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An Analysis of the Relationship Between Survey Burden and Non-Response: If We Bother Them More, Are They Less Cooperative?

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AN ANALYSIS OF THE RELATIONSHIP BETWEEN SURVEY BURDEN AND NON-RESPONSE: IF WE BOTHER THEM MORE, ARE THEY LESS COOPERATIVE?

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ABSTRACT

Individual operations in NASS surveys may be contacted on numerous occasions over time. This may be particularly true with large or unique operations possibly being selected with near certainty for recurring surveys and included in samples for multiple surveys. Cooperation in any particular survey may be affected by the number and frequency of times an establishment has been selected for NASS surveys in the past.

This paper examines the relationship between response on the 1998 June Crops/Stocks Survey in South Dakota and the reporting burden placed on operations by NASS in the past. This paper will examine the effects that the accumulated reporting burden associated with the number and frequency of NASS survey contacts, length of those contacts and the difficulty of the survey request have on survey cooperation. Comparisons of these burden measures made between respondents and non-respondents for the 1998 June Crops/Stocks Survey show little, if any, correlation between these burden measures and an individual operation's willingness to cooperate.

KEY WORDS

Respondent burden; Non-response; Quarterly Agricultural Survey

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This report is based on a paper entitled, *An Analysis of the Relationship Between Survey Burden and Non-Response: If We Bother Them More, Are They Less Cooperative?* which was prepared for the 1999 International Conference on Survey Non-Response held in Portland, Oregon, October 28-31, 1999.

SUMMARY

A commonly held belief in survey research is that increased burden is negatively correlated with survey cooperation. In this context, burden includes such things as the number and frequency of survey contacts, length of those contacts and the difficulty of the survey request. However, existing literature provides limited evidence to support the notion that increased or accumulated burden also increases refusal rates.

USDA's National Agricultural Statistics Service (NASS) contacts farms and ranches in the United States for many surveys. This paper explores the accumulated burden effect of 61 surveys conducted in South Dakota between January 1996 and June 1998 on the refusal rate for a particular survey, the June 1998 Crops/Stocks Survey.

There were 14,557 operations contacted for the 61 surveys. Of these, 35 percent were contacted for only a single survey while 85 percent were contacted for five or fewer surveys in the two and one half year period. Analyses revealed the number of surveys an operation was in is a poor predictor of the operation's overall refusal rate for all NASS survey contacts.

In looking at the response to the 1998 June Crops/Stocks Survey, we found that:

- there was no statistically significant difference in the mean number of surveys refusals and cooperators were in;
- there was a marginally statistically significant difference in the mean number of total OMB questionnaire minutes; however, although the refusals had more minutes than the cooperators, the magnitude of the difference was not of practical significance;
- there was no statistically significant difference in the length, measured in OMB minutes, of the most recent survey for the refusals and the cooperators;
- there was no statistically significant difference in the refusal rates on the 1998 June Crops/Stocks Survey for those operations who were and who were not in a difficult survey during the previous two and one half year period;
- there was a statistically significant difference in the mean number days since the most recent contact; however, although the refusals had a more recent contact than cooperators, the magnitude of the difference was not of practical significance.

These results indicate that accumulated burden does not necessarily lead to higher refusal rates on a particular survey. However, the authors caution generalizing these results to all states. Instead, similar investigations should be carried out in other states and additional research be conducted to determine other factors that relate to refusing NASS surveys.

1. INTRODUCTION

A commonly held belief in survey research is that increased burden is negatively correlated with survey cooperation. Federal Statistical Agencies and others are currently striving to lessen the reporting burden placed on respondents, as per the U.S. Office of Management and Budget's current government wide goal of five percent yearly reduction of information collection burdens. (Paperwork Reduction Act of 1995, see also Machin, 1997 for a review of survey burden reduction efforts in the UK.) Burden may be defined in a number of ways – length of the interview or questionnaire, number of contacts, difficulty in reporting the requested data, etc. The length of the survey questionnaire is often assumed to be positively correlated with survey non-response. However, the evidence to support this claim is inconsistent at best. A literature review by Bogen (1996) found that while this claim was supported in some studies, other studies showed exactly the opposite. In addition, some studies showed that there was little relationship, either positive or negative, between questionnaire length and cooperation.

