.9	15	6.8	220
Minn.	121	55.0	2	0.9	10	4.5	59	26.8	28	12.7	220
Total	275	62.5	5	1.1	23	5.2	94	21.4	43	9.8	440

[1]Includes 9 reports that were coded "inaccessible" for the parent survey (after the reinterview was conducted) because their CATI data were lost. However, all 9 had completed reinterviews. Data were collected for both interviews but not used in summary.

[2]Parent survey refusals and inaccessibles were not eligible for reinterview.

[3]These were not contacted for reinterview, even though they were eligible, due to time constraints and the states' reluctance to reinterview cases in which the original response was obtained by personal interview.

The completion rate for the July reinterview survey was somewhat below expectations due primarily to the high non-response rate on the parent survey and time pressures to complete both surveys. Recall, that parent survey refusals and inaccessibles were not eligible for reinterview. There were 94 such samples lost, which accounted for 54% of the reinterview non-usable samples and 21.4% of the total reinterview sample. Another 43 samples (9.8% of the total 440 reinterview samples) were lost because the SSO just did not have time to do them. These two circumstances effectively reduced the sample size to 303. Of those 303, 28 were refusals or inaccessibles during the reinterview. Nine more were "lost" in the handoff between CATI and the SPS edit. All nine were eventually coded as inaccessible for the parent survey, even though the original interview and reinterview questionnaires were completed.

Table 2 below shows the response coding for all 440 samples that were selected for the July 1992 reinterview study, including those that became ineligible for reinterviewing and those that were not completed.

Table 2. Response Coding on the July Cattle on Feed Survey vs. Its Reinterview Survey (Both States Combined).

	July Reinterview Response						
July AS Response	Interview Complete	Interview Refusal	Inacc.	Did not Qualify	Did not Get to	Total	(%)
Mail Complete	1	0	0	0	2	3	(0.7)
Tel. Complete	264	4	21	0	32	321	(73.0)
Int. Complete	1	0	0	0	**9**	10	(2.3)
Tel. Refusal	0	0	1	72	0	73	(16.6)
Int. Refusal	0	0	0	1	0	1	(0.2)
Inaccessible	**9**	1	1	21	0	32	(7.3)
Total (%)	275 **(62.5)**	5 (1.1)	23 (5.2)	**94 (21.4)**	**43 (9.8)**	440	(100)

One can see how low the refusal rate (and nonresponse rate) for the reinterview was by comparing these rates with the refusal, inaccessible and non-response rates for Iowa and Minnesota for the July Ag Survey as shown in Table 3. The corresponding reinterview response rates for the samples eligible for reinterview are shown in Table 4.

Table 3. July 1992 Agricultural Survey Response Counts for Iowa and Minnesota.

State	Total Units	Refusals n	Refusals %	Inacc n	Inacc %	Usables n	Usables %	Non-Response Rate
Iowa	2,215	273	12.3	70	3.2	1,872	84.5	15.5%
Minn	1,562	269	17.2	44	2.8	1,249	80.0	20.0%
Total	3,777	542	14.4	74	2.0	3,121	82.6	16.3%

Table 4. July 1992 Cattle on Feed Reinterview Response Counts for Iowa and Minnesota.[1]

State	Total Units	Refusals n	Refusals %	Inacc n	Inacc %	Completed n	Completed %	Non-Response Rate
Iowa	170	3	1.8	13	7.6	154	90.6	9.4%
Minn	133	2	1.5	10	7.5	121	91.0	9.0%
Total	303	5	1.7	23	7.6	275	90.8	9.2%

[1]Includes only those units that had a chance for reinterview. That is, this excludes the 94 cases that were coded as "inaccessible" or "refusal" on the parent survey and thus were ineligible for reinterview and excludes the 43 cases that were just not done due to time constraints and states' reluctance to reinterview personal interviews.

Statistical Measures

In estimating response bias, a "proxy to the true value" must first be obtained [3]. In this study, as in previous reinterview studies, the reconciled value was considered to be the "true" or final value. Considerable cost and effort is expended to ensure that the value obtained during reconciliation is the best proxy to the true value, as reinterviews are done face-to-face and conducted by supervisory and experienced enumerators. When the original and reinterview responses differed, the enumerators were instructed to determine the "correct" response during the reconciliation process. If there was no difference, i.e. the same response was given during both interviews, this response was considered the final value. If the respondent could not determine which response was correct, or if a difference was not reconciled by the enumerator, the final value was missing and the observation was not used for that item. If the respondent indicated that either response could be correct, then the average of the two responses was used as the final value. A third response, different from both the original and reinterview responses, was also possible if the reinterview respondent said that neither response was correct.

The formulas used to calculate response bias and variance estimates were based on a stratified sample design. For the i^{th} observation in stratum h, bias was measured as:

$$B_{hi} = O_{hi} - F_{hi} \qquad \text{stratum } h = 1,....,L \text{ and unit } i = 1,....,n_h$$

where O_{hi} = original response
F_{hi} = final or reconciled value

A negative bias indicates underreporting of a survey item, whereas a positive bias indicates overreporting.

Response bias estimates and univariate tests of significance were generated for both the original data and the corresponding SPS edited data. Frequency distributions and chi-square tests for evaluating the relationships among reasons for differences, respondent combinations and relative bias are also presented.

RESULTS

Response Bias

Response bias estimates for selected survey items at the state and combined two-state levels are shown in Table 5. Bias estimates were summarized for both the original July AS data and SPS edited data. Results from univariate tests (for Ho: Bias = 0) are also shown with the corresponding levels of significance indicated in parentheses. Finally, the biases as a percent of the original AS data and SPS edited data are given.

[Note: All results presented in Table 5 and throughout this report were derived by excluding one outlier in the analyses for total cattle on feed, cattle on feed capacity, total cattle and all heifers. One report, which occurred in a zero cattle stratum with a large expansion factor, was responsible for the outlier problems in all four items. This sample unit was omitted for these four items because it alone determined the direction and a major proportion of the response bias for the four items. The results of this study should not hinge on one report, particularly not on a badly answered one. The original respondent for this sample knew little about the operation and every positive response given was determined to be zero by the operator during the reconciliation process.]

Significant differences were detected for cattle on feed capacity in Iowa, Minnesota and for the two-states combined. No other significant differences were detected for the other items at any level. The large differences for capacity were not surprising, since two different versions of the question were used. This result demonstrates that there is a significant difference in the wording of the two questions, with the reinterview version producing significantly lower numbers. Several other results also point to this fact and they are discussed in detail later in this paper. The primary implication of this result is that the two versions of the capacity question do not provide the same information. The usage of capacity data and recommendations are also discussed later.

Original and SPS edited data produced similar results with respect to statistical significance for the two states. For the SPS edited data, there were two cases in which there were substantial differences between the two states in the direction and magnitude of the percent bias. For total cattle on feed, Iowa reporting showed negative biases of 2.8% compared to positive biases of 13.4% for Minnesota. For steers, Iowa reporting showed negative biases of 6%, while Minnesota reporting showed positive biases of 1.8%. For the other four items, the direction and magnitude of the percent bias (for SPS edited data) was relatively the same for the two states. Similar results for total cattle on feed and steers were found with the original unedited data. The direction of the bias for all heifers was downward for both states, but Iowa reporting showed a decrease of 8.3% compared to only 2.0% for Minnesota.

Table 6 shows the estimated percent bias (for SPS edited minus reconciled values), the associated standard errors and confidence intervals. As mentioned before, no significant differences were detected between the SPS edited data and the final reconciled values, except for cattle on feed capacity, even in Minnesota where a response bias of 13.4% for cattle on feed inventory was estimated. The precision of the bias estimates was very low, as indicated by wide confidence intervals and large standard errors relative to the bias estimates. The small sample size is not the only factor influencing the bias estimates and the significance tests. The actual number of non-zero differences play an important role also. Although there were 266 usable samples overall, the actual number of biases was far less for each item. There were only 52 non-zero differences for cattle on feed, 112 for total cattle and calves, 88 for capacity, 69 for all heifers, 63 for calves and 70 for steers. These few differences were spread over 10 strata in Iowa and 8 strata in Minnesota. With such a structure, the small number of non-zero differences, the large number of zero differences, and the large expansion factors could and did result in extreme variances which resulted in lower precision for the response bias estimates. This lack of precision of response bias estimates is a problem that continues to plague us with reinterview surveys. Work continues on sample design and estimation improvements to increase our response bias estimation precision.

Table 5. Response Bias Estimates for Selected Items for the July 1992 Cattle on Feed Reinterview Study. (Excluding Outlier). Levels of Significance are Indicated in Parentheses.

	Original - Final		SPS Edited - Final	
Item/State	Bias	% of Original	Bias	% of SPS Edited
Total COF				
Iowa	-25,912	-2.8 (.44)	-25,912	-2.8 (.44)
Minn	60,117	13.4 (.17)	60,117	13.4 (.17)
Total	34,205	2.5 (.54)	34,205	2.5 (.54)
Total Cattle				
Iowa	-76,495	-1.9 (.48)	-74,411	-1.8 (.49)
Minn	-51,181	-2.0 (.42)	-48,080	-1.9 (.45)
Total	-127,676	-1.9 (.31)	-122,491	-1.9 (.33)
COF Capacity				
Iowa	666,613	23.9 (.004)	816,853	27.8 (.001)
Minn	163,068	22.6 (.046)	186,246	25.0 (.023)
Total	829,681	23.6 (.001)	1,003,099	27.2 (.000)
Calves				
Iowa	18,052	1.6 (.61)	-568	-0.1 (.99)
Minn	-20,738	-3.1 (.55)	-22,123	-3.3 (.52)
Total	-2,686	-0.1 (.96)	-22,691	-1.3 (.67)
Heifers				
Iowa	-48,456	-8.3 (.10)	-25,412	-4.2 (.40)
Minn	-6,744	-2.0 (.73)	-5,959	-1.8 (.76)
Total	-55,200	-6.0 (.12)	-31,371	-3.3 (.38)
Steers				
Iowa	-42,415	-5.7 (.07)	-44,755	-6.0 (.07)
Minn	5,770	1.4 (.58)	7,440	1.8 (.47)
Total	-36,645	-3.2 (.16)	-37,315	-3.2 (.16)

Table 6. Precision of Response Bias Estimates for All Six Items at the State and Two-State Levels (With Outliers Removed). July 1992 Cattle on Feed Reinterview Survey.

