AN EVALUATION OF AERIAL PHOTOGRAPHY AS A QUALITY CONTROL MEASURE OF THE JUNE ENUMERATIVE SURVEY

BY

RONALD J. STEELE

AND

SHERMAN B. WININGS

RESEARCH AND DEVELOPMENT BRANCH
STANDARDS AND RESEARCH DIVISION
STATISTICAL REPORTING SERVICE

MAY 1972

CONTENTS

TABLES

SUMMARY

Color aerial photography can function successfully as a quality control technique for the June Enumerative Survey (JES).

The following table shows the percent of segments correctly identified by the Aerial Photo Survey (APS) for presence or absence of certain characteristics. Also shown are the estimated rank-correlation coefficients between JES and APS data for each characteristic.

Characteristic to be identified	Segments correctly identified by APS	r_s
	(Percent)	
Occupied dwellings	96	0.978**
Grain storage capabilities	96	0.662**
Livestock:		
Cattle	96*	0.835**
Hogs	88*	0.786**
Sheep	88*	0.822**
Chickens	68*	0.580**
Cattle crossing tract boundaries	96	0.823**
Land usage:		
Buildings	100	0.996**
Small grain and hay	100	0.875**
Pasture w/evid. of livestock	100	0.947**
Row crops	96	0.950**
Woods	100	0.913**
Pasture w/o evid. of livestock	96	0.639**

* Evidence of livestock was considered synonymous with livestock present.
** Denotes with a probability greater than 0.99 that the population correlation coefficient is greater than zero.

A multivariate test for differences in reported tract and crop acreage between JES and APS indicated no significant difference between means of the two surveys. Listed below are the tract and crop acreage means and the difference (d) between the two surveys.

	JES	APS	d
Tract total	238.55	239.44	0.89
Row crops	61.31	63.14	1.83
Corn	22.97	23.85	0.88
Soybeans	37.68	38.07	0.39
Small grain, hay	39.11	39.44	0.33
Wheat	8.71	9.03	0.32
Oats	3.42	3.52	0.10

(All figures are in acres)

Using the power function of the test on mean vectors, it was determined a sample size of 53 segments would be required to detect differences as small as the above listed sample differences with a probability of significant results greater than 0.90.

The total cost of the APS was approximately $2500, or $100 per segment. This was almost twice the cost of the re-enumeration survey used in previous years as the quality control technique for the JES. The use of black and white film would reduce the cost of the APS to about $80 per segment, still substantially more than the cost for re-enumeration. It is believed that this cost difference would not decrease substantially even if this survey were expanded to an operational basis under the present survey cost structure.

Due to the different nature of aerial photography as a quality control check, it may provide a practical means of obtaining data for respondents not at home or refusals in full scale surveys, or as an independent source for certain types of information.

AN EVALUATION OF AERIAL PHOTOGRAPHY AS A QUALITY CONTROL MEASURE OF THE JUNE ENUMERATIVE SURVEY

INTRODUCTION

In the past, the quality control technique utilized for the annual June Enumerative Survey (JES) has been a re-enumeration of a subsample of tracts enumerated in the JES. This technique has not been fully satisfactory, since it is subject to some of the same communication, response, data recording and processing errors as the original enumerative survey. Very little consideration has been given to the results of the re-enumeration survey (RES) when preparing the estimates for the JES because of the limitations of the RES. The main benefits of the RES were its psychological effect on enumerators and alerting supervisory enumerators to errors in the current survey. Knowing some of their interviews will be checked, the enumerators are believed to take greater care in obtaining accurate data on the initial interview.

Previous aerial photo surveys have indicated that aerial photography might be used as a quality control technique.1/ It would provide the same psychological effect as the RES, as well as providing a permanent document of the conditions at the time of photography for future reference. An aerial survey would also have the following advantages: 1) photos could be obtained at or near the time of the interview, 2) respondent burden would be relieved, and 3) it is a more objective (though not necessarily more accurate) quality control since it is not subject to the same communication and response errors as the JES and RES.

In view of these advantages and the results of previous research, it was decided a small scale pilot survey would be made. The broad objective of the survey was to evaluate aerial photography and its interpretation as a quality control check for the 1970 June Enumerative Survey for Ohio. Ohio was selected for the study because of the interest of Dan Tucker, Ohio's Statistician in Charge.

The following is a list of comparisons or measurements made between the JES and the aerial photo survey (APS): 1) number of occupied dwellings, 2) identification of grain storage capabilities, 3) identification of livestock species actually present and evidence of the presence of livestock, 4) determination of areas where livestock have access to pastures or lots adjacent to the tract, 5) classification of land use into six categories; woods, sites with buildings, row crops, pasture with evidence of livestock, small grain and hay, and pasture without evidence of livestock, and 6) reported crop acreages and planimetered acreages from aerial photographs.

1/ See "An Evaluation of Remote Sensing Data for Estimating Livestock Inventories," by W. W. Wilson, D. H. Von Steen, and P. V. Hurt, Standards and Research Division, Statistical Reporting Service, January 1972.

METHODS AND PROCEDURES

Sample Selection

A desirable sample would have been one containing at least two JES segments in each enumerator's district or assignment area. Since Ohio had approximately 22 enumerators, this would have meant a sample size of 44 segments. This was about twice as large as available funds would allow. Monetary restrictions limited the study to 25 segments. Twenty-three segments were randomly selected from the previous years enumerator assignments. In addition, two NOC (non-open country) segments were selected at random from all NOC's. See figure 1, page 3 for the geographic distribution of the sample. The idea was to have one segment per enumerator plus the NOC segments. However, enumerator assignments changed in 1970, resulting in a final sample with more than one segment for some enumerators and no segments for other enumerators. The previous year's assignments were used for allocation because materials (photos and aeronautical charts) had to be prepared before the final enumerator assignments were made.

Data Collection

The June Enumerative Survey was conducted during the period May 25-June 5. The aerial photos were to be obtained between May 25 and June 13. All segments were photographed on May 26-28. However, due to incomplete photo coverage of some segments, a second flight was necessary. This was made on June 7.

The standard Ohio JES questionnaire was used--no special questionnaires were used for the segments in the APS.