Survey burden may also be defined as the number of survey contacts. In surveys of certain populations, sample units may be contacted on numerous occasions over time. This is particularly true in surveys of establishments, where large or unique operations may be selected with near certainty for recurring surveys, and may be included in samples for multiple surveys. Cooperation in any particular survey may be affected by the number and frequency of times an establishment has been selected for surveys by that organization in the past.

The sum of the length of time of

previous survey contacts is also assumed to adversely affect survey participation. The most common evidence for this comes from panel survey response patterns. Most panel surveys, which contact respondents multiple times over the course of data collection, suffer from attrition from the original sample (see Kalton, Kasprzyk, and McMillen, 1989 for a discussion of nonresponse in a variety of panel surveys). This is taken to be evidence that increased contacts result in subsequent non-response. Frankel and Sharp (1981) also found the length of a single completed survey interview was related to expressed willingness to participate in later interviews. Respondents who participated in a 25 minute interview were more likely to agree to participate in a future interview than respondents participating in a 75 minute interview. However, there was little difference in actual cooperation between those who had the long or short initial interview when later contacted for the second interview.

There is also some evidence that past survey experiences may trigger future refusals. DeMaio (1980) found that one of the most common reasons for refusing interviews in later waves of the CPS panel, was “unfavorable past experiences” as survey respondents. However, although respondents had obviously been in a survey before (the previous panel wave), “unfavorableness” may be due to either the accumulated burden of repeated interviews or any one of a plethora of other factors (related to the panel or other recalled contacts from that organization or others).

Many panel surveys do not re-contact early wave refusals in later waves of data collection. However, for panel surveys that do re-contact early wave refusals, a significant proportion of them will respond

on subsequent contacts (Presser, 1989). This implies that accumulated burden does not always trigger subsequent survey refusals.

USDA's National Agricultural Statistics Service (NASS) contacts farms and ranches in the United States for many surveys. For example, the Quarterly Agricultural Survey (QAS) collects data on inventory and production; the Farm Labor Survey collects information on hours worked and wages; the Agricultural Resource Management Study (ARMS) collects information on production practices, chemical and pesticide use, and farm economics. A particular farm or ranch may be selected for any or all of these surveys, both within a single year and over multiple years. This paper examines the relationship between response on one NASS survey (June 1998 QAS) and the reporting burden placed on agricultural operations by NASS in the past.

In NASS surveys, there is some evidence that accumulated burden may contribute to later non-response. During 1990 and 1991, the reasons given for refusing to participate in NASS's ongoing Farm Costs and Returns Survey (collecting detailed expenditure, income, cost of production and demographic data) were collected. Some respondents did report refusing because they had been contacted on this survey or other surveys in the past (O'Connor, 1991, 1992). However, this was not the most frequently cited reason for refusing to participate. (The number one reason for refusing in this hour long survey was "too busy/lack of time.") Similarly, in a survey of farmers and ranchers in North and South Dakota, self reported number of past USDA requests for data was not positively correlated with their willingness to provide

data to USDA in the future (Jones, Sheatsley and Stinchcombe, 1979). This group also did not cite the frequency or number of survey requests as a primary reason for refusing to participate in USDA surveys. (Invasion of privacy was the number one reason cited by this group for refusing to participate.)

The number of surveys that NASS is conducting in the population of agricultural operators has been increasing, while the size of the population continues to decrease. This suggests that the number of times an operation may be contacted by NASS and the frequency of these contacts is increasing over time. In order to determine the accumulated burden on sampled operations and how this is related to participation in a subsequent survey, this paper examines a set of contacts made by NASS with farm and ranch operations in South Dakota from January 1996 to June 1998.

2. METHODS

Interview disposition (not sampled, completed, refused, non-contact) was recorded for each South Dakota agricultural operation for the Quarterly Agricultural Surveys, the Agricultural Labor Surveys, the Hog Surveys, the Cattle and Sheep Surveys, the Agricultural Resource Management Studies, and the Yield surveys conducted by NASS between January 1996 and June 1998. Contacts coded as "estimated" were considered refusals. (South Dakota was selected because they have historically had a relatively high rate of survey refusals.) Details about these surveys appear in Appendix A. There were 61 total possible survey contacts in this set.