Item/State	Estimated Percent Bias	Standard Error	95% CI
Total Cattle on Feed			
Iowa	-2.8	3.7	(-10.0, 4.4)
Minn	13.4	10.5	(-7.3, 34.0)
Total	2.5	4.0	(-5.3, 10.3)
Total Cattle & Calves			
Iowa	-1.8	2.8	(-7.4, 3.7)
Minn	-1.9	2.4	(-6.7, 2.9)
Total	-1.9	2.0	(-5.8, 2.0)
COF Capacity			
Iowa	27.8	7.4	(13.3, 42.3)
Minn	25.0	11.4	(2.6, 47.4)
Total	27.2	6.3	(14.8, 39.7)
Heifers			
Iowa	-4.2	5.0	(-14.0, 5.6)
Minn	-1.8	5.7	(-13.0, 9.5)
Total	-3.3	3.8	(-10.8, 4.1)
Calves			
Iowa	-0.1	3.7	(-7.4, 7.2)
Minn	-3.3	5.3	(-13.6, 7.0)
Total	-1.3	3.1	(-7.3, 4.8)
Steers			
Iowa	-6.0	3.7	(-13.2, 1.1)
Minn	1.8	1.8	(-1.8, 5.4)
Total	-3.2	2.6	(-8.4, 1.9)

Response Bias and Reasons for Differences

One of the goals of this survey was to identify the reasons for discrepancies between the original and reinterview responses. This information can be used to evaluate the questionnaires and to determine how much of the bias may be fixable. For each difference that occurred between an original and reinterview response, the reinterview enumerator was instructed to ask the respondent to provide a reason for the difference. These explanations were recorded on the reconciliation form and were later coded by the state survey statistician. The specific reasons for the differences between the original and reinterview responses were grouped into three general categories, "estimation", "definitional" and "other".

The first category, "estimation or rounding reasons", includes cases in which the respondent indicated that they estimated the answer for at least one of the two interviews. The second category is "definitional reasons". These reasons are related to problems of interpreting what should or should not be included for a particular question. Examples of definitional reasons are reporting animals weighing over 500 pounds as calves, not reporting as of the reference date or including cattle from another operation. The third category, "other reasons", includes all other reasons that could not be attributed to either estimation or definitional reasons. This category consists of a wide range of reasons, including problems pertaining to telephone interviewing, recording errors by enumerators, and cases in which there was no explanation because the respondent just did not know why the difference occurred [7].

The explanations obtained during reconciliation were used to identify specific reasons for differences, the frequency of the reasons and the response bias associated with specific reasons or categories. In general, differences due to "definitional" reasons can be viewed as being potentially fixable by changes in the survey instruments, procedures or training. Differences due to "estimation" or "other" reasons probably are not as correctable, if correctable at all. Appendix D shows the specific reasons by category, their frequency of occurrence and their expanded differences for all six survey items.

Since biases can be positive or negative and therefore cancel each other out, using the net bias could be misleading when analyzing response bias with respect to reasons. Therefore, the absolute value of each non-zero difference was expanded to obtain the total absolute response bias for each reason category. Table 7 shows the frequency of differences by reason category and the percentage of the total absolute response bias that each category makes up. In general, "other" reasons tended to occur less frequently, except for total cattle. The frequency of "estimation" and "definitional" reasons were relatively the same except for capacity and all heifers. For the six items in general, while "estimation" reasons were given for about one-third of the differences, they contributed the least to the total absolute response bias. "Definitional" reasons were the major contributor to the absolute response bias for all items except total cattle, for which "other" reasons accounted for the majority of the absolute response bias. The results for cattle on feed will be addressed in detail in the section of this report entitled "Response Bias for Cattle on Feed Inventory."

Table 7. Percentage of Total Absolute Response Bias by Reason Categories for All Six Items. Frequencies of Response Errors are Shown in Parentheses. For Original - Reconciled Values.

	Reason Category			
Item	Estimation	Definitional	Other	Total
Total Cattle	4.9%	34.4%	60.7%	100%
	(23)	(19)	(70)	(112)
Total COF	8.6%	66.4%	25.0%	100%
	(20)	(19)	(13)	(52)
COF Capacity	6.5%	84.0%	9.5%	100%
	(24)	(51)	(13)	(88)
All Heifers	20.4%	59.0%	20.6%	100%
	(24)	(33)	(12)	(69)
Calves	10.2%	65.2%	24.6%	100%
	(22)	(25)	(16)	(63)
Steers	19.1%	54.0%	26.9%	100%
	(32)	(25)	(13)	(70)

In order to study the relationship between the magnitude of the bias and the reason categories, a relative (percentage) bias was calculated for each observation with a non-zero difference between the original value and the reconciled value for each of the six items. Three levels of relative bias were used -- less than 10% in magnitude, between 10% and 20%, and greater than 20% in magnitude.

Table 8 shows the relationship between the magnitude of the relative bias and the reason categories. The results show that for each item the three reason categories did not have the same distribution of relative biases. All of the Chi-square tests were significant at the α=0.05 level. However, due to the small number of observations, the chi-square test may not be valid, except for total cattle and all heifers. To remedy this situation, counts from the "less than 10%" and "between 10% and 20%" were combined, reducing the number of relative bias groups to two - "less than 20%" and "greater than 20%". The resulting p-values for these tests are shown in parentheses next to the original p-values. Again, all tests were significant, indicating a relationship between the magnitude of relative bias and reason categories. Estimation reasons tended to be associated with smaller biases, while definitional reasons tended to result in larger relative biases for all six items. "Other" reasons also were associated with larger biases for all items except total cattle. It takes only a few observations to make a substantial impact on the overall bias, which can be seen by looking at the specific reasons listed in Appendix D.

Table 8. Frequency Table of Reason Category by Relative Bias for All Six Items (2 States Combined) for the July 1992 Cattle on Feed Reinterview Survey.[1]

Item/Relative Bias[2]	Reason Category: Estimation		Definitional		Other	
Total Cattle & Calves						
Bias ≤ 10%	18	(78%)	7	(37%)	40	(57%)
10% < Bias ≤ 20%	3	(13%)	2	(10%)	12	(17%)
Bias > 20%	2	(9%)	10	(53%)	18	(26%)
Total	23	(100%)	19	(100%)	70	(100%)
	Chi-square p-value=0.024		(0.001)			
Total Cattle on Feed						
Bias ≤ 10%	13	(65%)	2	(11%)	4	(31%)
10% < Bias ≤ 20%	4	(20%)	1	(5%)	1	(8%)
Bias > 20%	3	(15%)	16	(84%)	8	(61%)
Total	20	(100%)	19	(100%)	13	(100%)
	Chi-square p-value=0.001		(0.001)			
COF Capacity						
Bias ≤ 10%	12	(50%)	3	(6%)	1	(8%)
10% < Bias ≤ 20%	6	(25%)	5	(10%)	2	(15%)
Bias > 20%	6	(25%)	43	(84%)	10	(77%)
Total	24	(100%)	51	(100%)	13	(100%)
	Chi-square p-value < 0.001		(0.001)			
All Heifers						
Bias ≤ 10%	12	(50%)	5	(15%)	1	(8%)
10% < Bias ≤ 20%	6	(25%)	6	(18%)	3	(25%)
Bias > 20%	6	(25%)	22	(67%)	8	(67%)
Total	24	(100%)	33	(100%)	12	(100%)
	Chi-square p-value=0.01		(0.004)			
Steers						
Bias ≤ 10%	20	(62%)	4	(16%)	2	(15%)
10% < Bias ≤ 20%	4	(13%)	4	(16%)	1	(8%)
Bias > 20%	8	(25%)	17	(68%)	10	(77%)
Total	32	(100%)	25	(100%)	13	(100%)
	Chi-square p-value=0.001		(0.001)			
Calves						
Bias ≤ 10%	12	(54%)	4	(16%)	3	(19%)
10% < Bias ≤ 20%	5	(23%)	5	(20%)	3	(19%)
Bias > 20%	5	(16%)	16	(64%)	10	(62%)
Total	22	(100%)	25	(100%)	16	(100%)
	Chi-square p-value=0.021		(0.01)			

[1]Includes only observations with a bias.
[2]Relative bias = 100 * (Original value - reconciled value)/reconciled value

Tables 1a-1f in Appendix D show the specific reasons by category given for the differences between the original and reinterview responses for all six items. Also shown are their frequencies and the expanded response bias. The reasons listed in these tables were obtained by the enumerators during the reconciliation process. Previous studies have shown that the definitional and "other" categories account for most of the estimated bias, while estimation reasons account for a small percentage. Similar results were observed on this survey. Although estimation reasons were reported for roughly one-third of all differences for all six items, they contributed very little (less than 10%) to the overall net bias (except for calves). The definitional and "other" categories appear to be the major ones to focus our attention on in trying to reduce or understand response bias. As mentioned before, definitional problems are more likely correctable by adjusting survey procedures and instruments.

For total cattle there were eight cases in which a difference was attributed to a "misunderstanding between the enumerator and the respondent", which accounted for 82 percent of the total negative definitional bias for this item. For total cattle on feed, there were five cases in which this reason was reported, accounting for 65 percent of the total positive definitional bias. Also, for total cattle on feed, four reports of "Respondent forgot to include some cattle or calves" accounted for 63 percent of the total negative definitional bias. In the "other" reasons category there were two reports in which a difference was attributed to "Respondent had not made decision on marketings", accounting for 75 percent of the total positive "other" bias and 34 percent of the overall total positive bias. For cattle on feed capacity, ten differences and 20 percent of the total positive definitional bias were due to a "misunderstanding between the enumerator and the respondent". The reason "Question was asked differently" was reported for 25 of the 51 differences in the definitional category, and accounted for 57 percent of the total positive definitional bias for capacity.

Response Bias and Respondent Effects

In order to analyze the composition of respondents and the effect of respondents on the response bias, a respondent combination was generated for each reinterview sample based on the respondents to the original interview and the reinterview. These combinations of "original respondent - reinterview respondent" were grouped into three categories. The first category, "operator-operator", includes all of the combinations in which an operator responded both times. Operators include individual operators, partners and hired managers. This category is indicative of the amount of response bias attributable to interviewing the operator. The second category, "other-operator", consists of all combinations in which someone other than the operator responded to the original interview, and the operator was the reinterview respondent. This category can be used to determine the bias associated with interviewing someone other than the operator. The final category is "other combinations", which consists of all remaining respondent combinations. This category contains a hodgepodge of combinations and is therefore difficult to interpret.