The aerial photos were taken from a Cessna 180 at an altitude of approximately 2500 feet with 35mm cameras mounted on the struts of the aircraft. Color Extachrome film was used and color enlargements were made to provide a scale of about 1:4000.

The photography was processed and sent to the Ohio SSO for interpretation. Photo interpretation was performed according to the instructions for handling aerial photographs. See Appendix I, Exhibit C, page 30. Livestock were identified according to the procedures used in the 1969 Idaho Livestock Survey.2/ The land use identification key is shown on page 6. The key is an abbreviated decision chart designed to aid in determining land use categories by color discrimination in conjunction with characteristic land use patterns. In reading the key, begin at the top, and after each decision box follow the arrow to the appropriate alternative until this process terminates in the choice of a particular land use category. Photographs illustrating each land use category are included on pages 7 and 8.

2/ W. W. Wilson, D. H. Von Steen, and P. V. Hurt. Op Cit.

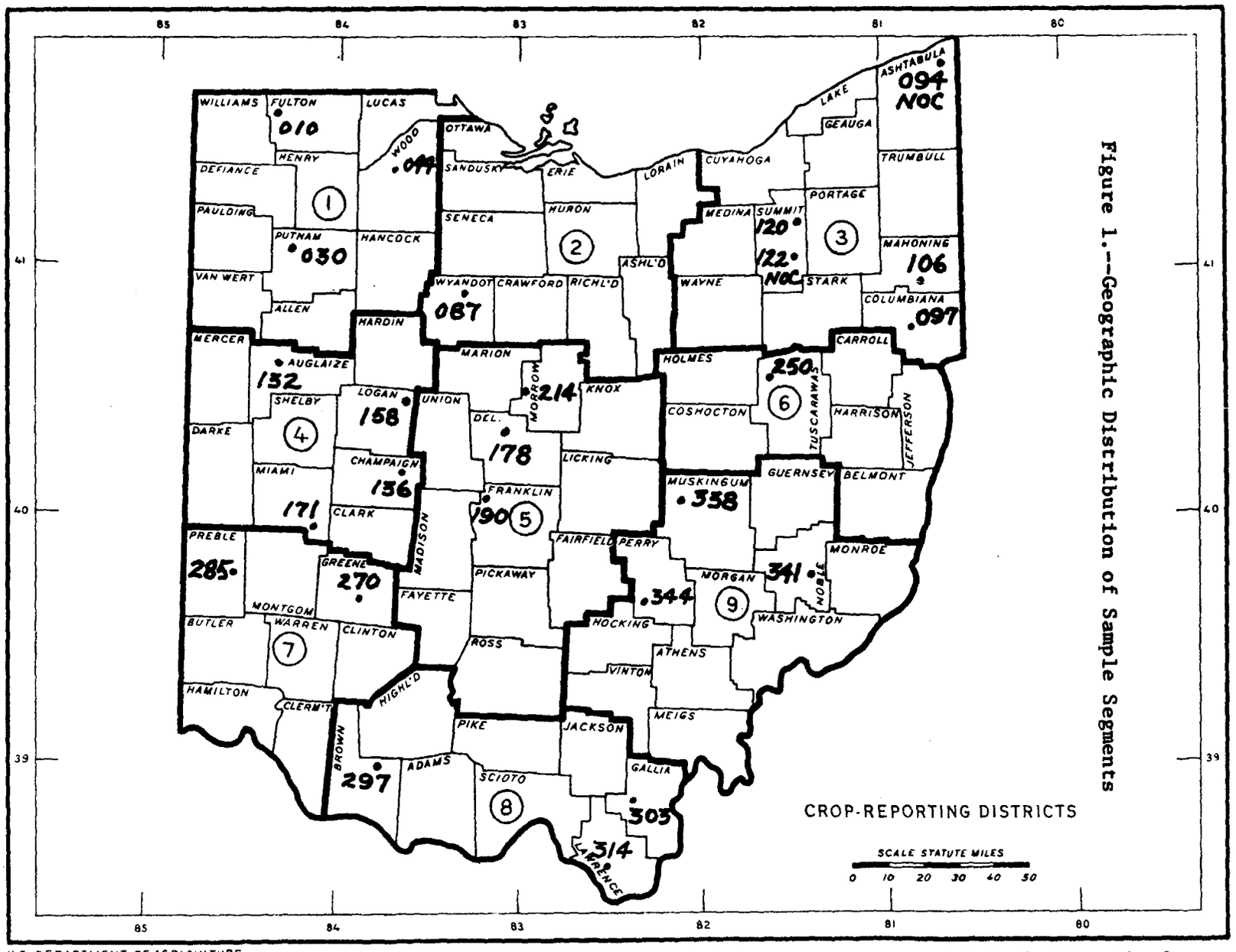


Figure 1.--Geographic Distribution of Sample Segments

U.S. DEPARTMENT OF AGRICULTURE

Statistical Reporting Service

While the photographs were being interpreted, copies were made of the edited JES questionnaires. Immediately following interpretation of the aerial photographs the results of the two surveys were compared. Where gross differences were detected, a supervisory enumerator was sent to the segment to verify the correct report for the purpose of understanding why the differences might have occurred. However, the original data was not changed for the analysis.

The following criteria were used to determine which segments were to be verified for gross differences detected: 1) if the photography showed fields missed during the enumeration, 2) if the identification of occupied dwellings differed from the JES reported, 3) if the identification of livestock species differed from the JES reported, 4) if the identification of land use differed from the JES reported. When a segment was to be revisited for verification purposes, all tracts and fields were to be verified if possible. These visits were generally limited to one hour.

Appendix I, page 24, contains instructions for coding and editing June Enumerative questionnaires, handling aerial photographs, and the recording form used for the summarization of the survey.

Key Operation

An attempt will now be made to talk through the land use identification key by referring to the photographs on pages 7 and 8.

Buildings

Since buildings do not resemble any other land use, they are not included in the key. An example of buildings is shown on the first photograph.

