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An Assessment of the Frozen Weights Procedure

March and September Multiple Frame Hog Survey

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ABSTRACT

This report compares the frozen weights and former operational procedures for estimating hog and pig inventories in the non-overlap domain of the March 1981 Multiple Frame Hog Survey. Both procedures use a weighted estimator with weights based on the ratio of tract to farm acres. However, the procedures use data collected at different times and not necessarily from the same farm operators. Estimates computed by the two procedures do not differ statistically, but do show differences attributable to nonsampling errors in the reporting of total farm acres. The frozen weights procedure is preferred because: 1) its estimates do not differ statistically from the former operational procedure (although both suffer from nonsampling errors); 2) it eliminates a sensitive question concerning farm acreage; 3) it makes more contacts possible by telephone as opposed to personal interview; and 4) it uses substitution rules for out-of-business operators which are identical to the list frame rules.

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SUMMARY

With the March 1981 Multiple Frame Hog Survey, Methods Staff implemented a new estimation procedure for the nonoverlap (NOL) domain. The new "frozen weights" procedure is designed for the March and September multiple frame surveys. Data was collected in the March 1981 survey in 14 states to compare the frozen weights and former operational procedures. The analysis did not uncover any statistically significant changes in national or state estimates of the NOL domain. However, some changes as large as 15 percent in such items as total hogs and pigs occurred in Kansas, Georgia, and Illinois. These large changes appear to be a symptom of nonsampling errors in reported farm acres. In numerous cases, total farm acres recorded in December was changed by the March respondent but attributed by that respondent to mistakes in records. There is no clear indication that the acreage changes are due to different respondents. The frequency and size of these acreage corrections, however, shows the severe difficulty of obtaining correct data for weighting estimates.

The frozen weights procedure is preferred because: 1) the estimates do not differ statistically from the old operational procedure (although both suffer with nonsampling errors); 2) it eliminates a sensitive question concerning farm acreage; 3) it makes more contacts possible by mail and phone as opposed to personal interview; and 4) it uses substitution rules for out-of-business operators which are identical to the list frame rules.

An Assessment of the Frozen Weights Procedure: March and September Multiple Frame Hog Survey

INTRODUCTION

The Statistical Reporting Service (SRS) uses an area frame sample in fourteen states as part of multiple frame surveys to obtain weighted estimates of hog and pig inventories. These multiple frame hog and pig surveys are conducted quarterly: in June, September, December, and March. In the March 1981 Multiple Frame Hog Survey, Methods Staff made operational the frozen weights procedure for obtaining the estimator weights for the nonoverlap (NOL) domain. The frozen weights procedure is to be used in both the September and March surveys.

Two major elements distinguish the frozen weights and former operational procedure. The first involves the data used in constructing the weight. For the former operational procedure the weight was based on the current acreages. Thus, in March the weight was

(March tract acres)/(March farm acres).

For the frozen weights procedure the acreages are "frozen" from the previous quarter, that is, the acreage data obtained three months previous is used. Thus, in the March multiple frame survey, the weight is

(December tract acres)/(December farm acres).

The second distinguishing element between the frozen weights and former operational procedures concerns who is interviewed in March and September. Under the frozen weights procedure, the same operator is contacted in March as in December, regardless of whether or not the same land is being operated. Similarly, in September, the operator from June is contacted. In this respect, the procedure resembles that of the list frame. Under the former operational procedure, the current operators of land in a sample segment were interviewed. When operators had changed from the previous quarter, it was necessary to identify and locate the new operator.

This study compares the two procedures, examining the effects on the estimates, and the relative difficulty with which the required data may be obtained and summarized. Effects on the acres reported by different respondents is studied. Finally, suggestions are made for improving the procedures.

ENUMERATION

The test to compare the former procedure and the frozen weights procedure required data collected according to both procedures at the same time. Two questionnaires were devised to obtain the data required - they were labelled NOL(I) and NOL(A). (Copies of the questionnaires are in appendices A and B.)

Nonoverlap operators selected in March were interviewed using the NOL(I) form. Of course, the intent of the form was to obtain hog and pig inventory data, but the questionnaire was also used to screen the NOL for operated acreage changes between December and March. (The March NOL is a subsample of the December NOL, and total acres operated was asked in December.) Under the former procedure, new operators in a segment had to be located and interviewed; changes in acres operated was used as an indication that there may be new operators in the segment. To this end, the March respondent was told the acreage figure supplied by the December reporter, and was then asked the current acreage. If there was a discrepancy, the respondent was asked whether the December figure was wrong because 1) operated acres had changed or 2) it had been recorded incorrectly in December. No attempt was made to learn whose records were in error. Because the December acreage figure was given to the March respondent before current acres was asked, the number could be influenced to agree when they should not, so the former procedure and frozen weights could appear more similar than is actually the case. Tract acres was not asked again in March, even when farm acreage changed.