Enumerators are instructed to contact the operator whenever possible for Agricultural Surveys, because the operator is considered to the most knowledgeable person regarding the operation. The reinterview enumerators were also instructed to contact the operator whenever possible, regardless of who the original respondent was. Table 9 shows the frequency distribution of the original and reinterview respondent combinations for the two states combined, along with similar results from the March 1988 and December 1989 reinterview surveys for comparison. As with previous reinterview studies, the operator was involved in a large percentage of both interviews. The operator-operator category accounted for 74.1% of the total respondent combinations, most of which were individual operators (70.7%). Operators accounted for 87.3% of all reinterview respondents and 81.6% of all original respondents. The other-operator and other combination categories accounted for nearly the same proportion of respondent combinations with 13.2%

and 12.8%, respectively.

To analyze the relationship between the respondent combination and the magnitude of the bias, a relative bias was generated for each observation with a non-zero difference between the initial unedited value and the reconciled value for each of the six survey items of interest. Three levels of relative bias were used. These levels were for relative biases (positive or negative) less than 10% in magnitude, between 10% and 20%, and greater than 20%.

The relationship between the magnitude of the bias and the respondent combinations is shown in Table 10. For total cattle and calves, it appears that the operator-operator group tends to be associated with biases of lesser magnitude, while the other two combinations are more evenly distributed. However, due to the small number of biases observed in the "other-operator" and "other combinations" categories, the results of the Chi-square test were not significant ($p=0.086$). None of the results for the other five items were statistically significant, indicating that there was no detectable relationship between the respondent category and the magnitude of the bias. Small cell counts were observed for all six items. To try to remedy the problem of small cell counts, the three relative bias groups were reduced to two by combining the "Bias $\leq$ 10%" and "10 < Bias $\leq$ 20%" into "Bias $\leq$ 20%". Although this helped to increase the cell counts, none of the tests were significant at the $\alpha = 0.05$ level, resulting in inconclusive tests as to whether the size of bias varied by respondent category.

Although the tests were not significant, due in part to the small number of biases in some cells, the "operator-operator" category appears to be associated with smaller biases for total cattle and calves. For cattle on feed capacity, all respondent categories were associated with biases of substantial magnitude, which is probably an indication that the change in wording for this question equally affected all respondents in terms of response bias. Except for total cattle and calves and cattle on feed capacity, the number of biases falling in the various size categories appears to be evenly distributed among the respondent categories. Previous reinterview studies have suggested that larger biases tend to be associated with the other-operator and other combinations of respondents, but small sample sizes (particularly the small number of non-zero differences) proved inadequate to statistically establish such a relationship from this study.

Table 9. Frequency Distribution of Original and Reinterview Respondent Combinations for Iowa and Minnesota Combined in the July 1992 Cattle on Feed Reinterview Study, with Comparable Results from Previous Reinterview Surveys.

Respondent: Original interview-reinterview	Frequency		Percent		Dec '89 % (Grain Stocks)		Mar '88 % (QAS Hogs)	
Operator-Operator	197		74.1		79.7		80.7	
Ind. Operator-Ind. Operator		188		70.7		72.6		71.4
Partner-Same Partner		6		2.3		5.4		6.3
Manager-Manager		0		0.0		0.1		0.5
Partner-Different Partner		3		1.1		1.6		2.5
Other-Operator	35		13.2		5.5		6.4	
Spouse-Individual Operator		30		11.3		4.3		3.8
Other-Individual Operator		3		1.1		1.2		2.1
Spouse-Partner		2		0.8		0.0		0.3
Other-Partner		0		0.0		0.0		0.2
Other Combinations	34		12.8		14.8		12.9	
Spouse-Spouse		11		4.1		2.5		3.0
Other-Same Other		0		0.0		0.7		0.6
Individual Operator-Spouse		12		4.5		6.6		5.2
Individual Operator-Other		7		2.6		2.9		2.2
Partner-Spouse		1		0.4		0.1		0.5
Partner-Other		0		0.0		0.1		0.3
Spouse-Other		2		0.8		0.8		0.3
Other-Spouse		0		0.0		0.1		0.6
Any other combination		1		0.4		1.0		0.2
Total	266		100.0		100.0		100.0	

Table 10. Frequency Table of Respondent Combination by Relative Bias for All Six Items (2 States Combined) for the July 1992 Cattle on Feed Reinterview Study.[1]

Item/Relative Bias[2] (Absolute Value)	Respondent Combination					
	Operator-Operator		Other-Operator		Other Combinations	
Total Cattle & Calves						
Bias ≤ 10%	55	(66%)	7	(39%)	3	(30%)
10% < Bias ≤ 20%	11	(13%)	4	(22%)	2	(20%)
Bias > 20%	18	(21%)	7	(39%)	5	(50%)
Total (p=0.086)	84	(100%)	18	(100%)	10	(100%)
Total Cattle on Feed						
Bias ≤ 10%	16	(37%)	2	(29%)	1	(50%)
10% < Bias ≤ 20%	5	(12%)	1	(14%)	0	(00%)
Bias > 20%	22	(51%)	4	(57%)	1	(50%)
Total (p=0.97)	43	(100%)	7	(100%)	2	(100%)
COF Capacity						
Bias ≤ 10%	12	(18%)	1	(7%)	2	(29%)
10% < Bias ≤ 20%	11	(16%)	0	(00%)	0	(00%)
Bias > 20%	44	(66%)	13	(93%)	5	(71%)
Total (p=0.20)	67	(100%)	14	(100%)	7	(100%)
All Heifers						
Bias ≤ 10%	14	(25%)	3	(27%)	1	(33%)
10% < Bias ≤ 20%	13	(24%)	2	(18%)	0	(00%)
Bias > 20%	28	(51%)	6	(55%)	2	(67%)
Total (p=0.90)	55	(100%)	11	(100%)	3	(100%)
Steers						
Bias ≤ 10%	24	(41%)	1	(14%)	1	(25%)
10% < Bias ≤ 20%	8	(13%)	1	(14%)	0	(00%)
Bias > 20%	27	(46%)	5	(71%)	3	(75%)
Total (p=0.52)	59	(100%)	7	(100%)	4	(100%)
Calves						
Bias ≤ 10%	16	(33%)	1	(11%)	2	(33%)
10% < Bias ≤ 20%	9	(19%)	4	(44%)	0	(00%)
Bias > 20%	23	(48%)	4	(44%)	4	(67%)
Total (p=0.24)	48	(100%)	9	(100%)	6	(100%)

[1]Includes only observations with a bias.
[2]Relative bias = 100 * (Original value - reconciled value)/reconciled value

Response Bias by Reason and Respondent Combinations

Finally, the relationship between the respondent categories and the reason categories, were investigated through contingency tables. Table 11 shows the two-way frequency tables of respondent category by reason category for the two states combined for all six items. This table can be used to see if any one group of respondents was more likely to report certain reasons. The p-value for chi-square tests are also shown. No significant relationship between respondent and reason categories were detected for any item. Once again, however, small cell counts were a problem, affecting the power of the tests. To increase cell counts, the "other-operator" and "other combinations" were grouped into one "all other combinations" group. This particular grouping was done because the "operator-operator" group accounted for 74% of all respondent combinations and we can therefore look at operator vs. other respondents. The results were still not significant at the $\alpha = 0.05$ level, indicating that with the sample size available we are unable to detect reason differences by respondent group.

Table 11 shows only that there is no detectable relationship in the frequency of occurrence of reasons by respondent category, however, it says nothing about the actual proportion of response bias that each reason-respondent combination contributes to the overall response bias. Table 12 below shows the total absolute response bias broken down by reason and respondent category for all six items. Table 11 indicated that the reasons for differences were reported in relatively the same proportion within each respondent category. Recall that Table 7 showed the percent of the total absolute bias by reason category for each item. Also, recall that Table 9 showed that the "operator-operator" category accounted for about 74% of all respondent combinations. Table 12 shows that even within respondent category "definitional" reasons accounted for the majority of the total absolute response bias for all items except total cattle and calves, for which "other" reasons contributed most to the bias. Table 12 shows that estimation reasons contributed very little to the overall bias.

Table 11. Two-Way Frequency Table of Reason Category by Respondent Category for the Two States Combined for All Six Items.

Item/Reason Category	Respondent Category					
	Operator-Operator		Other-Operator		Other Combinations	
Total Cattle & Calves						
Estimation	19	23%	3	17%	1	10%
Definitional	11	13%	4	22%	4	40%
Other	54	64%	11	61%	5	50%
Total	84	100%	18	100%	10	10%
	Chi-square p-value = 0.26 (0.15)					
Total Cattle on Feed						
Estimation	15	35%	4	57%	1	50%
Definitional	15	35%	3	43%	1	50%
Other	13	30%	0	00%	0	00%
Total	43	100%	7	100%	2	100%
	Chi-square p-value = 0.44 (0.16)					
COF Capacity						
Estimation	18	27%	4	27%	2	33%
Definitional	40	60%	7	46%	4	67%
Other	9	13%	4	27%	0	00%
Total	67	100%	15	100%	6	100%
	Chi-square p-value = 0.57 (0.77)					
All Heifers						
Estimation	19	35%	4	36%	1	33%
Definitional	26	47%	5	46%	2	67%
Other	10	18%	2	18%	0	00%
Total	55	100%	11	100%	3	100%
	Chi-square p-value = 0.94 (0.12)					
Calves						
Estimation	19	40%	2	22%	1	17%
Definitional	16	33%	4	45%	5	83%
Other	13	27%	3	33%	0	00%
Total	48	100%	9	100%	6	100%
	Chi-square p-value = 0.16 (0.17)					
Steers						
Estimation	29	49%	3	43%	0	00%
Definitional	18	31%	4	57%	3	75%
Other	12	20%	0	00%	1	25%
Total	59	100%	7	100%	4	100%
	Chi-square p-value = 0.16 (0.11)					

Table 12. Percentage of Total Absolute Response Bias[1] by Respondent and Reason Categories for All Six Items for the July 1992 Reinterview Survey.[2]