Row Crops

Beginning at the top of the key, we note the areas labeled row crops are not green. In early June, when the photographs were taken, the fields had been plowed and planted but there was not sufficient ground cover to make the row crop fields appear green on the aerial photos. Hence, row crops appeared to be bare soil and the coloration of the fields was gray or brown, this decision leads us to the decision box for fine lines or checks. Having decided there are fine lines within the fields, this leads us to the determination that the fields are in fact row crops. Fallow soil was also coded row crops.

Woods

Referring to the area labeled woods on the first photograph, the following decisions can be made. The area is green, there is not smooth even cover and the area appears very rough. Hence, we determine the area is woods.

Small Grain or Hay

Looking at the examples on the second photograph, we see the area is green and has smooth, even cover. This leads us to the decision that the area is small

grain or hay. The shade of green may vary from light to fairly dark green. Fields set aside for government programs were also included in the small grain and hay category even though the land use characteristics are somewhat dissimilar.

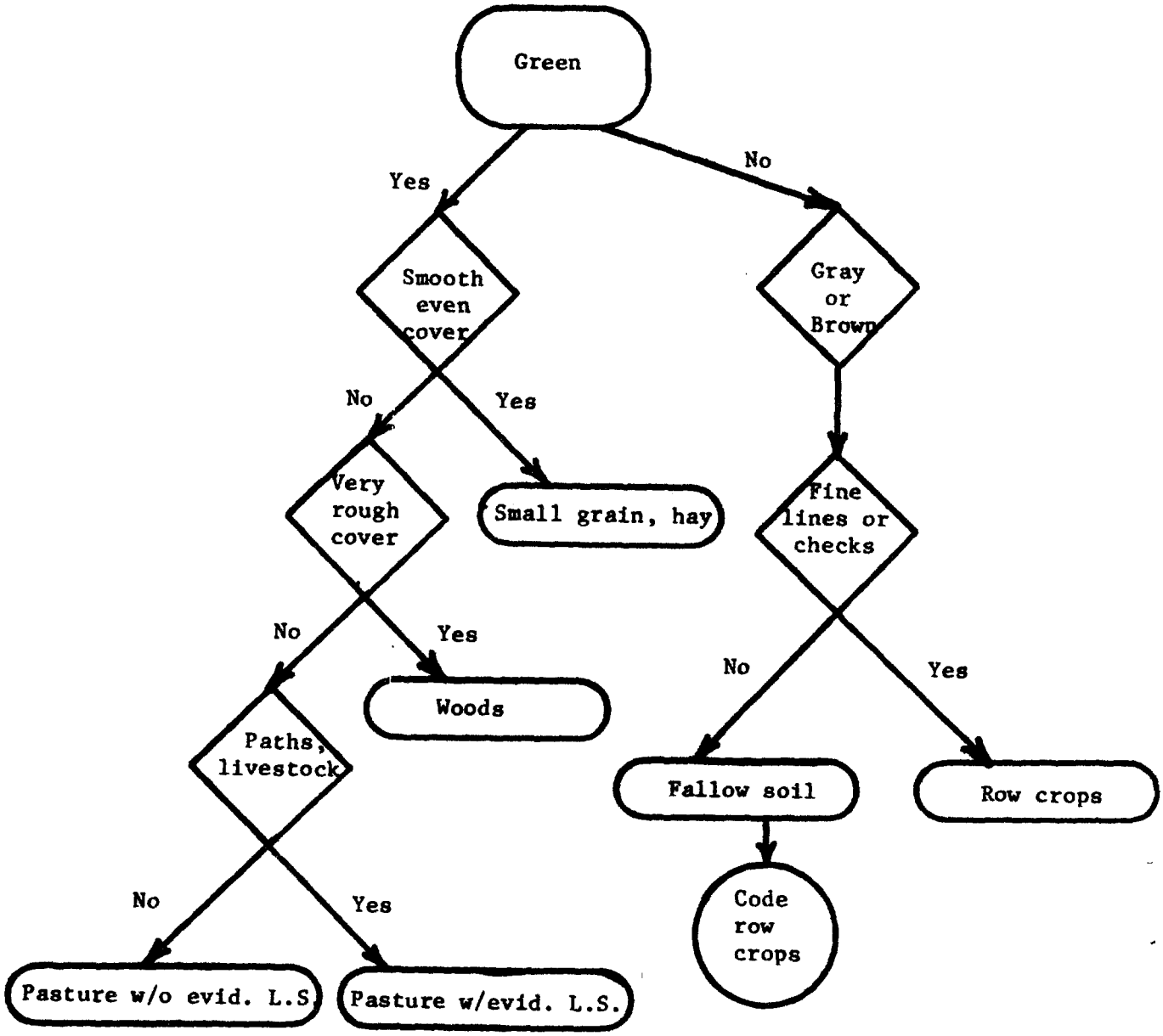
Pasture With Evidence of Livestock

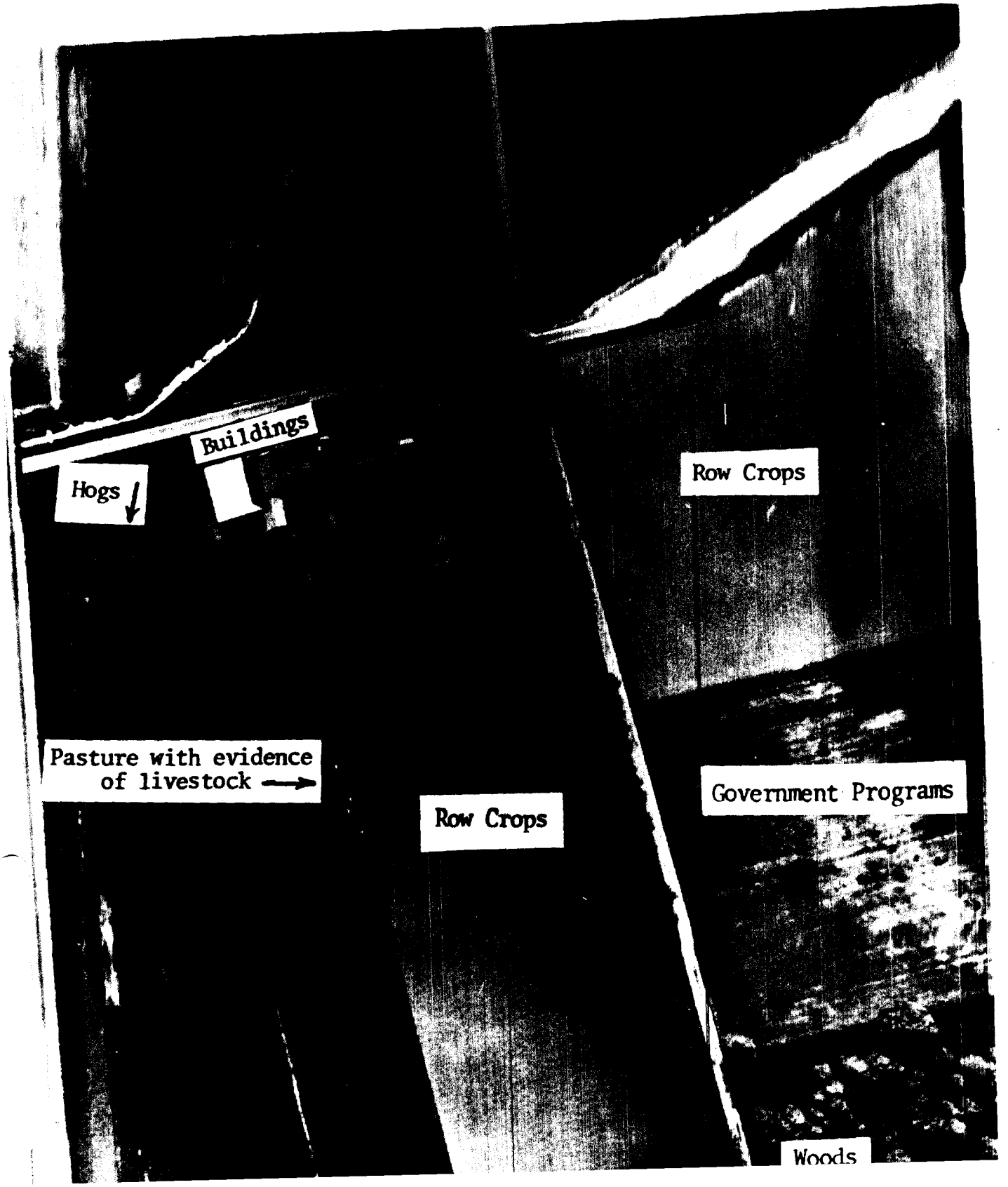
In the example shown on the first photograph, both hogs and cattle can be discerned within the pasture. Also, note the paths running from the barn to the general area of the cattle. In most cases, evidence of livestock within a pasture will be determined by paths such as these. Trees may be found within pastures. Observing the pasture, note that it appears green, the ground cover is neither extremely smooth nor extremely rough, and there are paths and livestock within the field.

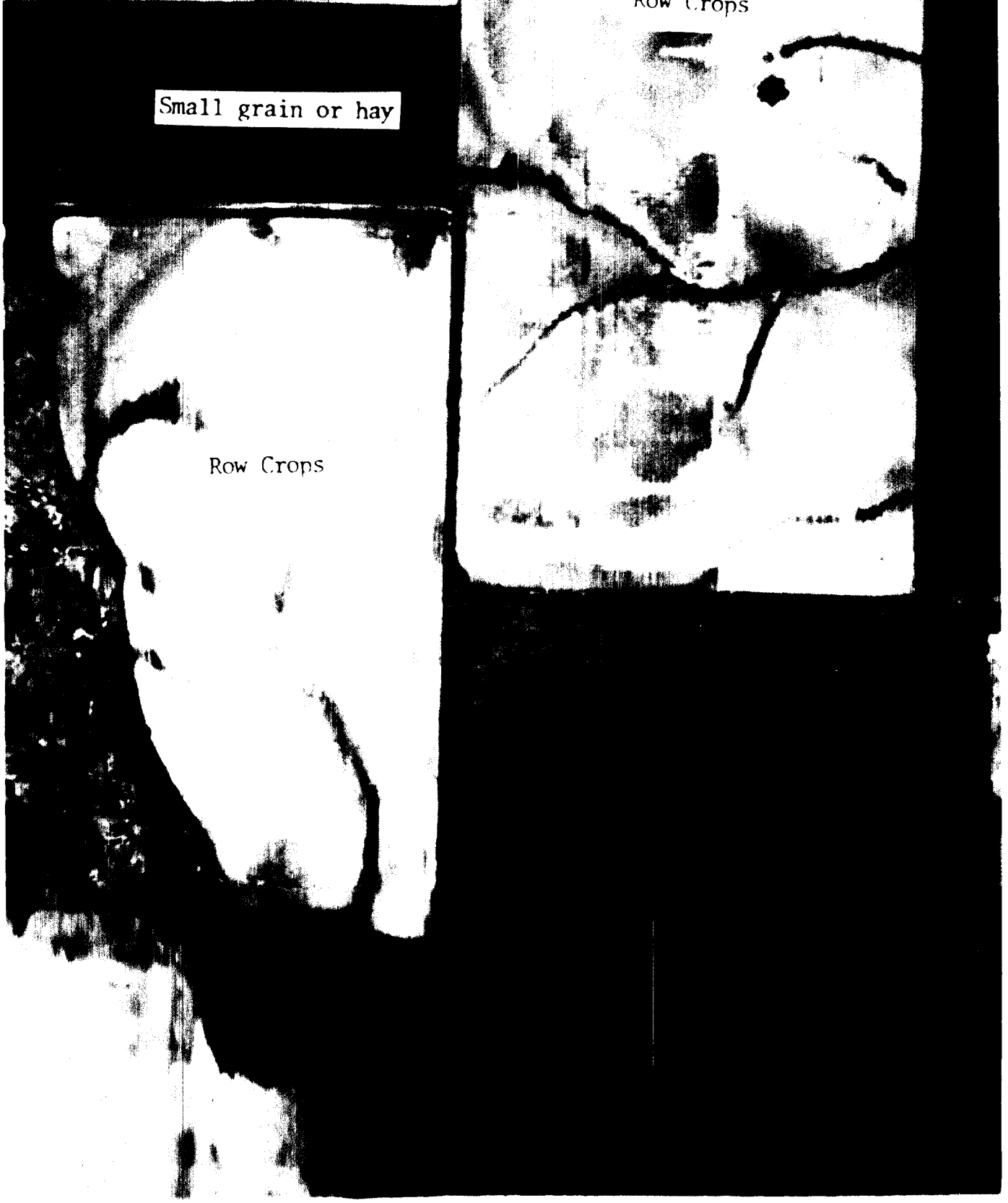
Pasture Without Evidence of Livestock

Pasture will appear the same as previously explained except there will be no livestock or paths within the field. No examples are shown on the photographs of pasture without evidence of livestock. However, it should not be too difficult to visually imagine no cattle, hogs or paths within the area labeled pasture with evidence of livestock, thus providing you with an example of pasture without evidence of livestock.