In the case where operated acres had changed, the December respondent still supplied inventory data on the NOL(I) form, even though the entries were zeroes when the operation was out of business.

The NOL(A) questionnaire was essential to monitoring the former operational procedure. It provided data in two situations: split tracts and updates. In this study, there were 139 updates and 17 split tracts out of 2727 tracts in the fourteen states surveyed.

Split tracts came about as new operators took over part of a tract. Each portion of a split tract was assigned a unique subtract code, and the operator of each subtract was interviewed using the NOL(A) form.

An operator who took over for an out-of-business operator in a tract was interviewed using the NOL(A) form. The operation data for the new operator was substituted for that of the operator now out-of-business in the tract.

For the frozen weights procedure, operational in March 1981, the needed data was collected on the NOL(I) form. The frozen weights procedure requires that the same operator be interviewed in March as in December. This is precisely what occurs with the NOL(I) form: each NOL operator interviewed in March had been located earlier and had been interviewed in December. Farm acreage is not asked again in September and March. Eliminating this sensitive question could help the response rate. Improved response is not certain, however; see Nealon (1980).

The estimate of totals using the frozen weights procedure is simple to compute. The weight used on the March data was the same as in December; it is frozen as (December tract acres)/(December farm acres).

Not quite as straightforward were the computations for the former operational estimate. For operators who took over all or part of the tract, the data on the NOL(A) form was weighted by the ratio of tract to farm acres reported in March.

When there was no change in farm acres, the tract and farm acres reported in December for that operation were used as the current acres to form the weight. Data on the operation was obtained on the NOL(I) form.

If a mistake in records caused a change in farm acres, the weight was tract acres in December divided by corrected farm acres.

When the tract was sold but the operator was still farming, the data was not included under the former operational procedure. The data was zeroed because the tract acres in the numerator of the weight is zero. Only 26 times were tracts zeroed in this survey.

Finally, if the farm acres changed, the weight used was current tract acres divided by new farm acres. Hog inventory data was obtained from the NOL(A) form.

ESTIMATION

Obtaining estimates of totals from the survey data under frozen weight and former operational procedures involves essentially the same formulas. The major difference is the weight applied to the data items. For both procedures an expanded item value is obtained for each sample tract. The total is the sum of the expanded item values of the tracts. The expanded item is defined as follows:

expanded item = expansion factor x NOL adjustment factor x item x weight.

The expansion factor reflects the fact that the sampled unit represents a number of more or less similar units of the population. It multiplies the observed data to a value which is an estimate of the item total of those like units. The NOL adjustment factor is zero for operators who have a partner on the list, a fraction between zero and one whenever duplicate reporting is possible, and is one otherwise. The item is the data item reported on the questionnaire. The weight takes the form: (tract acres)/(farm acres). It prorates an item which is reported for an entire farm to the amount attributable to a given tract.

The procedures for computing the estimate of standard error of the total are discussed in Cochran and Huddleston (1970).

Analyzing the data from this study began with writing computer programs to obtain the necessary estimated totals and standard errors (s.e.). To check these programs the estimates and s.e.'s were compared with those obtained from the operational Enumerative Summary System (ESS). It was discovered that the research values of the former operational estimate were consistently smaller than those from the ESS. Appendix C shows the size of the differences. Generally the differences were small, although not small enough to be attributed to a numerical problem such as roundoff error. Considerable time was spent attempting to resolve the differences. One event has precluded a definite solution: an essential data tape was lost by Martin Marietta Data Systems during conversion to the RACF security system. Reconstructing the tape would have been prohibitively expensive.

COMPARISON OF NOL ESTIMATES FROM THE TWO PROCEDURES

Expanded NOL domain totals for the frozen weights and former operational procedures for March 1981 are displayed in Table 1. The total hogs and pigs in the NOL domain increased 2.7 percent under the frozen weights. The state totals increased as much as 15 percent (Georgia), and decreased as much as 15 percent (Kansas). Illinois showed a 10 percent increase; Iowa, Minnesota, North Carolina, and Wisconsin showed 5 percent increases; Indiana showed a 5 percent decrease. The other states recorded changes of 2 percent or less. Comparable patterns were apparent in estimates of the other items listed in Appendix D. Changes in the state totals for the domains combined amounted to less than 1.5 percent overall, the exception being 5 percent in Georgia.

To check for statistical differences, the estimates from the procedures were examined using paired comparisons. The expanded item totals in a segment were obtained under frozen weights and under the former operational procedure. The difference between these paired values was the basis for the

Table 1: Estimates of Total Hogs and Pigs Compared Under Frozen Weights and Old Operational Procedures (NOL only).