All surveys were sampled from South Dakota's list frame of farmers and ranchers,

which NASS maintains. Samples were stratified based on survey-related control data (usually size and type of operation) maintained on the list frame. Mode of contact varied, but involved primarily telephone (CATI), with limited face-to-face and mail for most surveys. The exception was the ARMS, which was entirely face-to-face interviews. The sensitivity and difficulty of the surveys also varied, however, except for the ARMS, all data collected are generally readily available to farmers and ranchers. The ARMS collects extremely detailed income, expense and debt information, in addition to potentially sensitive questions on pesticide and chemical use.

The samples were not all independent. For example, the monthly agricultural yield survey samples are subsets of the crops/stocks samples and if operations are in one yield survey, they are in all seven yield surveys in a given crop year. This had some data collection implications since interviewers might tell operators they would likely be contacted again. However interviewers would not always know this fact and this is not covered under official NASS policy.

For surveys other than the yield surveys, interviewers do not normally know what other surveys an operation may have been selected for, so they will not be able to tell respondents how many contacts they may have in the future. The few exceptions to this are noted in the appendix. Note: This analysis does not include ALL of the survey contacts that NASS makes within this population. However, these are the surveys which are part of National estimating programs, with the largest samples sizes, targeting the broadest populations. Other surveys are conducted which may target

specific specialized subpopulations, (e.g. large cattle feedlots, horticultural operations, etc. which probably have little overlap with the surveys we examined) or may be conducted under sponsorship of organizations other than NASS. Most of these surveys record only completed interviews, so refusals and other non-response cannot be identified. These limited number of surveys are not included here, but may have contributed to the accumulated burden.

In order to measure the effect of burden on later response, we examined response in the most recent survey of our set (June 1998). Because we were primarily interested in sampled operations that refused to participate, not those that we were unable to contact, we included only two types of response in our analysis: those that were contacted and provided survey data, and those that were contacted but refused to participate. Other non-contacts were minimal in this survey and were not included in our analyses. The sample size for the June 1998 survey was 1,460, with 69.5% of the records completed, 26.7% refused and 3.8% other non-response.

Analyses took the sample design into consideration and used *t*-tests with jackknife estimates for standard errors.

3. RESULTS

3.1 Assessment of accumulated NASS survey burden

Once we combined response information from the 61 possible survey contacts we were able to see how many times NASS had contacted potential respondents and how they responded to these contacts. The results are shown in

Table 1. Percent of Surveys Refused By Total Number of Survey Contacts

Number of Survey Contacts	Count	Number of Surveys Refused																
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	5,125	76.4	23.6															
2	2,737	68.3	17.9	13.7														
3	2,208	66.7	14.0	9.3	10.0													
4	1,375	61.7	15.5	9.0	7.1	6.6												
5	923	61.0	13.4	5.7	7.8	7.3	4.8											
6	704	59.5	14.3	7.8	4.5	4.3	5.5	4.0										
7	492	57.3	11.8	8.3	6.1	4.7	5.1	3.3	3.5									
8	304	54.9	15.5	8.2	3.6	5.3	3.3	3.6	2.0	3.6								
9	230	53.9	15.7	5.2	5.7	4.8	2.6	3.5	4.8	1.7	2.2							
10	161	48.4	18.0	5.6	3.1	7.5	1.9	1.2	3.7	4.3	3.7	2.5						
11	79	44.3	16.5	3.8	7.6	7.6	1.3	5.1	3.8	2.5	2.5	2.5	2.5					
12	68	48.5	23.5	2.9	1.5	4.4	2.9	4.4	2.9	1.5	5.9	1.5						
13	59	47.5	10.2	6.8	3.4	3.4	8.5	1.7		6.8	3.4	5.1	3.4					
14	32	50.0	9.4	3.1	6.3		3.1	3.1	6.3	3.1		6.3	3.1	3.1	3.1			
15	19	52.6	5.3	10.5			10.5			5.3				10.5	5.3			
16	15	46.7		13.3	6.7					13.3		13.3						6.7
17	4	25.0		25.0		25.0											25.0	
18	9	55.6		11.1					11.1		11.1						11.1	
19	3	33.3										33.3					33.3	
20	4		25.0						25.0		25.0		25.0					
21	3	33.3	66.7															
22	1		100.0															
23	0																	
24	1						100.0											
25	1				100.0													

Note 1: This analysis included 61 possible surveys from January 1996 through June 1998.