Ohio
Land Use
Identification Key




Buildings
Hogs
Row Crops
Pasture with evidence of livestock
Row Crops
Government Programs
Woods


Row Crops
Small grain or hay
Row Crops

COMPUTATIONS

Estimated Correlation Coefficients

Since the objective of this study was to evaluate aerial photography as a quality control technique, a matter of primary importance is the relationship between JES and APS data. The correlation coefficient can be used as an indicator of the strength of linear relationship between two variables, i.e., JES and APS data.

The data used for this analysis was the number of tracts within each segment containing the specified characteristic. Since these counts were not normally distributed, it was necessary to turn to a non-parametric statistic where no assumptions are made concerning the underlying distribution. Spearman's rank-correlation coefficients were used to test the hypothesis that the JES and APS data were independent under the null hypothesis H_o: $\rho = o$, where ρ denotes the true correlation.

Rank-correlation coefficients were estimated for occupied dwellings, grain storage, livestock (by species), cattle crossing tract boundaries, and land use (by usage classification).

Table Comparisons

Two-way classification tables were constructed and comparisons made for the previously listed classifications.

The values used in these tables are the number of segments with the specified characteristic present or absent. As such, it is a qualitative analysis, agreement between the two surveys for presence or absence of a characteristic does not imply quantitative agreement. For example, the JES may report a segment having occupied dwellings in five tracts, but the APS may only report dwellings in two tracts. For this segment the two surveys would be considered to be in agreement since they both reported occupied dwellings present. The two-way classification tables and comparisons are shown in the results section, tables 2-9, pp. 11-17.

Multivariate Analysis of Variance Test For Differences Between JES and APS

A paired-observations multivariate test was used to determine if there were significant differences between group mean vectors for JES and APS reported tract and crop acreage. The hypothesis to be tested was H_o: $\delta = o$ against the alternative H_1: $\delta \neq o$ where $\delta = \mu_1 - \mu_2$, and μ_1 and μ_2 are the mean vectors for JES and APS, respectively. Hotelling's T^2 - statistic was used to test the hypothesis.

RESULTS

Estimated Correlation Coefficients

Spearman's rank-correlation coefficient r_s was estimated as follows:

$$r_s = 1 - \frac{6(\Sigma d_i^2)}{N(N^2-1)}$$

where: $d_i = (X_i) - (Y_i)$

(X_i) = Rank of X_i

(Y_i) = Rank of Y_i

X_i = Number of tracts in the i^{th} segment containing the specified characteristic as reported by the APS.

Y_i = Number of tracts in the i^{th} segment containing the specified characteristic as reported by the JES.

N = 25 segments.

The observed X values were arranged in order of size and a rank was assigned for each value. For tied-ranks (two or more segments with equivalent values for X), an average was taken of the ranks they would have been assigned if the values were distinguishable. For example, if a rank of 7 were assigned to an X value of 5 and three segments had X values of 4, the three segments would be ranked 8,9 and 10 if they were distinguishable. However, since they aren't distinguishable, the rank of each would be taken as $(8+9+10) \div 3 = 9$. The same procedures were followed for ranking the Y values. Next, each (Y_i) was subtracted from its paired (X_i) to obtain the difference d_i.

Spearman's rank-correlation was used because the X_i's and Y_i's were not normally distributed, thus it was necessary to use a non-parametric statistic.

The following table lists the values computed for r for each classification. When the estimated rank-correlation coefficient exceeds 0.505, there is a probability of .99 that the population correlation coefficient, ρ, is greater than zero. This is known as the 1 percent level of significance. The 5 percent level of significance is attained when r is greater than 0.396.

The rank-correlation coefficients are highly significant for all classification. The hypothesis of independence between JES and APS data was rejected and it was concluded there was a significant correlation between JES and APS.

Table Comparisons

Table comparisons were made for occupied dwellings, grain storage, livestock (by species), cattle crossing tract boundaries, and land use (by usage classification).

Table 1.--Estimated rank-correlation coefficients between JES and APS

Sample Classification	r_s
Occupied dwellings	0.978**
Grain storage	0.662**
Livestock (by species)	
Cattle	0.835**
Hogs	0.786**
Sheep	0.822**
Chickens	0.580**
Cattle crossing tract boundaries	0.823**
Land use:	
Woods	0.913**
Buildings	0.996**
Row crops	0.950**
Pasture with evidence of livestock	0.947**
Small grain, hay	0.875**
Pasture without eivdence of livestock	0.639**

**Denotes with a probability of 0.99 that the population correlation coefficient is greater than zero. (n=25)

The first comparison was for presence or absence of occupied dwellings within each segment. Occupied dwellings are important because they may house farm operators. For 23 of the 25 segments, both surveys reported occupied dwellings present. For one segment APS and JES both reported no occupied dwellings present. The two surveys did not agree in only one segment. The APS reported occupied dwellings present, the JES reported no occupied dwellings. The re-enumeration concurred with the JES.

Table 2.--Comparison of presence or absence of occupied dwellings by JES and APS

APS \ JES	No. of segments with occupied dwellings	No. of segments without occupied dwellings	APS total
No. of segments with occupied dwellings	23	1	24
No. of segments without occupied dwellings	0	1	1
JES total	23	2	25

These results indicate the APS was successful in determining presence or absence of occupied dwellings in 96 percent of the segments.