State	Old Operational Total (000)	Old Operational C.V.	Frozen Weights Total (000)	Frozen Weights C.V.	Ratio: Frozen Weights to Old Operational	Paired t value	Tract Counts OL	Tract Counts NOL	Percent Change In NOL+OL total under frozen weights
Georgia	539	29.9	620	27.9	1.15	1.90	292	181	5.1
Illinois	648	25.0	712	23.9	1.10	1.21	555	145	1.3
Indiana	1344	64.3	1286	66.7	.96	-.50	573	139	-1.1
Iowa	2443	15.6	2581	15.9	1.06	1.21	605	179	1.0
Kansas			140	37.1	.66	-1.26	656	105	
Kansas 1/	165	38.2	140	37.1	.85	-1.19	656	105	-1.4
Kentucky	160	30.0	160	30.0	1.00	-.20	501	180	0
Minnesota	1088	19.9	1139	19.1	1.05	1.09	464	190	1.3
Missouri	925	16.0	940	15.9	1.02	1.03	520	223	.6
Nebraska	413	26.9	417	26.9	1.01	.95	580	116	.1
North Carolina	196	19.4	205	18.5	1.05	.95	157	216	.5
Ohio	550	20.1	550	20.2	1.00	-.19	396	244	0
South Dakota	185	35.1	185	35.1	1.00	-1.00	563	81	0
Texas	215	20.5	218	21.1	1.00	.81	189	588	0
Wisconsin	224	27.7	235	27.2	1.05	.90	447	140	.8
Total	9144	11.2	9387	11.0	1.03	1.27	6498	2727	
Total 1/	9096	11.1	9387	11.0	1.03	1.28	6498	2727	.6

1/ Data adjusted for an incorrect weight in stratum 12 of Kansas

Note: Totals do not add due to rounding.

statistical tests. The stratified subsampling design of the sample was considered in the tests by using an approximation to the standard error estimator described in Cochran and Huddleston (1970). The approximation led to t values that were slightly too large, hence the tests would reject too often the hypothesis of equality. The individual t-values for the paired comparisons are shown in Table 1. The approximate t values, even though somewhat inflated, are below the critical value at the 5 percent level. They are well below the critical value which ensures an overall testing level of 5 percent when fifteen tests per inventory item are being made.

The other hog and pig inventory items listed in Appendix D were also subjected to the same testing procedure. As with the total hogs and pigs item, no national and state estimates for these items showed significant differences in NOL estimates under the frozen weight and former operational procedures.

Even without statistical significance, practical considerations require investigating the 10 percent and greater differences in the estimates under the two procedures. Substantial differences in expanded totals appeared in land-use strata 13 and 20 in Georgia; strata 11 and 12 in Kansas; and 12, 20 and 31 in Illinois. Examining the individual records in these strata, it seems that most of the large changes result from March corrections to December farm acres. These changes would affect the weight applied to the former operational procedure. Table 2 displays the information on the large changes. Evidently, nonsampling errors associated with the reporting of operated farm acres is a major cause of difficulty with the weighted estimates.

In stratum 12 of Kansas, the edit procedure used to compute the operational estimate allowed a weight of 8 to slip through. The farm acreage had been corrected from 40 to five acres, a figure below that of December's 40 tract acres, and a weight of 40/5 = 8 resulted. This contributed to the large difference in estimates on the Kansas data that appeared in the operational ESS listings. The item was corrected for the statistical tests.

Now, the editing requirements for this survey were complicated enough to exceed the capacity of the Agency's automated edit system, so the check for [tract acres less than or equal to farm acres] was omitted. Historically, what were felt to be the more obvious checks for data consistency have been left to the survey statistician. Unfortunately, it is difficult to ensure that these checks are being made when they have not been included in the machine edit. Any inconsistent data that

Table 2: Large Acreage Changes in Selected States and Strata.

State	Stratum	December: tract/farm acres	March: tract/farm acres	Mistake in records	Total hogs and pigs: changes under frozen weights
Georgia	13	25/61	0/200	no	960.0
	13	99/470	0/410	no	0.0
	13	22/42	22/24	yes	-5114.2
	13	38.5/900	38.5/700	yes	-1347.4
	20	62/328	0/222	no	8599.7
	20	56/156	0/196	no	30122.6
	20	60/303	0/250	no	7924.8
	20	68.5/130	68.5/200	yes	26414.0
Illinois	12	75/84	75/200	yes	5194.1
	20	120/227.5	120/237	yes	1655.1
	20	1/1	1/56	yes	52440.1
Kansas	11	76/176	76/76	yes	-32034.0
	11	22/23	22/500	yes	6725.0
	12	40/40	40/5 (sic)	yes	-48173.0

slips through the edit is summarized with the rest, affecting the estimates in unpredictable ways.