Note 2: No respondent was in more than 25 surveys

Note 3: No respondent refused more than 15 of the surveys they were in.

Table 1. The total number of operations that were contacted on these surveys was 14,557.

The maximum number of times a respondent had been contacted was 25, although over 85% of respondents were contacted five times or less in the 2 ½ year period. Particularly striking in this table is the number of operations that were contacted only once. This is by far the most common number of times an operation was contacted. It should be noted also, that the 1997 Census of Agriculture reported 31,284 farms in South Dakota. This indicates that even though the overall target population is relatively small, there is a sizable proportion of potential respondents who were NEVER contacted by NASS for these surveys during this time.

Table 1 also shows the number of times potential respondents refused to provide

survey data. The number of people who refused 100 percent of the time they were contacted (shown in bold on the table diagonal) is very small. Surprisingly, there are no “100 percent refusals” in the group of respondents who were contacted 12 times or more. There also did not appear to be any pattern to respondents’ willingness to respond. That is, it did not appear that respondents cooperated then started to refuse, or vice versa. The cooperate/refuse pattern appears random across the repeated contacts.

Table 2 shows the same information summarized by the percent of times a respondent refused to provide data. The third column of the table shows the percentage of respondents who were “hard core cooperators”, providing survey data all or most of the times they were contacted

Table 2. Percent of Surveys Refused By Number of Survey Contacts

Number of Survey Contacts	Count	Percent Refused			
		0-24% ("Hard Core Cooperators")	25-49%	50-74%	75-100% ("Hard Core Refusals")
1	5,125	76.4			23.6
2	2,737	68.3	17.9		13.7
3	2,208	66.7	14.0	9.3	10.0
4	1,375	61.7	15.5	9.0	13.7
5	923	74.4	5.7	7.8	12.1
6	704	73.8	7.8	8.8	9.5
7	492	69.1	14.4	9.8	6.8
8	304	70.4	11.8	8.6	9.2
9	230	74.8	10.5	6.1	8.7
10	161	72.0	10.6	6.8	10.5
11	79	64.6	16.5	11.4	7.5
12	68	74.9	8.8	8.8	7.4
13	59	67.9	13.6	10.2	8.5
14	32	68.8	6.2	9.4	15.6
15	19	68.4	10.5	5.3	15.8
16	15	66.7		26.6	6.7
17	4	75.0			25.0
18	9	66.7	11.1	22.2	
19	3	33.3		66.6	
20	4	25.0	50.0	25.0	
21	3	100			
22	1	100			
23	0				
24	1	100			
25	1	100			

(never refusing, up to refusing less than one quarter of the time). The far right column shows the percentage of operations who are "hard core refusals" (refusing 3/4 of the time contacted or more). The striking thing about this table is the consistent pattern shown for all number of contacts. Hard core cooperators (column three) remain around 70 percent regardless of the number of contacts, just as the hard core refusals are fairly consistent around ten percent. Columns four and five show lesser degrees of cooperation but are also fairly consistent.

If, in fact, more contacts make people less cooperative, then we should see an

increase in the percent of time respondents refuse as the number of contacts increases. We do not see this pattern in our data. (It is interesting that the few respondents with the largest number of contacts in our data set are more cooperative than respondents with fewer contacts.)

A formal test of the relationship between the overall percentage of surveys refused and the number of surveys an operation was selected for was performed with a simple regression model. The overall refusal percent was modeled by the count of the number of surveys the operation was selected for. The coefficient on the number

of surveys was -0.00542 with a poor R² of 0.0015 (*p*-value < 0.001). With the large number of observations (14,557) available, the statistical significance is not surprising. This means the number of surveys accounts for less than one percent of the variation in the refusal rate. Since the coefficient's magnitude is so small, the result tells us very little.