The classification of grain storage capabilities by the two surveys was also fairly close overall. The JES and APS agreed there were grain storage facilities in 21 segments, and were none in three segments. Again they only disagreed on one segment. JES reported there were grain storage capabilities, but according to the photo interpreter there were none. For storage capabilities, no attempt was made to re-enumerate where there were conflicting reports since the JES question did not specify the location of the storage capabilities with regard to segment boundaries. They could have been located outside the segment and still been reported. See Appendix II, Exhibit B, page 38.

The comparison of the presence, absence and evidence of cattle is shown in Table 4.

The two surveys were in accord as to the presence or absence of cattle in 19 segments. In addition, if evidence of cattle is considered synonymous with cattle present as it was in computing correlation coefficients, there would be 21 segments for which the two surveys agreed. For the two segments in which APS reported evidence and JES reported no cattle, the re-enumeration determined cattle were present in one and absent in the other. The JES reported two segments with cattle present whereas APS reported no cattle present. The re-enumeration concurred with the photo interpretation for both segments. When cattle present and evidence of cattle are considered synonymous, the APS correctly identified the presence or absence of cattle in 96 percent of the segments.

The comparison of the presence, absence and evidence of hogs is presented in Table 5.

There were 18 segments for which the two surveys were in agreement. The 4 segments where APS reported evidence of hogs and JES reported hogs present, the re-enumeration indicated hogs present for all four. However, for the 2 segments the photo interpreter determined evidence of hogs present and JES reported no hogs present, the re-enumeration found no hogs. The re-enumeration corresponded with the JES report in the one segment identified by the JES as having hogs present and by the APS as having no hogs present. When hogs present and evidence of hogs are considered the same, the APS correctly identified 88 percent of the segments for presence or absence of hogs.

Sheep were practically nonexistent in the survey area. Table 6 shows the comparison of sheep present, absent or in evidence. In only one segment did the two surveys agree for presence or evidence of sheep. The JES reported sheep present, the photo interpreter indicated evidence of sheep. One tract was re-enumerated for sheep, but only because it was being re-enumerated for other reasons. In that instance both JES and APS reported no sheep, but the re-enumeration reported sheep present.

Table 3.--Comparison of presence or absence of grain storage capabilities by JES and APS

APS \ JES	No. of segments with grain storage	No. of segments without grain storage	APS total
Number of segments with grain storage	21	0	21
Number of segments without grain storage	1	3	4
JES total	22	3	25

Table 4.--Comparison of presence, absence or evidence of cattle by JES and APS

APS \ JES	No. of segments with cattle	No. of segments without cattle	APS total
Number of segments with cattle	9	0	9
Number of segments with cattle evidence	2	2	4
Number of segments without cattle	2	10	12
JES total	13	12	25

Table 5.--Comparison of presence, absence and evidence of hogs by JES and APS

APS \ JES	No. of segments with hogs present	No. of segments without hogs present	APS total
Number of segments with hogs present	5	0	5
Number of segments with evidence of hogs	4	2	6
Number of segments without hogs present	1	13	14
JES total	10	15	25

Table 6.--Comparison of presence, absence and evidence of sheep by the JES and APS

APS \ JES	No. of segments with sheep present	No. of segments without sheep present	APS total
Number of segments with sheep present	0	1	1
Number of segments with evidence of sheep	1	0	1
Number of segments without sheep present	2	21	23
JES total	3	22	25

Although chickens are not visible in aerial photographs at a scale of 1:4,000, it is possible to identify their presence in some instances by looking for chicken coops, poultry barns, etc. The photo interpreter correctly identified 4 of 12 segments with evidence of chickens or chickens present as reported by the JES. None of the segments were re-enumerated for chickens. Using the JES data as the basis for correct classification, the photo interpreter correctly identified 68 percent of the segments.

Table 7.--Comparison of presence, absence and evidence of chickens by JES and APS

APS \ JES	No. of segments with chickens present	No. of segments without chickens present	APS total
Number of segments with chicken present	3	0	3
Number of segments with evidence of chickens	1	0	1
Number of segments without chickens present	8	13	21
JES total	12	13	25

Both surveys corresponded almost completely in identifying segments where cattle could cross tract boundaries to areas outside the segment. There was only one segment in which the two surveys disagreed. No attempt was made to re-enumerate for reported "cattle crossings." The APS concurred with the JES classification for 96 percent of the segments.

Table 8.--Comparison of cattle crossing tract boundaries by JES and APS

APS \ JES	No. of segments with cattle crossing tract boundaries	No. of segments without cattle crossing tract boundaries	APS total
Number of segments with cattle crossing tract boundaries	3	0	3
Number of segments without cattle crossing tract boundaries	1	21	22
JES total	4	21	25

Comparisons between APS and JES for land use (by usage classification) are shown in Table 9 a-f. For the following classifications the two surveys were in total accord: buildings, small grain and hay, and pasture with evidence of livestock. There were two segments in which JES reported pasture without evidence of livestock but the APS did not report any. Plus, there were five segments where just the opposite was reported. The re-enumeration concurred with the photo interpreter for six of these seven segments. The two surveys disagreed on one segment in each of the remaining classifications. The re-enumeration verified the APS for the segment in the woods classification. For row crops though, the re-enumeration supported the JES report. Thus, in four of the six land use classifications, the APS correctly identified land usage for all segments. In the remaining two classifications it correctly identified land use for 96 percent of the segments.

Manova Test for Differences Between JES and APS

As stated before, the purpose of this analysis was to determine if there were significant differences between group mean vectors for JES and APS reported tract and crop acreage. The test hypothesis is H_o: $\delta = o$ where $\delta = \mu_1 - \mu_2$ and μ_1 and μ_2 are the mean vectors associated with JES and APS, respectively.