NOL tract acreage changes which exceeded 10 percent between December and March are counted in Table 3. Counts of all such NOL tracts are shown first. Table 4 shows the counts of large changes when the respondent admitted that the operation had changed. Table 5 shows counts when changes were attributed to a mistake in records. As indicated in Table 2, many of the estimate changes are due to reporting mistakes. Many acreage changes attributed to mistakes appear to be explained as misread or transposed digits, problems which could be avoided.

RESPONDENT EFFECTS

Do different respondents report different acreages for the same operation? In the test of the frozen weights procedure, data was obtained on the same operation in December and March, and the respondent was identified so that effects due to respondent could be checked.

The numbers of tracts reported on by each group of respondents in December and March is examined first. Table 6 shows the counts of tracts where respondents indicated no error in total farm acres, and Table 7 displays the counts when a recording error was indicated. Between these tables, percentages of

Table 3: Acreage Changes Exceeding 10 percent Between December and March Surveys.

State	Number of NOL Tracts	Number of NOL Tracts Where Tract:		Number of NOL Tracts Where Farm:	
		Acreage Increased by 10% or More	Acreage Decreased by 10% or More	Acreage Increased by 10% or More	Acreage Decreased by 10% or More
Georgia	181	0	16	9	21
Illinois	145	0	0	15	4
Indiana	139	0	1	16	12
Iowa	179	1	2	10	6
Kansas	105	0	1	6	9
Kentucky	180	0	3	6	6
Minnesota	190	0	1	6	3
Missouri	223	0	3	9	6
Nebraska	116	0	0	5	3
North Carolina	216	0	3	11	13
Ohio	244	1	3	18	13
South Dakota	81	0	0	1	1
Texas	588	0	0	41	21
Wisconsin	140	0	2	8	6
Total	2727	2	35	161	124

Table 4: Acreage Changes Exceeding 10 percent Between December and March Surveys for Changed Operations.

State	Number of NOL Tracts	Number of NOL Tracts Where Tract:		Number of NOL Tracts Where Farm:	
		Acreage Increased by 10% or More	Acreage Decreased by 10% or More	Acreage Increased by 10% or More	Acreage Decreased by 10% or More
Georgia	181	0	0	0	0
Illinois	145	0	0	1	0
Indiana	139	0	0	2	0
Iowa	179	0	0	0	0
Kansas	105	0	0	0	0
Kentucky	180	0	1	2	1
Minnesota	190	0	0	0	0
Missouri	223	0	1	0	1
Nebraska	116	0	0	1	0
North Carolina	216	0	0	0	0
Ohio	244	1	0	2	0
South Dakota	81	0	0	0	0
Texas	588	0	0	0	0
Wisconsin	140	0	1	1	0
Total	2727	1	3	9	2

Table 5: Farm Acreage Changes Exceeding 10 percent Between December and March Surveys due to Mistakes in Records.

State	Number of NOL Tracts where: Farm Acreages Increased 10% or More	Farm Acreages Decreased 10% or More
Georgia	5	10
Illinois	14	3
Indiana	12	6
Iowa	3	2
Kansas	3	6
Kentucky	3	0
Minnesota	2	0
Missouri	5	1
Nebraska	2	1
North Carolina	9	11
Ohio	17	9
South Dakota	1	0
Texas	27	8
Wisconsin	4	0
Total	107	57

Table 6: Counts of NOL Tracts With No Total Acreage Recording Error Indicated.

	Count, Percent of Total	March Respondent operator	spouse	other	refusal	accessible	Total
December Respondent	operator	1063 46%	323 14%	121 5%	26 1%	27 1%	1560 68%
	spouse	148 6%	137 6%	13 1%	1 <1%	3 <1%	302 13%
	other	93 4%	44 2%	45 2%	7 <1%	11 <1%	200 9%
	refusal	54 2%	27 1%	9 <1%	57 3%	7 <1%	154 7%
	inaccessible	35 2%	13 1%	7 <1%	11 <1%	10 <1%	76 3%
	Total	1393 61%	544 24%	195 9%	102 4%	58 3%	2292 100%

Table 7: Counts of NOL Tracts with Error in Recorded Total Farm Acreage.