3.2 Effect of Burden on Survey Response

In order to analyze the effect of prior survey burden on a subsequent survey contact, we compared operations who cooperated and provided survey data with operations who were contacted, but refused to provide any data for the June 1998 Crops/Stocks survey. (This was the last survey included in our data set.) As an indication of accumulated burden we looked at several things traditionally thought of as

burdensome to survey respondents. The first type of burden was the number of times the operation had been contacted by NASS in the past (as noted before, in our analysis this included 61 possible survey contacts from January 1996 until this survey). There was no significant difference in the number of surveys refusals or cooperators had been contacted for, with the average number just under three contacts for each group, as shown in Table 3. We also compared the total amount of time they had been asked to spend responding in the past (measured as the total OMB approved estimate of minutes of burden for each survey). This is also shown in Table 3 as Mean Number of Minutes. There is a marginally significant difference between refusals and cooperators in the total accumulated interview time, but in practical terms, the difference (three and one half minutes) is negligible.

Table 3. Total Time Burden in the Two & One Half Year Period

June 1998 Respondents	Mean Number of Surveys	Mean Number of Minutes
Cooperators (n=988)	2.7260	50.9015
Refusals (n=368)	2.8807	54.4394
Difference Between Cooperators & Refusals	-0.1548 (<i>p</i> -value 0.1460)	-3.5379 (<i>p</i> -value 0.0910)

We also thought that perhaps the burden imposed by the most recent prior contacts might affect cooperation. We compared the number of minutes (again, based on official OMB estimated burden) for respondents and cooperators for the two most recent contacts prior to June 1998 (Table 4).

The only significant difference between refusals and cooperators was in the length of the second most recent contact, 2.2 minutes. While statistically different, in practical terms the difference is negligible as it is unlikely that respondents would distinguish between interview lengths differing by two minutes.

Table 4. Length of Two Most Recent Survey Contacts

June 1998 Respondents	Mean Minutes, Most Recent Contact	Mean Minutes, 2 nd Most Recent Contact
Cooperators (n=988)	10.7137	6.0871
Refusals (n=368)	10.4355	8.2872
Difference	0.2782 (<i>p</i> -value 0.7827)	-2.2002 (<i>p</i> -value 0.0172)

Note: Operations that did not have any other contacts in the past 2½ years were given 0 minutes for their prior contacts.

Demaio (1980) found that “unfavorable” prior survey experiences were related to future survey cooperation. One way a survey experience might be perceived as unfavorable to a respondent is if they have to provide information that is difficult to report, is sensitive, or requires a lot of time or effort to provide. While most of the surveys in our data set have relatively short estimated completion times and are felt to request information that is relatively easy to provide, the Agricultural Resource Management Study (ARMS) takes 90 minutes on average to complete (with interviews lasting up to several hours), and asks for several types of information that might be deemed ‘sensitive’, such as detailed financial information and pesticide use. This survey is widely believed in NASS to be

extremely burdensome and difficult. For this reason, we suspected that participation in an ARMS survey might adversely affect cooperation on later surveys. To test this hypothesis, we compared the refusal rate on the June 1998 survey for those operations who had been selected to report in the ARMS in the past year with those who had not. As shown in Table 5, operations who had previously been selected for the ARMS survey were actually more likely to participate in the June 1998 survey than those who had not. (However, because of the NASS perceived burden imposed by being in the ARMS survey, the sample is selected specifically to minimize the number of operations in both the ARMS and other surveys such as the June 1998 QAS.)

Table 5. Refusal Rate By Selection Status in ARMS Survey (for the past year)

	June 1998 Refusal Rate
Selected for ARMS (n= 23)	0.0929
NOT Selected in ARMS (n=1,333)	0.2265
Difference	-0.1336 (<i>p</i> -value 0.0660)

Because the number of respondents in the ARMS survey in the past year is quite small, we also compared the June 1998 response rate for operations who had been in the ARMS survey any time in the past two

and one half years. Response rates were virtually identical for both groups, indicating that prior inclusion in the ARMS survey did not affect future survey participation (Table 6).