Table 9.--Comparison of land use (by usage classification) between JES and APS

a. Woods

APS \ JES	Segments with woods	Segments without woods	APS total
Segments with woods	23	1	24
Segments without woods	0	1	1
JES total	23	2	25

b. Buildings

APS \ JES	Segments with buildings	Segments without buildings	APS total
Segments with buildings	24	0	24
Segments without buildings	0	1	1
JES total	24	1	25

c. Row crops

APS \ JES	Segments with row crops	Segments without row crops	APS total
Segments with row crops	21	1	22
Segments without row crops	0	3	3
JES total	21	4	25

d. Pasture with evidence of livestock

APS \ JES	Segments with pasture with evidence livestock	Segments without pasture with evidence livestock	APS total
Segments with pasture with evidence livestock	17	0	17
Segments without pasture with evidence livestock	0	8	8
JES total	17	8	25

e. Small grain and hay

APS \ JES	Segments with small grain and hay	Segments without small grain and hay	APS total
Segments with small grain and hay	23	0	23
Segments without small grain and hay	0	2	2
JES total	23	2	25

f. Pasture without evidence of livestock

APS \ JES	Segments with pasture without evidence livestock	Segments without pasture without evidence livestock	APS total
Segments with pasture without evidence livestock	4	5	9
Segments without pasture without evidence livestock	2	14	16
JES total	6	19	25

There are three basic assumptions or conditions required to test H_o: $\delta = o$. First, it is necessary to have $V_E \geq p$ where V_E is the error degrees of freedom and p is the number of dependent variables. For this case, $V_E = 24$ and $p = 7$, so this condition is satisfied. The second assumption is that the observation vectors are normally distributed, and the third concerns equality of covariance matrices, and this assumption will be based on statistical evidence.

To test for equality of covariance matrices, the hypothesis H_{10}: $\Sigma_1 = \Sigma_2$ is tested against the alternative H_{11}: $\Sigma_1 \neq \Sigma_2$, where Σ_i denotes the covariance matrix of the i^{th} treatment. The test statistic is given as $V = 2.3026\ mM$ which follows a chi-square distribution with $p(p + 1)/2$ degrees of freedom, where

$$m = 1 - \left[\frac{1}{(n_1-1)} + \frac{1}{(n_2-1)} - \frac{1}{(n_1+n_2-2)}\right]\left[\frac{2p^2+3p-1}{6(p+1)}\right],$$

and

$$M = (n_1+n_2-2)\ \log_{10}|S| - (n_1-1)\ \log_{10}|S_1| - (n_2-1)\ \log_{10}|S_2|.$$

S_1 and S_2 are the sample covariance matrices (unbiased estimates of Σ_1 and Σ_2) for JES and APS, respectively,

and $S = [(n_1-1)\ S_1 + (n_2-1)\ S_2]/(n_1 + n_2 - 2)$.

S_1, S_2, and S are shown on the following page.

Then $|S_1| = 9.54578 \times 10^{27}$

$|S_2| = 9.77088 \times 10^{27}$

$|S| = 9.67176 \times 10^{27}$

$n_1 = n_2 = 25$

A five place log table (base 10) allows approximations:

$\log_{10}|S_1| = 27.97981$

$\log_{10}|S_2| = 27.98993$

$\log_{10}|S| = 27.98551$

By substitution, $M = 0.03072$

$$m = 1 - [1/24 + 1/24 - 1/48]\left[\frac{98 + 21 - 1}{48}\right] = 0.84635$$

Sample Covariance Matrices

S_1

	Tract total	Row crops	Corn	Soybeans	Sm. grains	Wheat	Oats
Tract total	13173.24	3567.31	1332.44	2152.72	1416.26	342.76	3Ø.2Ø
Row crops	3567.31	5584.3Ø	1Ø95.79	4441.82	983.66	492.65	38.16
Corn	1332.44	1Ø95.79	461.79	626.78	317.3Ø	7Ø.7Ø	13.74
Soybeans	2152.72	4441.82	626.78	3779.43	633.89	4Ø4.44	25.Ø1
Sm. grain, Hay	1416.26	983.66	317.3Ø	633.89	8Ø5.11	279.81	4Ø.86
Wheat	342.76	492.65	7Ø.7Ø	4Ø4.44	279.81	191.31	12.56
Oats	3Ø.2Ø	38.16	13.74	25.Ø1	4Ø.86	12.56	3Ø.75

S_2

	Tract total	Row crops	Corn	Soybeans	Sm. grains	Wheat	Oats
Tract total	13311.13	3818.91	1376.35	2244.2Ø	1515.46	371.84	5.34
Row crops	3818.91	6Ø58.36	1235.ØØ	4677.86	1Ø65.36	535.15	31.Ø3
Corn	1376.35	1235.ØØ	48Ø.57	729.23	341.82	86.63	12.92
Soybeans	2244.2Ø	4677.86	729.23	3844.12	649.6Ø	41Ø.84	2Ø.54
Sm. grain, hay	1515.46	1Ø65.36	341.82	649.6Ø	784.97	272.Ø9	28.33
Wheat	371.84	535.15	86.63	41Ø.84	272.Ø9	19Ø.59	1Ø.49
Oats	5.34	31.Ø3	12.92	2Ø.54	28.33	1Ø.49	36.16

S

	Tract total	Row crops	Corn	Soybeans	Sm. grains	Wheat	Oats
Tract total	13242.19	3693.11	1354.4Ø	2198.46	1465.86	357.3Ø	17.77
Row crops	3693.11	5821.33	1165.4Ø	4559.84	1Ø24.51	513.9Ø	34.6Ø
Corn	1354.4Ø	1165.4Ø	471.18	678.ØØ	329.56	78.66	13.33
Soybeans	2198.46	4559.84	678.ØØ	3811.77	641.75	4Ø7.64	22.78
Sm. grain, hay	1465.86	1Ø24.51	329.56	641.75	795.Ø4	275.95	34.6Ø
Wheat	357.3Ø	513.9Ø	78.66	4Ø7.64	275.95	19Ø.95	11.53
Oats	17.77	34.6Ø	13.33	22.78	34.6Ø	11.53	33.45

and

$$\text{d.f.} = p(p+1)/2 = 28$$

therefore,

$$\chi^2_{(28)} = 2.3026(0.84635)(0.03072) = 0.05987$$

The tabular value for $\chi^2_{0.05(28)} = 41.34$. Thus, $H_{10}: \Sigma_1 = \Sigma_2$ is accepted and the basic assumptions are concluded to be viable.