	Count Percent of Total	March Respondent operator	spouse	other	refusal	inaccessible	Total
December Respondent	operator	137 48%	31 11%	9 3%	1 1%	0 0%	178 63%
	spouse	40 14%	10 4%	2 <1%	0 0%	0 0%	52 18%
	other	22 8%	5 2%	4 1%	0 0%	0 0%	31 11%
	refusal	8 3%	4 1%	0 0%	2 <1%	0 0%	14 5%
	inaccessible	6 2%	1 <1%	0 0%	0 0%	1 <1%	8 3%
	Total	213 75%	51 18%	5 5%	3 1%	1 <1%	273 100%

counts generally agree. It appears, however, that operators tend to correct farm acres reported by someone else the previous quarter: 14 percent of the tracts with no farm acreage errors are reported by respondents other than the operator in December and by the operator in March (Table 6), while the percentage is 26 percent when errors are indicated. (Table 7).

Table 8 is derived from tables 6 and 7, ignoring refusals and inaccessibles. Typically acreage data for refusals and inaccessibles is imputed by the enumerator or survey statistician and may be different from what someone involved with the farm operation would have reported. The first column of Table 8 contains the diagonal sums of Tables 6 and 7, respectively; the second column contains the corresponding off-diagonal sums. Errors in farm acres were reported on about the same proportion of tracts whether the respondent was the same or different in December and March. No farm acreage errors were reported on 88 percent of the tracts. This figure is probably inflated since the respondent was told the previous quarter farm acres, and would tend to agree with that figure.

Next, respondent effects on the magnitude of acreage changes is explored. For operations in which an error in records is reported, the average absolute difference between December and March acreages is arranged by respondent-pairs. Table 9 displays the results. The spread of the absolute values of changes is large, even with the same respondent in December

and March. Evidently farm acreage reports are subject to wide variation. This is an important difficulty with the use of weighted estimates, because the quality of the estimate depends so much on the correctness of the weights.

Table 8: Counts of NOL Tracts With and Without Errors Indicated in Total Farm Acres.

Count, Percent of Row Total	no error in acres	error in acres	total
Same respondent in December and March	1245 89%	151 11%	1396 100%
Different respondent in December and March	742 87%	109 13%	851 100%
Total	1987 88%	260 12%	2247 100%

Table 9: Average Absolute Farm Acreage Changes when Error in Records Indicated.

Absolute Average Farm Acreage Change (Min,Med,Max) 1/		March Respondent				
		Operator	Spouse	Other	Refusal	Inaccessible
December Respondent	operator	284 (0,11,20200)	73 (0,1.5,1022)	180 (.3,17,918)	143 (.143)	-- --
	spouse	42 (0,10,574)	38 (.1,2,204)	1 (.5,1.5,1.5)	-- --	-- --
	other	125 (.2,32,1000)	118 (.5,15,285)	40 (.5,2,112)	-- --	-- --
	refusal	1074 (3,18,3345)	262 (30,114,713)	-- --	186 (8,364,364)	-- --
	inaccessible	20 (.3,2,72)	430 (430)	-- --	-- --	.5 (.5)

1/ (Min,Med,Max) corresponds to (minimum, median, maximum) value in the cell.

Note: Cell counts are those displayed in Table 7.

RECOMMENDATIONS

The recommendation of this report is that the frozen weights procedure be continued in the operational survey. The simplified procedures for data collection and processing when using frozen weights and the potential improvements to response rates on the March and September surveys appear to offset any changes in the survey estimates. However, under frozen weights the farm and tract acres are collected only in June and December, and not checked in September and March. It is therefore critically important that these data be recorded correctly. This will require more care in the interviewing and data transcribing process. More effort expended to locate and interview the actual farm operator will certainly help improve the precision of the estimates.

It also recommended that the Agency reconsider the historical practice of leaving supposedly obvious data edit checks to the survey statistician. Some form of automated editing is recommended, even for the routine checks for data consistency. The effect of bad data inadvertently included in survey summaries cannot always be detected, but is always detrimental.

REFERENCES

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(2) December Enumerative Survey Supervising and Editing Manual, Statistical Reporting Service, U.S.D.A. Washington D.C., 1981.

(3) Nealon, Jack. The Effects of Omitting Acreage Questions and Modifying the Operation Description Section in Hog Surveys. Statistical Reporting Service, U.S.D.A. Washington D.C., 1981.

Appendix A: NOL(I) Questionnaire

Crop Reporting Board
Economics and Statistics Service
U.S. Department of Agriculture
Washington, D.C. 20250

HOG AND PIG SURVEY

MARCH 1, 1981

Form Approved
O.M.B. Number 40-R3774
Approval Expires 3-31-81
C.E. 11-6088
NOL (I)

Stratum	ID	Tract	Subtract
899			

Resp.	Diffm	2 Tel. 3 Int.
910	911	

Please make corrections in name, address, and Zip Code, if necessary.