**Table 6. Refusal Rate By Selection Status in ARMS Survey
(over the past two and one half years)**

	June 1998 Refusal Rate
Selected in ARMS (n=223)	0.2482
NOT Selected in ARMS (n=1,133)	0.2208
Difference	0.0274 (p-value 0.5391)

It has also been suggested that burden is increased with more frequent contacts made to a potential respondent. In order to test this hypothesis, we compared the average number of days since the last contact (and the contact prior to that) had been made with June cooperators and refusals. As shown in Table 7, the

difference of 45 days is statistically significant, but again, since the average length of time since the prior contact was close to a year and ten months, this may have little practical value with regard to developing contact procedures for respondents.

Table 7. Time Since Prior Contacts

June 1998 Respondents	Mean Days Between Most Recent Contact	Mean Days Between 2 nd Most Recent Contact
Cooperators (n=988)	681.6458	772.5490
Refusals (n=368)	636.5099	753.8431
Difference Between Cooperators & Refusals	45.1359 (p-value 0.0238)	18.7059 (p-value 0.1588)

Note: Respondents who had not had a prior contact in the past 2 ½ years were given a value of 913 days (2½ years), since that was the minimum time since they would have been contacted.

4. DISCUSSION

In this paper we tried to define “survey burden” in a number of ways that are traditionally used by survey researchers. Then we examined these burdens (as imposed by NASS) to see if they affected cooperation on a future survey. If burden imposed by NASS is correlated with cooperation on NASS surveys, NASS may want to consider ways to decrease the burden on individual operations as a means to increase later response. However, none of the types of burden we looked at appeared to be related to future survey cooperation in the 1998 June Crops/Stocks Survey. While this is a single survey, it is typical of NASS surveys and is representative of the type of information and respondents in most other NASS surveys.

Of course, our results do not reflect contacts by organizations other than NASS; we only included contacts over which we have control. Agricultural operations are subjected to requests from other agricultural businesses, in addition to requests targeted at the general population. We do not know how this additional survey burden affects their cooperativeness on NASS surveys. We do know, from other research (McCarthy, Johnson, and Ott, 2000), that sampled operations who have more knowledge and more positive opinions of NASS are more likely to cooperate on our surveys.

In addition, there may be other ways in which respondent burden may be defined. For example, anecdotal evidence suggests that the timing of a survey contact may affect its perceived burden. Farmers may feel a contact is more burdensome during extremely busy times, such as harvesting or planting, on the farm. Establishments may perceive respondent burden more in terms of

seasonal activities occurring when they are contacted rather than by how long or how frequent the surveys are.

Because farmers and ranchers are a specialized population, they may respond differently to response burden. As representatives of agricultural establishments, they may be less likely to refuse cooperation because the survey topics are personally relevant to them and they may realize ways in which the survey results affect them. This may be true of other establishment populations as well.

5. CONCLUSION AND RECOMMENDATIONS

Using the data available to us, we found little, if any, evidence to support the idea that accumulated burden adversely affects survey cooperation. However, our findings should not be taken to mean that NASS should ignore trying to reduce the number of times they contact respondents. Federal Statistical agencies should be commended for efforts to reduce burden on respondents, since they usually provide data voluntarily and without compensation. However, if the objective of reducing burden is to increase cooperation, we may be disappointed with the results of burden reduction efforts.

One alternative strategy might be to *increase* the burden on a smaller group of respondents and forgo the objective of making burden as small as possible for everyone. If burden is concentrated on a small group within the population, additional resources could then be spent on maximizing the cooperation of this smaller group who would be asked to participate in many more surveys than they currently are. Whether or

not cooperation could be maintained with greatly increased amounts of data being collected is of course, unknown. To a respondent, it would be similar to being asked to be in an ongoing panel survey (for which high response rates can be achieved). However, instead of panel waves, each contact would be for a different and separate survey. Our research suggests that this may be a fruitful avenue for future research efforts.