Item/ Reason Category	Respondent Category		
	Operator-Operator	Other-Operator	Other Combinations
Total Cattle			
Estimation	7.4	1.7	0.1
Definitional	38.3	37.0	18.9
Other	54.3	61.3	81.0
Column %	100.0	100.0	100.0
Total COF			
Estimation	7.2	37.8	5.2
Definitional	66.3	62.2	94.8
Other	26.5	0.0	0.0
Column %	100.0	100.0	100.0
COF Capacity			
Estimation	7.0	3.3	2.7
Definitional	85.3	72.4	97.3
Other	7.7	24.3	0.0
Column %	100.0	100.0	100.0
All Heifers			
Estimation	23.5	7.4	1.5
Definitional	57.1	61.1	98.5
Other	19.4	31.5	0.0
Column %	100.0	100.0	100.0
Calves			
Estimation	9.4	3.6	37.9
Definitional	72.2	39.3	62.1
Other	18.4	57.1	0.0
Column %	100.0	100.0	100.0
Steers			
Estimation	22.2	20.0	0.0
Definitional	52.0	80.0	51.8
Other	25.8	0.0	48.2
Column %	100.0	100.0	100.0

3ias = Absolute Value of (Original Value - Final Value)
ncludes only those observations with a bias, either positive or negative

Response Bias for Total Cattle on Feed Inventory

The primary focus of this series of reinterview surveys (i.e., the January 1992, July 1992 and January 1993 surveys) is cattle on feed inventories. The reinterview program for cattle on feed grew out of the concern that inventories were being overreported in the farm feeder states. Thus, the results of the July 1992 reinterview study may have been somewhat surprising. No statistically significant bias at the individual or combined state levels was detected. In fact, the results indicated only a slight overreporting of 2.5% at the combined level. Iowa reporting indicated a slight underreporting with a bias of 2.8%. Minnesota overreporting was estimated 13.4%, but the variance was large enough for the result to be insignificant. Do these results then indicate that there is no problem? Not necessarily! What must be remembered when looking at the results from July is the sample size was very small. With such a small sample size (recall that there were only 266 usable samples), the results are very volatile and mistakes on just a few reports can have an enormous impact on the final bias estimate.

The percent response bias was the same for both the SPS edited data and the original unedited data at the individual state and the combined two-state levels. "Estimation" reasons contributed little to the overall bias, while "definitional" and "other" reasons contributed the most. Table 8 shows that "definitional" and "other" reasons tended to be associated with relative biases of greater magnitude, while "estimation" reasons were generally associated with smaller biases. Table 10 shows no relationship between the respondents and the magnitude of the relative bias. Table 11 shows no relationship between the reason and respondent categories. Again, the power of these tests was severely limited by the small July 1992 reinterview sample size.

Table 7 showed the percent of the total absolute response bias accounted for by each of the three reason categories. "Definitional" reasons were the major contributor, accounting for 66% of the total absolute response bias. "Other" reasons were responsible for 25% and "estimation" reasons for about 9%. The differences attributable to "definitional" reasons are listed below in Table 19. Also shown are their individual percent contribution to the "definitional" bias and the number of times each reason was reported.

Table 19. Definitional Reasons Reported for Total Cattle on Feed (Two States Combined).

Reason	% of Definitional Absolute Response Bias	Number of Times Reported
Included cattle/calves from another operation	0.5	1
Did not report as of the reference date	4.9	2
Respondent did not figure death loss in total	7.2	2
Respondent did not understand the question	9.6	5
Respondent forgot to include some cattle or calves	13.7	4
Misunderstanding between enumerator & respondent	64.1	5
Total	100.0	19

For each of the five reported "misunderstandings", the reinterview response was determined to be the correct response during reconciliation. The source of the reporting error for these five samples was attributed to

either the initial respondent, the initial enumerator or both. The same person responded for two of the five reports. For the five cases of "did not understand question", the reinterview response was also determined to be the correct response. The source of error was attributed to the initial respondent in four cases and to both the initial respondent and the initial enumerator in the other case. The same person responded to four of these five cases. For the two differences discussed above, the same person responded to both the parent survey and the reinterview survey in six out of ten cases, the reinterview response was determined to be correct in all cases, and the reporting error was said to have occurred during the initial interview in all ten cases. Does this imply that there are problems with the operational survey, or with CATI, or that no one wants to admit they made an error during a face to face reinterview? As mentioned above, "other" reasons accounted for about 25% of the total absolute response bias. Two reports of "respondent had not made decision on marketings" accounted for almost 42% of the bias due to "other" reasons and 10% of the total absolute response bias.

For cattle on feed inventory, there was a total of 52 non-zero differences between the original and reinterview responses (excluding one outlier), 34 in Iowa and 18 in Minnesota. There was variability in the composition of the differences between and within the two states. Iowa had about four times as many negative differences as Minnesota (21 vs. 5). Minnesota had more positive differences than negative (13 vs. 5), while the opposite was true for Iowa (21 negative vs. 13 positive).

Of the 13 negative differences for Iowa, 4 were due to a "misunderstanding between the enumerator and respondent", accounting for 46% of the total negative bias for cattle on feed in Iowa. Two cases in which the "respondent forgot to include some cattle or calves" accounted for almost 21% of the total negative bias. Eight "estimation" reasons accounted for only 12% of the total negative bias. As for the positive differences, the major contributor was one case in which the "respondent had not made a decision on marketings", accounting for almost half of the total positive bias for Iowa.

Whereas the reason "misunderstanding between enumerator and respondent" accounted for 46% of the total negative bias for Iowa, one difference due to this reason was responsible for 70% of the total positive bias in Minnesota. For Minnesota, the five negative differences contributed very little to the overall bias. In all, there were seven "estimation", eight "definitional" and three "other" reasons for Minnesota. To demonstrate just how volatile the bias estimates are, without the one difference due to a "misunderstanding", the percent bias in Minnesota would have dropped from 13.4% to only 3.7%.

In order to reduce response bias and improve data collection, enumerator training should emphasize the reason why NASS is conducting these reinterviews, why it is important to read the questionnaires exactly as worded and the importance of a positive attitude when conducting a reinterview. Eliminating operations that report zero total cattle on the parent survey (as is planned for January 1993) should give the enumerators more time to do a complete job on every reinterview sample since less time will be wasted going to operations with no cattle. With the relatively small sample size, data quality is very important. As was seen in the July 1992 reinterview survey, one observation can completely change both the magnitude and direction of the bias estimates for a survey item, so taking the time to collect good data must be stressed.

Response Bias for Cattle on Feed Capacity

The current question used in the Ag Survey to obtain the operator's capacity for cattle on feed is: **"What is the total capacity of the feedlot(s)?"**. For the January and July reinterview studies this question was replaced with the following: **"What is the maximum number of cattle and calves you normally feed for the slaughter market at any one time on the [Section 2, Item 1] acres?"**. The January study indicated that the definition currently used for "capacity for cattle on feed" probably provides an upper bound for this term. Several results from the July survey also point to a problem in the "capacity" question.

- The only differences, between original and final values or SPS edited and final values that were significantly different from zero were those for the capacity question. Significant differences were found at both the state level and the two state level.

- Definitional reasons accounted for 58% of all reasons given for the differences between the initial response and the reinterview response for capacity. Of all six items studied in this report, capacity had the highest proportion of definitional reasons.

- One reason, "Question was asked differently", which was grouped into the definitional category, occurred more frequently than any other reason for capacity. In fact, 28% of all reasons and nearly 50% of the definitional reasons for capacity were due to this one specific reason.

- Definitional reasons accounted for 84% of the total absolute response bias for capacity, of which 55% was attributable to the one reason "questions were asked differently".

- The chi-square test for independence between the magnitude of relative bias and reason categories was highly significant (p-value < 0.001). Eighty-four percent of definitional reasons were associated with relative biases of 20% or more.

- The problem with the capacity definition apparently was not restricted to any one particular respondent combination. Table 10 shows that all 3 respondent groups tended to report relative biases of greater magnitude (i.e., greater than 20%) for capacity. This seems to indicate that the change in wording equally affected all respondents.

- There were 88 instances in which the original and reinterview responses differed for capacity. Only seven of these resulted in expanded negative differences (underreporting) of 39,808. The other 81 positive differences indicated an expanded overreporting of 789,873. If the reinterview version of the capacity question collects the data we are after, then the data from the current operational question is greatly overestimating cattle on feed capacity.

The net effect of bringing over the list frame control data can be seen in Table 20. The average of the SPS edited data for capacity is greater than both the reinterview and final averages. When zero cattle on feed was reported, the average of the SPS edited data was twice as large as the initially reported capacity and four times greater than the final reconciled values. The table also shows how often positive values for capacity were reported for operations reporting zero cattle on feed. About 13.6% (36 out of 266) of the initial July Ag Survey respondents reported both zero cattle on feed and positive capacity. For the SPS edited data and the final reconciled data, the percentages were 19.2% and 10.4%. Obviously, an operation does not have to have cattle on feed at the time of the interview to have feedlot capacity. In fact, an operation could have the facilities for feeding cattle and yet never feed out cattle for the slaughter market.

One problem with the current question is the definition of "feedlot(s)". The January and July reinterviews have shown that operators that have never fed cattle for the slaughter market report capacity based on their pasture or facility for feeding dairy animals. When respondents who reported zero cattle on feed were asked for the number of cattle they normally feed for the slaughter market, they reported positive (reconciled) values at one-half the frequency obtained after the SPS edit for feedlot capacity. Also, the average of these positive values were almost 50% greater for the SPS edited data. This indicates that the estimates obtained from the SPS edited data may be higher than what is actually needed or wanted for cattle on feed capacity.

Table 20. Comparison of the Averages for Reported Cattle on Feed Capacity.

	For all reports		For reports with zero reported cattle on feed		For reports with zero COF and positive capacity	
Source of data	mean	n	mean	n	mean	n
Initial July Ag	153	265	45	129	161	36
SPS Edited	181	265	99	129	251	51
Reconciled (Final)	140	261	25	129	169	25

So, whether or not the wording of this particular question should be changed depends on the use of the data. If the primary intent of the item is to provide "high-end" stratification data for the LSF, it certainly seems to be doing that. However, we are paying a price in efficiency since we seem to be collecting positive capacity data for a substantial number of operators who are not cattle feeders. If the primary use of the item is in ratio estimation, the positive capacities for non-cattle feeders could be more damaging in terms of estimation efficiency.

Effect of Outliers on Response Bias

Potential outlier prints (POPS) for each state were generated for the July 1992 Cattle Reinterview Survey as part of phasing cattle on feed reinterview into the operational program. As mentioned earlier, all of the results presented so far were derived with the elimination of one outlier for four of the six items (total cattle on feed, total cattle and calves, cattle on feed capacity and all heifers). One sample in the zero cattle stratum in Minnesota greatly affected the expansions of these four survey items. The initial respondent (the spouse) reported 50 heifers, but during the reinterview the operator indicated that there were no cattle on the operation. Due to the large expansion factor for the zero cattle stratum (over 4000), this one sample's report of 50 heifers had an undue impact on both the level and variability of response bias for total cattle on feed, total cattle and calves, cattle on feed capacity and all heifers. Tables 13 and 14 demonstrate just how significant the impact of this one observation is on the estimates of the four items at both the state level (for Minnesota) and at the two state combined level. The tables show the change in the expanded totals, the ratio of expansions and their associated standard errors and coefficients of variation (C.V.'s).