Mr. _____, I am _____ from _____. We are now conducting the March 1 Hog and Pig Survey and your name was selected in a sample of farmers in this State. Response to this survey is voluntary and not required by law. However, your cooperation is very important to insure timely and accurate estimates. Your report is confidential and used only in combination with reports from other producers to arrive at State estimates.

Is your operation known by any name other than _____? *(Read above name to respondent)*

☐ NO ☐ YES → Enter name _____

LAND OPERATED NOW

The following questions refer to the hogs and pigs on all the land you operate. Therefore, we first must determine the total acres you operate. (Include cropland, pastureland, woodland and wasteland.)

1. In December it was determined that you operated _____ acres.

1a. How many ACRES are now in YOUR ENTIRE FARM or RANCH? ..... 900 .0

(Include all land owned, rented or managed, but exclude land rented to or managed by others.)

If item 1 and 1a are equal, skip to item 2.

1b. Has the number of acres in your operation changed since December 1, 1980, or is there a mistake in our records?
(Check one)

☐ 1. Operated acres changed
☐ 2. Mistake in records

930

2. Are there now any hogs or pigs regardless of ownership, on the land you now operate?

☐ YES
☐ NO

2a. Have there been any HOGS or PIGS on the land you now operate since December 1, 1980?

☐ YES - *Skip to Item 9, page 2.*
☐ NO - *Skip to Item 18, page 3.*

(Please continue on page 2.)

HOG AND PIG INVENTORY

Now I want to ask you about the hogs and pigs on the land you operate, regardless of ownership. Include hogs and pigs purchased and still on hand.
First I would like to ask about **HOGS and PIGS KEPT FOR BREEDING.**

3. How many are:
   a. Sows, gilts and young gilts bred and to be bred? 301
   b. Boars and young males for breeding? 302
   c. Sows and boars no longer used for breeding? 303

Now let's talk about the **HOGS and PIGS for MARKET and HOME USE** on the land you operate. *(Exclude breeding hogs already reported in Item 3.)*

4. How many are:
   a. Under 60 pounds? *(Include pigs not yet weaned.)* 311
   b. 60 – 119 pounds? 312
   c. 120 – 179 pounds? 313
   d. 180 pounds and over? *(Exclude hogs no longer used for breeding.)* 314

5. *Add Items 3a through 4d:* Then the total hogs and pigs now on the land you operate is 300
   Is that correct?

   ☐ YES - *Continue* ☐ NO - *Correct answers in 3, 4, and 5.*

FARROWING INTENTIONS

6. How many of the _____ (*Item 3a*) **SOWS and GILTS are EXPECTED TO FARROW:**
   a. From now through March, April and May 1981? 331
   b. During June, July and August 1981? 332

PREVIOUS THREE MONTHS FARROWINGS

9. How many **SOWS and GILTS FARROWED** during December 1980, January and February 1981 until now? 326

10. How many **PIGS** from these (*Item 9*) litters are:
    a. Now on hand? 327
    b. Already sold? 328

PURCHASES

11. How many **HOGS and PIGS PURCHASED** since September 1, 1980 are now on hand? *(Include feeder pigs purchased)* 317

If Item 11 is zero, skip to Item 13.

12. How many FEEDER PIGS were purchased during February 1981? 340

a. What was the average PRICE PER HEAD? ..... Dollars and Cents 341 .—

b. What was the average WEIGHT PER HEAD? ..... Pounds 342

DEATHS AFTER WEANING

13. How many WEANED PIGS and OLDER HOGS died during December 1980, January and February 1981? 335

OPERATION DESCRIPTION OF LAND

Additional information is needed about your operation to assist in detecting possible duplication in reporting.

18. Which of the following best describes your farming or ranching operation?
(Check only on unless you, the individual or operation listed on the face page, have more than one operating arrangement.)

Enumerator Note:
If more than one box is checked, complete a separate questionnaire for each type.

☐ = 1 Individually operated land.

☐ = 2–7 Partnership: Partners jointly operate land and share in the decision making.

☐ = 8 Hired manager of land owned by someone else.

☐ = 9 Do not now operate land for agricultural purposes.
(Out-of-business, landlord, retired, etc.)

Specify _____

921

18a. Has your operation changed since December 1, 1980?
(Partnership dissolved, additional partner added, etc.) 923

☐ YES *(Please explain)* _____

_____

_____

_____

☐ NO - *Continue*

Enumerator Note: Ask Items 19 and 20 only if partnership is checked. If partnership not checked, go to Item 22, page 4.

19. Does this partnership or joint arrangement have a name other than that listed on the face page?

☐ YES _____
(Enter name, then continue on page 4.)