Cooperation on agricultural surveys may be tied more to other phenomena than respondent burden. We have recently begun to collect information about respondents and non-respondents attitudes toward NASS as the survey sponsor (McCarthy, Johnson and Ott, 2000). Differences in the feelings potential respondents have about the survey sponsor and the effect of survey statistics on respondents appear to be much more closely related to survey cooperation or refusal than burden.

While survey organizations should continue to strive to reduce burden on their respondents, particularly those in limited populations, we should also be looking for real correlates of survey response. Burden, while long assumed to be directly related to survey cooperation, may, in truth, have little impact on response. If that is the case, resources spent on burden reduction in pursuit of increased response rates may be money ill spent.

Based on our findings, we offer the following recommendations:

Recommendation 1: Investigate other factors which may be related to refusing NASS surveys.

Recommendation 2: Repeat the analyses discussed in this paper in one or more other states. It is possible that the results obtained for South Dakota are unique and other states may follow different trends. Other possibilities for additional analysis include examining response/nonresponse on other surveys or burden over other time periods.

Recommendation 3: Perform additional analyses on the South Dakota data used for this paper. Additional analyses could involve determining if particular subgroups react differently to accumulated burden.

Recommendation 4: Explore alternatives to minimizing burden across all respondents. Sampling plans could be designed so that burden was purposefully increased on a small set of respondents, for which extra resources would be used to maintain their cooperation. (This approach is part of the pilot for an alternative to the current ARMS survey design.)

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APPENDIX A

South Dakota Surveys Included In Non-Response Analysis

Survey Name	Type of Information Collected	Dates Included	Average Sample Size	Average Response Rate		Official Average Minutes to Complete
				Refusals	Other Non-Response	
Crops/Stocks ^{1/}	Crop acreage and production, stocks inventory	March 1996, 1997, 1998	1,561	28%	4%	20
		June 1996, 1997, 1998	1,403	27%	3%	
		September 1996, 1997	1,556	26%	3%	
		December 1996, 1997	1,582	26%	3%	
Hogs	Hog inventory and production	March 1997, 1998	683	19%	1%	20
		June 1997, 1998	689	19%	1%	
		September 1996, 1997	691	18%	1%	
		December 1996, 1997	676	18%	1%	
Cattle	Cattle inventory and production	January 1996, 1997, 1998	1,357	21%	4%	20
		July 1996, 1997	180	22%	7%	
Sheep	Sheep inventory and production	January 1996, 1997, 1998	868	15%	3%	20
		July 1996, 1997	181	16%	4%	
Agricultural Labor	Number of agricultural workers and wages paid	January 1996, 1997, 1998	158	17%	5%	15
		April 1996, 1997, 1998	160	19%	3%	
		July 1996, 1997	140	16%	5%	
		October 1996, 1997	142	15%	5%	
Yield ^{2/}	Yields by crop	May 1996, 1997, 1998	480	5%	2%	20
		June 1996, 1997, 1998	378	9%	1%	
		July 1996, 1997	628	27%	5%	
		August 1996, 1997	1,057	16%	5%	
		September 1996, 1997	800	16%	6%	
		October 1996, 1997	506	17%	3%	
		November 1996, 1997	339	18%	2%	
		February 1996	366			
FCRS ARMS Phase 1 ^{3/4/} ARMS Phase 2 ^{3/4/} ARMS Phase 3 ^{3/4/}	Farm/ranch economic data including income, expenses and debt	June 1996, 1997	1,360			90
		September 1996, 1997	410	13%	2%	15
		February 1997, 1998	349	32%	8%	45

1/ The March 1996 and June 1996 Crops/Stocks surveys also included Hogs and had sample sizes of about 2,400. Their non-response rates were approximately the same as for the Crops/Stocks surveys alone.

2/ The Yield Survey sample is a subset of the year's Crop/Stocks sample.

3/ ARMS Phase 1 is a screening phase for ARMS Phase 2 and 3.

4/ Steps are taken to reduce the number of overlaps between ARMS and the other surveys. Also, steps are taken to reduce the probability that operations will be in ARMS consecutive years.

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