At the state level, total cattle and calf inventory was the least affected by the outlier, as the ratio of final to edited values was about 0.93 with the outlier and about 1.02 without it. The ratios of final to edited values were from 30 to 40 percentage points lower when the outlier was included for total cattle on feed, cattle on feed capacity and all heifers. Coefficients of variation (C.V.'s) for the ratio of the expansions (final/edited) for total cattle, cattle on feed and capacity were from 3 to 4 times greater when the outlier was included in the data. For all heifers the C.V. was 8 times larger with the outlier included.

At the combined level, the comparisons between the results with and without the outlier are not quite as severe, though still troublesome. No outliers were detected for Iowa. Again, all of the ratios are lower with the outlier data, ranging from about 3 points lower for total cattle and 14 points lower for total cattle on feed and capacity to around 20 points lower for all heifers. C.V.'s increased from 2 to over 5 times when the outlier was included in the data.

Table 13. Comparison of Summary Results: With and Without Outlier - Minnesota.

			Ratio of Expansions		
Item	Expanded Final	Expanded SPS Edited	Ratio F/E	Std. Error	C.V. (%)
Total Cattle					
with	2,473,223	2,652,595	0.932	0.088	9.5
without	2,567,012	2,518,932	1.019	0.025	2.4
Total COF					
with	388,903	673,664	0.577	0.241	41.7
without	388,903	449,019	0.866	0.105	12.2
COF Capacity					
with	558,420	1,643,244	0.340	0.209	61.4
without	558,420	744,666	0.750	0.114	15.2
Heifers					
with	331,142	550,950	0.601	0.261	43.5
without	341,813	335,853	1.018	0.0573	5.6

The response bias ratio in Table 13 indicates that for Minnesota the survey expansion for total cattle on feed is about 42% too high ((1 - 0.577) * 100%) with the outlier included in the data. However, excluding the outlier, the expansion is only about 13% too high.

Table 14. Comparison of Summary Results: With and Without Outlier - Two States Combined.

Item	Expanded Final	Expanded SPS Edited	Ratio of Expansions: Ratio F/E	Ratio of Expansions: Std. Error	Ratio of Expansions: C.V. (%)
Total Cattle					
with	6,578,048	6,683,009	0.984	0.038	3.9
without	6,671,837	6,549,345	1.019	0.020	1.9
Total COF					
with	1,341,680	1,600,530	0.838	0.126	15.0
without	1,341,680	1,375,885	0.975	0.040	4.1
COF Capacity					
with	2,678,659	4,580,336	0.585	0.127	21.7
without	2,678,659	3,681,758	0.728	0.064	8.7
Heifers					
with	964,986	1,159,382	0.832	0.168	20.2
without	975,657	944,285	1.033	0.038	3.7

Table 5 showed the expanded response bias and percent response bias for the original and SPS edited data at both the state and two state combined levels for all six items with the outlier excluded from the data. Table 15 compares the percent bias for both the original and SPS edited data both with and without the outlier. From these comparisons, it is possible to see the actual change in both magnitude and direction of the response bias estimates. Note that Iowa was not affected by the outlier data and that estimates for calves and steers in Minnesota were not affected by the outlier.

Table 15. Comparison of Bias Estimates When Outlier is Included and Excluded for All Items for the July 1992 Cattle on Feed Reinterview.

	Original - Final		SPS Edited - Final	
Item/State	% of Original With Outlier	% of Original Without Outlier	% of SPS Edited With Outlier	% of SPS Edited Without Outlier
Total COF				
Iowa	-2.8	-2.8	-2.8	-2.8
Minn	42.3	13.4	42.3	13.4
Total	16.2	2.5	16.2	2.5
Total Cattle				
Iowa	-1.9	-1.9	-1.8	-1.8
Minn	6.6	-2.0	6.8	-1.9
Total	1.5	-1.9	1.6	-1.9
COF Capacity				
Iowa	23.9	23.9	27.8	27.8
Minn	65.5	22.6	66.0	25.0
Total	39.2	23.6	41.5	27.2
Calves				
Iowa	1.6	1.6	-0.1	-0.1
Minn	-3.1	-3.1	-3.3	-3.3
Total	-0.1	-0.1	-1.3	-1.3
Heifers				
Iowa	-8.3	-8.3	-4.2	-4.2
Minn	39.8	-2.0	39.9	-1.8
Total	15.0	-6.0	16.8	-3.3
Steers				
Iowa	-5.7	-5.7	-4.2	-4.2
Minn	1.4	1.4	1.8	1.8
Total	-3.2	-3.2	-3.2	-3.2

Proportion of Original and Reinterview "Correct" Responses

The frequency of differences between the initial and reinterview responses for selected items are shown below in Table 16. Differences, whether positive or negative, occurred in fewer than half of the reinterviews for all six items. Positive and negative differences occurred in about the same proportions for cattle on feed inventory and the average differences were also about the same. For capacity, although the average differences were approximately the same, positive differences (initial minus reinterview) occurred over twice as often as negative differences. This is further evidence that the reinterview question, which asked for the maximum number of animals **normally** fed, resulted in substantially lower reported capacity numbers than the operational question. For total cattle and calves, positive differences occurred more frequently than negative differences (29% vs. 19%), but the magnitude of the average differences were approximately the same. For all heifers and calves, differences occurred at nearly the same rates, but the average positive differences were over twice as large as the negative differences for heifers. The average was twice as large for the negative differences for calves. For steers, negative and positive differences occurred at approximately the same rates, but the average was about twice as large for the negative differences.

The enumerators were instructed to determine the "correct" or "final" response for each difference that occurred. The final reconciled response could be the initial or reinterview response, a third response, either response (in which case the average of the two were used) or missing (if the enumerator failed to reconcile the difference). Table 17 shows the frequency of the responses determined to be correct during the reconciliation process. The reinterview response was determined to be the "true" value in over 50% of the reinterviews for all six items. "Either" and "initial" were given as the final reconciled value in nearly the same proportions for all items but capacity and steers. For steers, "either" was given as the correct answer in 18% of the differences while "initial" was given for 8% of the differences. For capacity, "either" was given as the correct value in 33% of the differences compared to 12% for "initial". "Either" was given as the correct answer more frequently for capacity than for any other item, indicating that respondents considered the reinterview form of the capacity question a different question. A third response was rarely given for any difference, accounting for only about 9%, 3%, 0%, 1%, 1% and 2% of the final responses for total cattle and calves, total cattle on feed, cattle on feed capacity, all heifers, calves and steers, respectively.

Table 16. Frequency of Differences between Initial and Reinterview Responses for all Six Items (Two States Combined).				
Item/Difference	Frequency	Percent	Average Difference	Range
Total Cattle and Calves				
Initial < Reinterview	77	29.0	-31.4	235
Initial > Reinterview	50	18.9	26.2	170
Initial = Reinterview	138	52.1	---	---
Total	265	100.0		
Total Cattle on Feed				
Initial < Reinterview	34	12.9	-38.8	235
Initial > Reinterview	28	10.6	31.3	199
Initial = Reinterview	202	76.5	---	---
Total	264	100.0		
Cattle on Feed Capacity				
Initial < Reinterview	31	11.8	-80.6	347
Initial > Reinterview	72	27.4	84.9	499
Initial = Reinterview	160	60.8	---	---
Total	263	100.0		
All Heifers				
Initial < Reinterview	44	16.6	-14.1	207
Initial > Reinterview	33	12.5	35.9	155
Initial = Reinterview	188	70.9	---	---
Total	265	100.0		
Calves				
Initial < Reinterview	40	15.1	-20.7	229
Initial > Reinterview	40	15.1	10.2	63
Initial = Reinterview	185	69.8	---	---
Total	265	100.0		
Steers				
Initial < Reinterview	45	16.9	-24.3	235
Initial > Reinterview	33	12.4	12.7	99
Initial = Reinterview	188	70.7	---	---
Total	266	100.0		

Table 17. Frequency Table of Reinterview Differences by Correct Response for All Six Items (Two States Combined).[1]

Difference	Initial	Reint	Third Response	Either	Missing
Total Cattle and Calves					
Initial < Reinterview	6	56	5	10	0
Initial > Reinterview	9	25	6	10	0
Total	15	81	11	20	0
	(11.8%)	(63.8%)	(8.7%)	(15.7%)	(0.0%)
Total Cattle on Feed					
Initial < Reinterview	6	23	0	4	1
Initial > Reinterview	2	22	2	2	0
Total	8	45	2	6	1
	(12.9%)	(72.6%)	(3.2%)	(9.7%)	(1.6%)
Cattle on Feed Capacity					
Initial < Reinterview	5	12	0	14	0
Initial > Reinterview	7	43	0	20	2
Total	12	55	0	34	2
	(11.7%)	(53.4%)	(0.0%)	(33.0%)	(1.9%)
All Heifers					
Initial < Reinterview	2	36	1	5	0
Initial > Reinterview	5	23	0	5	0
Total	7	59	1	10	0
	(9.1%)	(76.6%)	(1.3%)	(13.0%)	(0.0%)
Calves					
Initial < Reinterview	8	28	0	4	0
Initial > Reinterview	8	22	1	9	0
Total	16	50	0	13	0
	(20.0%)	(62.6%)	(1.2%)	(16.2%)	(0.0%)
Steers					
Initial < Reinterview	2	38	0	5	0
Initial > Reinterview	4	18	2	9	0
Total	6	56	2	14	0
	(7.7%)	(71.8%)	(2.5%)	(18.0%)	(0.0%)

[1]Includes only observations with a difference between the original and reinterview responses.

Record Usage and Response Bias

The July 1992 reinterview questionnaire also contained a section of questions pertaining to the use of written records by the initial and reinterview respondents during the interviews. These questions were asked to help determine if the use of written records during either interview resulted in a higher proportion of zero differences (i.e. no bias) between the original and reinterview responses. The ability to anticipate a zero vs. a non-zero difference would help in improving the estimates, especially the variance of the response bias, by reducing the large number of zeroes that go into the calculations.