☐ NO - *Continue on page 4.*

19a. Who are the persons in this partnership or joint land arrangement with you? *(Please make necessary corrections if partnership information has been entered.)* 924

925
a. Name _____ Phone _____
(Last) (First) (M)
b. Address _____
(Rt. or St.) (City) (State) (Zip)
Was this person operating a separate farm in this State on December 1, 1980? ☐ YES ☐ NO

926
a. Name _____ Phone _____
(Last) (First) (M)
b. Address _____
(Rt. or St.) (City) (State) (Zip)
Was this person operating a separate farm in this State on December 1, 1980? ☐ YES ☐ NO

927
a. Name _____ Phone _____
(Last) (First) (M)
b. Address _____
(Rt. or St.) (City) (State) (Zip)
Was this person operating a separate farm in this State on December 1, 1980? ☐ YES ☐ NO

20. How many hogs and pigs are now on this partnership or joint land? ..... Number
a. How many of these hogs and pigs were included in Item 5, page 2? ..... Number

22. SSO OPTION: The results of this survey will be released March 20, 1981. Would you like to receive a copy?

☐ YES = *1*
☐ NO

099

ENUMERATOR COMMENTS

That completes the survey. Another hog survey will be conducted in about three months and we may need to contact you again. Thank you for your help.

Check Code

Operator..... 1 ☐
Spouse..... 2 ☐
Other *(Specify)*..... 3 ☐
Observed Data Only - Refusal..... 4 ☐
Observed Data Only - No Response... 5 ☐

Enter Code 931

Reported by _____

Telephone Number _____ _____ Date _____
(A.C) *(Number)*

☆ U.S. Government Printing Office: 1981—340-060/110

Appendix B: NOL(A) Questionnaire

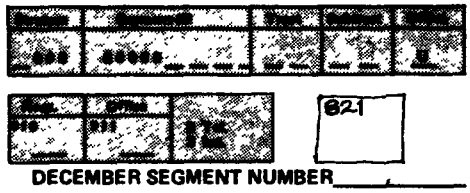
Crop Reporting Board
Economics and Statistics Service
U.S. Department of Agriculture
Washington, D.C. 20250

HOG AND PIG INQUIRY

MARCH 1, 1981

Form Approved
O.M.B. Number 40-R3774
Approval Expires 3-31-81
C.E. 11-00870
NONOVERLAP (A)

OFFICE USE



DECEMBER SEGMENT NUMBER_____

DECEMBER TRACT LETTER_____

Mr. _____, I am _____ from_____. We publish reports on Hogs and Pigs four times a year. We are now conducting the March 1 Survey and your name was selected in a sample of farmers in this State. Response to this survey is voluntary and not required by law. However, your cooperation is very important to insure timely and accurate estimates. Your report is confidential and used only in combination with reports from other producers to arrive at State estimates.

Is your operation known by any name other than_____? *(Read above name to respondent.)*

☐ NO ☐ YES ——→ Enter name _____

SECTION A. TRACT ACREAGE VERIFICATION

1. In December it was determined there were _____ acres inside the blue boundaries shown on this photo.

   Are these the correct acres you are now operating inside these boundaries?

   ☐ NO ☐ YES - *Enter the acres in the 840 code box. Conclude interview for December tract operator.*

2. How many acres are you now operating inside these boundaries? . . . . . _____ Acres 840 .

3. Is any land within these blue tract boundaries currently operated by someone else?

   ☐ YES - *Complete a line in Item 4 and a questionnaire for all current operators of the December tract.*

   ☐ NO - *Enter the correct acres in the 840 code box, and explain any difference of 10% or more. Conclude interview for December tract operator.*

_____

_____

_____

4. Operators inside the blue lines now are:

TRACT CODE	OPERATORS' NAME	ADDRESS	TRACT ACRES OPERATED NOW
	Operator Named Above		

Total Tract Acres *(Should equal Item 1)*

**Draw off each new tract operation on the aerial photo with a dashed blue line and assign a new tract code.*
**Complete a nonoverlap questionnaire for each operator with one or more acres now in the December tract.*
**For new operators, ask only Item 2 in Section A, then go to Item 5.*

5. How many ACRES are now in YOUR ENTIRE FARM or RANCH? *(Include all land owned, rented or managed, but exclude land rented to or managed by others.)* . . . . . Acres 991 .

ENUMERATOR NOTE:

**If tract is a partnership* include only *partnership land in Item 5.*
**If tract is individually operated* include only *individually operated land in Item 5.*

SECTION C. HOGS AND PIGS ON TOTAL ACRES OPERATED

1. Are there now any hogs or pigs, regardless of ownership, on the land you now operate?

☐ YES ☐ NO

1a. Have there been any HOGS or PIGS on the land you now operate since December 1, 1980?