Chi-Square tests for examining the relationship between record usage and whether or not a zero difference occurs were conducted for the six inventory items. Table 18 shows the frequency distribution of record usage and response bias, with the results of the chi-square tests indicated in parentheses. The results were not statistically significant, indicating that there is no recognizable relationship and that the knowledge of record usage does not appear to be particularly useful in predicting zero or non-zero differences. A disappointing result of this analysis is that only 6% of the usable samples reported using written records on at least one of the surveys. This is far too few to be useful even if the results had been significant. Surprisingly, those cases that reported using records at least once had a higher percentage of non-zero differences than zero differences. Hopefully, January 1993, with an increased sample size and three additional states, will provide a better picture of record usage. However, with only around 6% of the respondents using records in this survey, the outlook does not look too promising.

Table 18. Two-Way Frequency Table of Record Usage by Response Bias (Zero vs. Non-Zero) for All Six Items in the Two States Combined (All Usable Reports).

Record Usage	Response Bias = 0		Response Bias ≠ 0	
	n	%	n	%
Total Cattle and Calves				
Used records during at least one interview	6	5.3	10	6.5
Did not use records on either interview	107	94.7	143	93.5
Total (p=0.68)	113	100.0	153	100.0
Total Cattle on Feed				
Used records during at least one interview	3	5.4	13	6.2
Did not use records on either interview	53	94.6	197	93.8
Total (p=0.82)	56	100.0	210	100.0
COF Capacity				
Used records during at least one interview	2	2.1	14	8.1
Did not use records on either interview	92	97.9	158	91.9
Total (p=0.06)	94	100.0	172	100.0
All Heifers				
Used records during at least one interview	5	7.0	11	5.6
Did not use records on either interview	66	93.0	184	94.4
Total (p=0.67)	71	100.0	195	100.0
Calves				
Used records during at least one interview	3	4.7	13	6.4
Did not use records on either interview	61	95.3	189	93.6
Total (p=0.61)	64	100.0	202	100.0
Steers				
Used records during at least one interview	5	6.9	11	5.7
Did not use records on either interview	67	93.1	183	94.3
Total (p=0.70)	72	100.0	194	100.0

DISCUSSION AND RECOMMENDATIONS

Due to growing concern over the estimates of cattle on feed inventories, a new series of reinterview surveys has been developed to study response bias and to identify specific reasons for reporting errors in order to improve survey instruments, training and estimation. A three-phase plan was designed to implement a reinterview program for cattle on feed at NASS. This plan included a one-state pilot study in January 1992, a two-state semi-operational survey in July 1992 and a fully operational five-state annual survey beginning in January 1993.

The primary goal of the January 1992 pilot study was to work out the logistics of conducting a reinterview survey on cattle on feed inventories and to gather cognitive information on the problems associated with reporting cattle on feed data. The January pilot study succeeded in laying the groundwork for developing and field-testing reinterview and reconciliation instruments, as well as editing and summarization programs.

Although the January study was small, useful information was obtained to help refine the reinterview questionnaire and reconciliation form for July and to determine what cognitive problems exist in reporting cattle on feed.

The July 1992 Cattle on Feed Reinterview Survey was designed to get other NASS units involved in the reinterview process to facilitate the transition from a research activity to an operational program in January 1993. Other objectives of this survey were to provide real-time response bias estimates for Board use, to expand the domain of samples eligible for reinterview beyond CATI, and to continue collecting cognitive information to improve both the reinterview and operational survey instruments. Great strides toward an operational program were made during the July 1992 Cattle on Feed Reinterview Survey through the involvement of Sample Design Section, the Statistical Methods Branch and the Systems Maintenance Section, as well as increased involvement by the Questionnaire Design and Commodity Survey Sections.

For July no significant differences were detected at either the state or the combined two-state levels, except for capacity, for which significant differences were found at both levels. The response bias estimates indicated slight underreporting of cattle on feed inventory for Iowa (2.8%) and some overreporting (13.4%) in Minnesota. Overall, at the two-state combined level, there was slight overreporting (2.5%). For total cattle inventory, there was a slight underreporting (around 2%) at both the state and the two state levels. The precision of the response bias estimates was very low for July, and with the sample size allocated for January 1993 they may still be too low for direct adjustment of the operational survey values.

"Estimation" reasons contributed the least to the response bias, while "definitional" and "other" reasons were the major contributors. Similar results were reported for previous reinterview studies focusing on grain stocks and hogs. There were significant relationships detected between the magnitude of the relative bias and the reasons given for the differences. For total cattle on feed, "definitional" and "other" reasons were associated with larger biases, while "estimation" reasons were associated with biases of lesser magnitude. With the small sample size, no statistical relationships were detected between either the respondent categories and the magnitude of relative bias or between respondent and reason categories.

In our efforts to reduce response bias and to improve the survey instruments, high priority ought to be given to reducing the errors attributed to "definitional" reasons. "Estimation" and "other" reasons are more vague and sometimes case specific and are probably not as correctable, if correctable at all, as "definitional" reasons. "Definitional" reasons, such as misunderstandings, including cattle from another operation, and not reporting as of the reference date, are potentially fixable if they are given enough time and attention.

The third phase of the implementation plan is to be initiated in January 1993 and will build on the results from January and July 1992. All non-CATI domains other than mail will be eligible for reinterview sample selection. The January 1993 reinterview survey will be expanded to include the five farm feeder states (Iowa, Minnesota, Illinois, South Dakota and Nebraska) with a projected total of 1250 samples to be selected for reinterview. Real-time response bias estimates will be made at the five state aggregate level and will be provided for Board use.

Operations that report zero total cattle and calves on the initial survey and operations that are initially coded as out of business will not be reinterviewed but will be treated as "known zeros". Thus, for these operations, the response bias will be assumed to be zero. In July, there were no legitimate usable cases in which a respondent reported zero total cattle and calves on the parent survey and positive cattle on feed inventory on the reinterview survey. Hopefully, eliminating some of this "dead wood" in the sample will help in providing more precise response bias estimates.

The July reinterview version for the question for cattle on feed capacity will remain the same for January so that more information can be gathered to determine if the wording should be changed on the operational questionnaire. Cognitive information will continue to be collected for cattle on feed, calves, terminology, questionnaire wording and record usage.

Enumerator training should emphasize the reason why NASS is conducting these reinterviews, why it is important to read the questionnaires exactly as worded and the importance of a positive attitude when conducting a reinterview. Enumerator training for both the January Ag and reinterview surveys needs to stress the concepts and the importance of collecting quality data. Eliminating operations that report zero total cattle on the parent survey should give the reinterview enumerators more time to do a complete job on every reinterview sample since less time will be wasted going to operations with no cattle. With the relatively small reinterview sample size and the large number of zero differences, data quality is especially critical. As was seen in the July 1992 reinterview survey, one observation can completely change both the magnitude and direction of the response bias estimates for a survey item, so taking the time to collect accurate information must be stressed.

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APPENDIX A

NATIONAL AGRICULTURAL STATISTICS SERVICE

U.S. Department of Agriculture

Washington, D.C. 20250

AGRICULTURAL SURVEY
JULY 1992

Form Approved
O.M.B. Number 0535-0213
Approval Expires 12/31/92
Project Code 502

IA, MN Reinterview

Optional	Optional
407	408

Office Use	
999	1

Strata	ID	Tract	Subtr

Office Use		
Date	Time	Notes

INTRODUCTION

Hello, I am _____ with the (*State*) Agricultural Statistics Service. One of our telephone interviewers called this household recently to obtain information for our July Agricultural Survey. In order to evaluate the quality of our survey procedures, and make sure the questions we ask are clear and easy to understand, we are re-interviewing a few of the people who were in the original survey. I would like to speak with the person most knowledgeable about this cattle operation. I would appreciate it if you would take the time to help me.

SECTION 1 - IDENTIFICATION

Please verify name and address of this operation. Make corrections on label.

1. On the land operated by the farm, ranch or individual(s) listed on the label:

   a. were any cattle or calves on this operation July 1, 1992? ☐ YES ☐ NO → [*If NO go to Section 7 on last page*]

2. Does this operation do business under any name, other than as shown on label?

   ☐ YES - Enter name: _____

   ☐ NO (Do you want this name to appear on the label?) ☐ YES ☐ NO

3. Are the day-to-day decisions for this farming (or ranching) operation made by

   ☐ **An Individual Operator?**

   ☐ **Partners?** Enter number of partners, including self ____ ☐
   (Partners jointly operate land and share in decision making
   DO NOT include landlord as partner)

   ☐ **A Hired Manager?**

   3a Are the decisions still made by the same person(s) making them on June 1, 1991?

   ☐ YES ☐ NO - **Would you please explain what changed?**

   _____

   _____

Office Use
R Unit
921
Change
923
Substitution
941

SECTION 2 - ACRES OPERATED

1 How many total acres of land were in this operation on July 1? ---------- 900

Include: The farmstead, all cropland, woodland, pastureland, wasteland, and government program land that is owned, rented from others, or managed.

Exclude: Land rented to others and public, industrial, or grazing association land used on a fee per head or AUM basis.

SECTION 3 - CATTLE AND CALVES

1. Of the total cattle and calves, regardless of ownership, on the *[Section 2, Item 1]* acres operated **July 1**, how many were:

a. **beef cows** ?---------- ★ 351

b. **milk cows**, whether dry or in milk? ---------- ★ 352

c. **bulls** weighing 500 lbs. or more?---------- ★ 353

d. heifers, weighing 500 lbs. or more including **replacement heifers and other heifers** that had not calved?---------- ★ 359

e. **steers** weighing 500 lbs. or more? ---------- ★ 357

f. **calves** weighing less than 500 pounds, including newborn calves? ---------- ★ 358

2. *[Add ★ Items 1a through 1f]*
Then the **total cattle and calves** on hand July 1 was: ---------- 350

3. Were there any other cattle or calves on this operation July 1, that we have not already counted *(in item 1 above)*, even if they belonged to someone else? ---------- 860

☐ YES - *[Enter code 1, show corrections to include them in item 1 above and explain.]* ☐ NO - *[Enter code 3 and continue.]*

4. I have already asked about calves **less** than 500 pounds
Were there any calves on this operation **over** 500 pounds?