☐ YES - *Skip to Item 9.*

☐ NO - *Skip to Item 22.*

Now I would like to ask you about the hogs and pigs on the land you operate, regardless of ownership. *(Include hogs and pigs purchased and still on hand.)*

First I would like to ask about HOGS and PIGS FOR BREEDING.

3. How many are:
   a. Sows, gilts, and young gilts bred and to be bred? 401
   b. Boars and young males for breeding? 402
   c. Sows and boars no longer used for breeding? 403

Now let's talk about the HOGS and PIGS for MARKET and HOME USE on the land you operate. *(Exclude breeding hogs already reported in Item 3.)*

4. How many are:
   a. Under 60 lbs.? *(Include pigs not yet weaned.)* 411
   b. 60 – 119 lbs.? 412
   c. 120 – 179 lbs.? 413
   d. 180 pounds and over? 414
   (Exclude hogs no longer used for breeding.)

5. *Add Items 3a through 4d:* Then the total hogs and pigs now on the land you operate is 400
   Is that correct?

☐ YES - *Continue.* ☐ NO - *Correct answers in 3, 4 and 5.*

EXPECTED FARROWINGS

6. How many of the _____ *(Item 3a)* SOWS and GILTS are EXPECTED TO FARROW:
   a. From now through March, April and May 1981? 431
   b. During June, July and August 1981? 432

PREVIOUS THREE MONTHS FARROWINGS

9. How many SOWS and GILTS FARROWED during December 1980, January and February 1981 until now? 426

10. How many pigs from these *(Item 9)* litters are .....
    a. Now on hand? 427
    b. Already sold? 428

PURCHASES

11. How many HOGS and PIGS PURCHASED since September 1, 1980 are now on hand? 417

If Item 11 is zero, skip to Item 13.

12. How many FEEDER PIGS were purchased during February 1981? 440
    a. What was the average PRICE PER HEAD? ..... Dollars and Cents 441 . ___
    b. What was the average WEIGHT PER HEAD? ..... Pounds 442

DEATHS AFTER WEANING

13. How many weaned pigs and older hogs died during December 1980, January and February 1981? 439

22. The results of this survey will be released March 20, 1981. Would you like to receive a copy? ..... ☐ YES = 1 ☐ NO 098

That completes the survey. Another Hog and Pig survey will be conducted in about three months and we may need to contact you again. Thank you for your help.

Reported by _____ Date _____

Telephone Number _____ _____
(A.C.) *(Number)*

☆ U.S. Government Printing Office: 1981—340-963/168

APPENDIX C Ratios of Expanded Total Hogs and Pigs from Enumerative Summary System (ESS) and Research Summary.

State	Ratio of ESS to Research Value: Former Operational Procedure	Frozen Weights Procedure
Georgia	1.00	1.0
Illinois	1.05	1.0
Indiana	1.01	1.0
Iowa	1.05	1.0
Kansas	1.02 1/	1.0
Kentucky	1.00	1.0
Minnesota	1.00	1.0
Missouri	1.02	1.0
Nebraska	1.00	1.0
North Carolina	1.04	1.0
Ohio	1.01	1.0
South Dakota	1.02	1.0
Texas	1.01	1.0
Wisconsin	1.00	1.0
Total	1.02	1.0

1/ Corrected for incorrect weight in stratum 12.

APPENDIX D Inventory Item Codes for March Hog and Pig Survey.

Item	Description	Item
300	Total hogs and pigs	400
301	Sows and gilts for breeding	401
302	Boars and young males for breeding	402
303	Sows and boars no longer used for breeding	403
311	Mkt. hogs < 60 lbs.	411
312	Mkt. hogs 60-119 lbs.	412
313	Mkt. hogs 120-179 lbs.	413
314	Mkt. hogs > 180 lbs.	414
317	Hogs purchased last 6 mos. still on hand	417
322*	Sept. thru Nov. sows farrowed	*
323*	Sept. thru Nov. pigs now on hand	*
324*	Sept. thru Nov. pigs already sold	*
326	Last quarter sows farrowed	426
327	Last quarter pigs now on hand	427
328	Last quarter pigs already sold	428
331	Sows and gilts expected to farrow next quarter	431
332	Sows and gilts expected to farrow second quarter	432
335	Hog and Pig deaths last quarter	435
340*	Feeder pigs purchased during Feb.	440*
341*	Feeder pigs purchased during Feb. - av. price/head	441*
342*	Feeder pigs purchased during Feb. - av. price/head	442*

*Item not included in analysis

☆U.S. GOVERNMENT PRINTING OFFICE: 1982-360-931:SRS-640