☐ YES → **4a.** How many?---------- 870

4b. What was their average weight? ---------- **pounds** 871

4c. Did you include them earlier in the item 1 categories above (beef cows, milk cows, bulls, heifers, steers and calves under 500 pounds)?
[YES, Code 1 and explain; NO, Code 3] ---------- 872

_____

_____

☐ NO

SECTION 4 - CATTLE AND CALVES ON FEED

Now I would like to discuss Cattle and Calves on Feed for the slaughter market

1. How many cattle and calves were on feed July 1 that will go DIRECTLY from this operation to the slaughter market? ---------- **Number on feed July 1** [652]

2. Do you (this operation) have any cattle or calves that will go to another feedlot, be returned to pasture or go somewhere else before going to the slaughter market?

☐ **NO** ☐ **YES - 2a.** How many? ---------- **Number** [210]

3. Have we missed any cattle or calves that you feel should be included as Cattle on Feed?

☐ **NO** ☐ **YES - 3a.** How many? ---------- **Number** [212]
3b. Why were they not included?
_____
_____

4. Are there any CALVES less than 500 pounds on this operation that are being fed some grain, silage or protein concentrate?

☐ **NO** ☐ **YES**

4a. Will any of these calves be finished on this operation for the slaughter market?
☐ **YES -** 4a1 How many? ---------- [213]

4a2. Did you count them in the *[Item 1]* cattle on feed?
[YES = Code 1; No = Code 3] ---------- [214]

☐ **NO -** *[Go to question 4b.]*

4b. Will any of them be moved to another feedlot, returned to pasture, or sold as feeders?
☐ **YES -** 4b1 How many? ---------- [215]

4b2. Did you count them in the *[Item 1]* cattle on feed?
[YES = Code 1; No = 3] ---------- [216]

☐ **NO -** *[Go to question 5.]*

5. Sometimes the decision to finish calves for the slaughter market yourself or sell them as feeders has not been made at the time of our survey. If you (this operation) had some calves on feed but had not yet made a decision about them, would you INCLUDE or EXCLUDE them in the number of Cattle and Calves on Feed for the slaughter market?
[Include = Code 1, Exclude = Code 3] ---------- [217]

6. What is the maximum number of cattle and calves you normally feed for the slaughter market at any one time on the *[Section 2, Item 1]* acres? ---------- **Head** [676]

SECTION 5 - TERMS AND RECORD USAGE

1. Now I would like to discuss what some terms or words mean to you. Many times, terms mean different things to people living in different areas. This information will help us obtain the exact information that we are interested in. Please look at this card *[hand card to respondent]* and tell me in your own words what each term means to you. If you are not familiar with a term, let me know and go on to the next one.

   a. cattle and calves on feed:

   b. backgrounding:

   c. calves (calf):
   [Enumerator Note:
   If necessary probe with, "To you, are calves a certain weight, age, size, or something else?"]

2. *[Enumerator Note: Did the respondent use any written records for this survey?]*

   ☐ YES = 1
   ☐ NO = 3

   → 218

3. Did the respondent on the first survey use written records when providing information to the interviewer?

   ☐ YES = 1
   ☐ DON'T KNOW = 2
   ☐ NO = 3

   → 219

   [If Code 2 or 3 go to Section 6, Page 5.]

   3a. Were these written records from the operation's books, or from another source?

   ☐ Operation's books = 1
   ☐ Other Source = 2
   Identify _____

   → 220

SECTION 6 - PARTNER NAMES

1. Did you check **partners** in Section 1, Item 3, on Page 1?

☐ **YES** - [*Continue*] ☐ **NO** - [*Go to Section 8 on the back page*]

2. Please identify the other person(s) in this partnership, then go to Section 8 on the back page. (*Make necessary corrections if names have already been entered*)

Name: _____ Phone: _____
(First) (Middle) (Last)

Address: _____
(Rt. or St.) (City) (State) (Zip)

Did this person operate land individually in this State on June 1, 1991? ☐ YES ☐ NO

925
924

Name: _____ Phone: _____
(First) (Middle) (Last)

Address: _____
(Rt. or St.) (City) (State) (Zip)

Did this person operate land individually in this State on June 1, 1991? ☐ YES ☐ NO

926
924

Name: _____ Phone: _____
(First) (Middle) (Last)

Address: _____
(Rt. or St.) (City) (State) (Zip)

Did this person operate land individually in this State on June 1, 1991? ☐ YES ☐ NO

927
924

Name: _____ Phone: _____
(First) (Middle) (Last)

Address: _____
(Rt. or St.) (City) (State) (Zip)

Did this person operate land individually in this State on June 1, 1991? ☐ YES ☐ NO

928
924

[*Go to Section 8 on the back page*]

SECTION 7 - CHANGE IN OPERATOR

1. Has this operation (name on label) been sold, or turned over to someone else?

☐ **NO** - [*Go to next Section*] ☐ **YES** - Please identify the new operator(s).

Name _____

Address _____ Phone _____

City _____ State _____ Zip _____

1a. Did this person operate land individually in this State on June 1, 1991? _____. ☐ YES ☐ NO

SECTION 8 - CONCLUSION

1. Do you make any day-to-day decisions for another farm or ranch?

☐ **NO** ☐ **YES** - **1a.** What is the name of this operation? _____

1b. Was this operation in business before June 1, 1991? _____. ☐ YES ☐ NO

2. Thank you for your help in completing this questionnaire. Now I would like to compare these responses with those from the original telephone interview.

GO TO RECONCILIATION FORM.

3. Do you have any comments or suggestions about this or any of our other surveys that would make it easier for you to report?

This completes the survey. Thanks for your help.

Reported by: _____ Date: _____

Telephone (area code): _____ (number): _____

Respondent		Response Code		Enum	Eval	Jul Date
1-Op 2-Sp 3-Oth	101	3-Int 8-IR 9-Inac	910	098	100	987
Enumerator						

June	July	July
29-181	04-186	10-192
30-182	05-187	11-193
July	06-188	12-194
01-183	07-189	13-195
02-184	08-190	14-196
03-185	09-191	15-197

APPENDIX A

RECONCILIATION FORM

CATTLE REINTERVIEW SURVEY - JULY 1992

THIS FORM IS NOT TO BE OPENED UNTIL AFTER THE REINTERVIEW RESPONSES HAVE BEEN OBTAINED. In order to obtain measures of quality of our data, we must maintain independence between the initial and reinterview surveys. Viewing the initial response before the reinterview may hurt this relationship.

Strata	ID	Tract	Subtract	County

LABEL

RESPONDENT
CHANGE

office use
950

APPENDIX A

Initial Respondent: Initial Int:

QUESTION	ORIGINAL (1)	REINTERVIEW (2)	What is correct? -------- 1=orig 2=reint 3=either (3)	Source of difference? 1=orig. resp. 2=reint resp. 3=orig. enum. 4=reint enum. (4)	For office use Reason (5)
SECTION 1 --- IDENTIFICATION					
1. Label Correct? (yes/no)	310	410	510	710	810
Corrections to Label:		411	511	711	811
2. Any cattle or calves on this operation July 1? (yes/no)	312	412	512	712	812
3. Business under other name (yes/no)	313	413	513	713	813
Name:			514	714	814
4. Day-to-day decisions made by: 1=ind/oper 2-5=part 8=hired	315	415	515	715	815
4a. Are decisions made by the same person making them on June 1, 1991? (yes/no)	316	416	516	716	816
SECTION 2 --- ACRES OPERATED					
1. Total acres of land in this operation on July 1	317	417	517	717	817

EXPLANATION
(Explain as fully as possible why the original and reinterview differ)

Section number	Item	Reason for difference

IA,MN

APPENDIX A

Initial Respondent: Initial Int:

QUESTION	ORIGINAL (1)	REINTERVIEW (2)	What is correct? -------- 1=orig 2=reint 3=either (3)	Source of difference? 1=orig. resp. 2=reint resp. 3=orig. enum. 4=reint enum. (4)	For office use Reason (5)
SECTION 3 --- CATTLE AND CALVES					
1. Of the total **cattle and calves**, regardless of ownership, on the total acres operated **July 1**, how many were:					
a. Beef Cows	318	418	518	718	818
b. Milk Cows	319	419	519	719	819
c. Bulls weighing 500 lbs. or more	320	420	520	720	820
d. Heifers, weighing 500 lbs. or more that had not calved	321	421	521	721	821
e. Steers weighing 500 lbs. or more	322	422	522	722	822
f. calves weighing less than 500 lbs, including newborn calves	323	423	523	723	823
2. **Total cattle and calves** on hand July 1	324	424	524	724	824
SECTION 4 --- CATTLE AND CALVES ON FEED					
1. Total **cattle and calves** on feed that will go **DIRECTLY** from this operation to the slaughter market	325	425	525	725	825
2. Maximum number of **cattle and calves** you normally feed for the slaughter market at any one time	326	426	526	726	826

EXPLANATION
(Explain as fully as possible why the original and reinterview differ)

Section number	Item	Reason for difference

APPENDIX A

Initial Respondent: Initial Int:

QUESTION	ORIGINAL (1)	REINTERVIEW (2)	What is correct? -------- 1=orig 2=reint 3=either (3)	Source of difference? 1=orig. resp. 2=reint resp. 3=orig. enum. 4=reint enum. (4)	For office use Reason (5)
SECTION 6 --- PARTNER'S NAMES					
NAME 1:			527	727	827
NAME 2:			528	728	828
NAME 3:			529	729	829
NAME 4:			530	730	830
SECTION 7 --- CHANGE IN OPERATOR					
OPERATION NAME on label sold or turned over? (yes/no)	331	431	531	731	831
NAME:			532	732	832
Operate Land Indiv. on June 1, 1991? (yes/no)	333	433	533	733	833
SECTION 8 --- CONCLUSION					
1. Day-to-day decisions for another farm or ranch? (yes/no)	334	434	534	734	834
NAME:			535	735	835

EXPLANATION
(Explain as fully as possible why the original and reinterview differ)

Section number	Item	Reason for difference

IF NO FURTHER EXPLANATIONS, RETURN TO REINTERVIEW FORM - SECTION 8 QUESTION #3

IA,MN

APPENDIX A

EXPLANATION (Explain as fully as possible why the original and reinterview differ)		
Section number	**Item**	**Reason for difference**

APPENDIX B: Stratified Univariate Test

$H_0: \mu = \mu_0 \quad vs \quad H_1: \mu \neq \mu_0$

$if\ z > Z_{\frac{\alpha}{2}}\ or\ z < Z_{\frac{\alpha}{2}}\ then\ reject\ H_0$

$$z = \frac{\hat{x}_{st} - \mu_0}{\sqrt{Var(\hat{x}_{st})}}$$

$$\hat{X}_{st} = \sum_{h=1}^{L} N_h \bar{x}_h \qquad \bar{X}_h = \frac{1}{n} \sum_{i=1}^{n_h} x_{hi}$$

$$Var(\hat{x}_{st}) = \sum_{h=1}^{L} N_h (N_h - n_h) \frac{s_h^2}{n_h} \qquad s_h^2 = \frac{1}{n_h - 1} \sum_{i=1}^{n_h} (x_{hi} - \bar{x}_h)^2$$

Appendix C: Formula for Variance of the Percent Bias

The variance of the percent bias was calculated from the formula for a combined ratio estimate as described in Cochran [2].

$$V(\hat{R}) = \frac{\sum_{h=1}^{L} \left(\frac{N_h(N_h-n_h)}{n_h(n_h-1)} \sum_{i=1}^{n_h} (u_{hi}-\bar{u}_h)^2 \right)}{\left(\sum_{h=1}^{L} N_h \bar{x}_h \right)^2}$$

where

$\hat{R}$ = Proportion of total bias to SPS edited total (percent bias)

$$\hat{R} = \frac{\hat{Y}}{\hat{X}} \qquad f_h = \frac{n_h}{N_h}$$

$$\hat{Y} = \sum_{h=1}^{L} N_h \bar{y}_h \qquad \bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h}$$

$$\hat{X} = \sum_{h=1}^{L} N_h \bar{x}_h \qquad \bar{x}_h = \frac{\sum_{i=1}^{n_h} x_{hi}}{n_h}$$

$$u_{hi} = y_{hi} - \hat{R}x_{hi}$$

y_{hi} = bias for i^{th} observation in stratum h

x_{hi} = SPS edited value for i^{th} observation in stratum h

APPENDIX D: REASONS FOR DIFFERENCES

Table 1a. Reasons for Differences Between the Initial and Reinterview Responses by Category for *Total Cattle and Calves.* Data are From the July 1992 Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Figure was estimated	9	-10,859.72
Either could be right, both estimated	9	-2,494.53
Rounding	2	45.37
Used records or actually counted	3	2,298.57
Subtotal	23	-11,010.32
DEFINITIONAL REASONS		
Misunderstanding between enumerator and respondent	8	-52,283.16
Enumerator asked wrong question	2	-8,887.83
Respondent forgot to include some cattle or calves	5	-2,415.25
Did not report as of the reference date	2	327.74
Respondent did not figure in any death loss	2	8,004.40
Subtotal	19	-55,254.10
OTHER REASONS		
Difference was due to response on a prior question	38	-47,549.08
Initial respondent does not give accurate information on phone	3	-40,193.32
Initial respondent was tired or hurried on phone	3	-20,717.79
Enumerator forgot to ask	1	-6,438.33
Enumerator recorded wrongly	4	-3,113.30
Respondent does not know where answer came from	1	-2,084.12
Respondent just did not know	1	-1,933.43
Initial respondent thought they reported this the first time	1	-116.77
Gave wrong answer or added wrong	1	158.95
Initial respondent had difficulty hearing on phone	1	10,752.50
Initial respondent does not remember phone interview	1	11,202.15
Totals differ due to component difference	15	38,620.03
Subtotal	70	-61,412.51
Total	112	-127,676.93

APPENDIX D: REASONS FOR DIFFERENCES

Table 1b. Reasons for Differences Between the Initial and Reinterview Responses by Category for *Total Cattle on Feed.* Data are From the July 1992 Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Figure was estimated	6	-4,510.03
Either could be right, both estimated	5	-1,561.27
Some cattle/calves were not counted	2	-65.72
Rounding	3	171.27
Used records or actually counted	4	2,653.47
Subtotal	20	-3,312.28
DEFINITIONAL REASONS		
Respondent forgot to include some cattle or calves	4	-9,784.69
Respondent did not understand question	3	-2,970.54
Respondent misunderstood cattle on feed question	2	-1,408.91
Did not report as of the reference date	2	-1,380.60
Included cattle/calves from another operation	1	521.03
Respondent did not figure in death loss	2	8,004.40
Misunderstanding between enumerator and respondent	5	16,169.28
Subtotal	19	9,149.98
OTHER REASONS		
Initial respondent does not give accurate information on phone	2	-4,652.52
Difference due to response on a prior question	2	-373.02
Enumerator recorded wrongly	1	954.43
No explanation	2	1,537.90
Initial respondent was tired or hurried on phone	1	1,897.50
Gave wrong answer or added wrong	2	3,707.95
Enumerator forgot to ask	1	7,886.67
Respondent had not made decision on marketings	2	17,408.18
Subtotal	13	28,367.10
Total	52	34,204.80

APPENDIX D: REASONS FOR DIFFERENCES

Table 1c. Reasons for Differences Between the Initial and Reinterview Responses by Category for *Cattle on Feed Capacity.* Data are From the July 1992 Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Rounding	1	-3,134.00
Used records or actually counted	1	116.77
Figure was estimated	8	8,904.29
Either could be right, both were estimates	14	36,702.85
Subtotal	24	42,589.91
DEFINITIONAL REASONS		
Did not report as of the reference date	2	-5,408.57
Respondent forgot to include some cattle or calves	1	-833.33
Enumerator asked wrong question	3	11,793.36
Respondent misunderstood cattle on feed question	5	14,901.93
Misunderstanding between respondent and enumerator	10	146,902.24
Respondent did not understand question	5	160,465.26
Question was asked differently	25	427,384.88
Subtotal	51	755,205.77
OTHER REASONS		
Enumerator forgot to ask	1	-16,660.00
Initial respondent was tired or hurried on phone	2	-13,772.50
No explanation	2	2,117.31
Respondent had not made decision on marketings	2	3,041.42
Enumerator recorded wrongly	1	3,618.00
Initial respondent does not give accurate information on phone	1	4,760.00
Gave wrong answer or added wrong	1	5,373.13
Initial respondent does not remember phone interview	1	20,149.22
Respondent does not know where answer came from	2	23,259.38
Subtotal	13	31,885.95
Total	88	829,681.64

APPENDIX D: REASONS FOR DIFFERENCES

Table 1d. Reasons for Differences Between the Initial and Reinterview Responses by Category for *All Heifers*. Data are From the July 1992 Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Used records or actually counted	4	-5,440.07
Rounding	1	-50.00
Either could be right, both were estimates	6	770.75
Figure was estimated	13	8,001.22
Subtotal	24	3,281.90
DEFINITIONAL REASONS		
Respondent forgot to include some cattle or calves	11	-20,806.34
Misunderstanding between enumerator and respondent	8	-15,629.84
Enumerator asked wrong question	1	-5,550.42
Respondent did not understand question	3	-3,142.72
Respondent had difficulty with weight groups	5	-796.98
Respondent misunderstood cattle on feed question	1	158.95
Respondent had difficulty separating cows and heifers	4	542.97
Subtotal	33	-45,224.38
OTHER REASONS		
Initial respondent was tired or hurried on phone	3	-8,895.45
Respondent does not know where answer came from	1	-3,907.73
Reinterview enumerator did not attempt to reconcile	1	-3,386.70
Initial respondent does not give accurate information on phone	2	-2,639.28
Difference due to response on a prior question	1	-632.50
Other	1	197.17
Gave wrong answer or added wrong	1	350.30
Initial respondent had difficulty hearing on phone	1	2,530.00
Initial respondent does not remember phone interview	1	3,126.18
Subtotal	12	-13,258.01
Total	69	-55,200.48

APPENDIX D: REASONS FOR DIFFERENCES

Table 1e. Reasons for Differences Between the Initial and Reinterview Responses by Category for *Calves*. Data are From the July 1992 July Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Figure was estimated	9	-2,784.33
Rounding	1	95.37
Used records or actually counted	3	1,966.44
Either could be right, both were estimates	9	8,134.54
Subtotal	22	7,412.02
DEFINITIONAL REASONS		
Respondent forgot to include some cattle or calves	7	-32,575.80
Enumerator asked wrong question	2	-15,817.03
Respondent did not understand question	1	-1,380.17
Did not report as of the reference date	1	1,431.65
Respondent had difficulty with weight groups	8	12,064.46
Misunderstanding between enumerator and respondent	6	33,142.14
Subtotal	25	-3,134.75
OTHER REASONS		
Initial respondent does not give accurate information on phone	2	-16,798.51
Respondent does not know where answer came from	1	-1,302.58
Initial respondent said he was not asked this on phone	1	-1,042.06
Initial respondent had difficulty hearing on phone	1	-632.50
No explanation	1	-552.07
Gave wrong answer or added wrong	1	-394.33
Respondent just did not know	2	-91.12
Enumerator recorded wrongly	2	497.20
Initial respondent does not remember phone interview	1	781.55
Difference due to response on a prior question	1	2,084.12
Initial respondent was tired or hurried on phone	2	2,716.35
Enumerator forgot to ask	1	7,770.58
Subtotal	16	-6,963.38
Total	63	-2,686.11

APPENDIX D: REASONS FOR DIFFERENCES

Table 1f. Reasons for Differences Between the Initial and Reinterview Responses by Category for *Steers*. Data are From the July 1992 Cattle on Feed Reinterview Study for Both States Combined (With Outlier Excluded).

Reason	Frequency	Expanded Difference
ESTIMATING REASONS		
Figure was estimated	14	-3,979.98
Either could be right, both estimated	11	-1,063.41
Used records or actually counted	5	-289.34
Rounding	2	5,801.00
Subtotal	32	468.27
DEFINITIONAL REASONS		
Respondent forgot to include some cattle or calves	5	-24,436.59
Enumerator asked wrong question	1	-4,492.89
Respondent did not understand question	2	-4,112.49
Misunderstanding between enumerator and respondent	5	-1,702.84
Did not report as of the reference date	2	-1,022.69
Respondent had difficulty with weight groups	7	-63.77
Included cattle/calves from another operation	1	521.03
Respondent did not figure in any death loss	2	8,004.40
Subtotal	25	-27,305.82
OTHER REASONS		
Initial respondent does not give accurate information on phone	1	-6,587.23
Enumerator recorded wrongly	4	-3,790.92
Initial respondent was tired or hurried on phone	1	-2,624.70
Respondent does not know where answer came from	2	-1,098.31
Other	1	-197.17
Gave wrong answer or added wrong	2	918.01
Initial respondent does not remember phone interview	1	1,042.06
Initial respondent had difficulty hearing on phone	1	2,530.00
Subtotal	13	-9,808.79
Total	70	-36,645.79