Now, Hotelling's T^2 - statistic is used to test $H_o: \delta = o$. The test statistic is $T^2_{(7,24)} = nD^2$ and D^2 is computed as follows:

$$d_{kj} = Y_{1kj} - Y_{2kj} \qquad k = 1,\ldots, 7;\ j = 1,\ldots,25$$

$$\bar{d}_k = \sum_{j=1}^{25} d_{kj}/25 \qquad k = 1,\ldots, 7$$

$$SS_k = \sum_{j=1}^{25} d_{kj}^2 - \left(\sum_{j=1}^{25} d_{kj}\right)^2 \Big/ 25 \qquad k = 1,\ldots, 7$$

$$SP_{km} = \sum_{j=1}^{25} d_{kj}d_{mj} - \left(\sum_{j=1}^{25} d_{kj}\right)\left(\sum_{j=1}^{25} d_{mj}\right)/25 \qquad k \neq m = 1,\ldots, 7$$

$$S_{kk} = SS_k/24 \qquad k = 1,\ldots, 7$$

$$S_{km} = SP_{km}/24 \qquad k \neq m = 1,\ldots, 7$$

In terms of the quantities $\bar{d}_k$, S_{kk}, and S_{km}, D^2 is defined as

$$D^2 = (\bar{d}_1\ \bar{d}_2 \ldots \bar{d}_7) \begin{bmatrix} S_{11} & S_{12} & \cdots & S_{17} \\ S_{12} & S_{22} & \cdots & S_{27} \\ \vdots & \vdots & & \vdots \\ S_{17} & S_{27} & \cdots & S_{77} \end{bmatrix}^{-1} \begin{bmatrix} \bar{d}_1 \\ \bar{d}_2 \\ \vdots \\ \bar{d}_7 \end{bmatrix}$$

Calculations yielded $D^2 = 0.3985$ and $T^2 = 25\ D^2 = 9.963$ which is less than the tabular value of $T^2\ 0.05(7,24) = 24.049$, thus the null hypothesis is not rejected and it is concluded there is no significant difference between JES and APS mean vectors.

Power of Test on Mean Vectors

In a properly designed experiment the probability of the type II error should also be controlled. However, since there was no prior experience on which to base an estimate of the population covariance matrix, Σ, it was not possible to determine the sample size needed to acquire significant results prior to this survey. Also, as stated before, monetary restrictions limited the size of the experiment to 25 segments.

The probability of a type II error, β, can be obtained from the distribution of T^2. For testing the hypothesis H_o: $\delta = o$ against the alternative H_1: $\delta \neq o$, the statistic:

$$F = \frac{n - p}{np - p} T^2$$

follows the non-central F-distribution with parameter

$$\delta^2 = n(\mu_1 - \mu_2)' \Sigma^{-1} (\mu_1 - \mu_2)$$

and degrees of freedom p and n - p with n, p, and T^2 as previously defined. The power function of the test is $1 - \beta(\delta^2) = P(F' < F_\alpha;\ p,\ n - p)$ 3/

The following are the differences between sample means for this survey (in acres):

Tract total	Row crops	Corn	Soybeans	Small grain	Wheat	Oats
(0.89	1.83	0.88	0.39	0.33	0.32	0.10)

A sample size of 53 would be required to detect differences as small as were observed in this survey with a probability of significant results greater than 0.90.

3/ Donald F. Morrison, Multivariate Statistical Methods, page 149.

COST DATA

An in-depth cost analysis has not been carried out for this survey. The following is a brief discussion of total costs and cost per segment for obtaining APS data in comparison to RES data.

Total cost for the color aerial photography was approximately $2200. Interpretation required 56 hours. The interpretation was actually done by a GS-12, at the rate of $6.50 per hour for a total of $365. However, it could have been done by a GS-3 or 4 photo interpreter at a rate of $3.00 per hour for a total of $168. In addition, 66 man-hours were required for verification and travel between segments. The cost for verification was about $180. Since editing and processing costs would be approximately the same for the two surveys, this data has been omitted. Therefore, total cost for the aerial photo survey was about $2550, or $102 per segment.

For the three years prior to this survey, the average expenditure for the re-enumeration survey was $1300, or $52 per segment.

Use of black and white instead of color photography would reduce the expenditure for the APS by approximately $500, reducing the cost to $80 per segment. However, additional studies would be necessary to determine if the data acquired from black and white photography would be sufficient for use as a quality control. University of California studies 4/ conclude there is no appreciable advantage in color photography over black and white photography for identification of livestock or orchard crops. Experience has also shown that crop acreage can be measured to within one percent of the correct area on conventional aerial photography. Here again, there's no appreciable difference between color and black and white photography.

4/ The Inventory of Livestock and Crops, R. N. Colwell, E. H. Roberts, D. T. Lauer, University of California, 1966.

APPENDIX I EXHIBIT A

OHIO RESEARCH PROJECT
JUNE 1970
AERIAL PHOTOGRAPHY JUNE SEGMENTS
INSTRUCTIONS FOR COPYING
JUNE SURVEY DATA

Heading Information: SEGMENT NO. (enter code) :1-4: _ _ _ _ :

TRACT____ (enter code) :5-6: _ _ :

DATE_____ (enter code) :7-10: _ _ _ _ :

TYPE /CODE: Enumeration 1, Photography 2, Re-enumeration 3/ (enter code) :11: _ :

Enter segment number, tract letter and code, date and Julian date code and code 1 under type.

1. OCCUPIED DWELLING /CODE: Yes 1, No 0/.....(enter code) :12: _ :

   If tract is listed on top half of Part I.D. Code 1
   If tract is listed on bottom half of Part I.D. Code 0

2. GRAIN STORAGE /CODE: Yes 1, No 0/.....(enter code) :13: _ :

   Case 1. TRACT listed in column 12, Part I.D.
   Code as column 13, part I.D, go to 5.

   Case 2. Green questionnaire as completed. Code 0, go to 5.

   Case 3. Brown questionnaire -- code as questionnaire is coded on page 7, section C, question 2. Item code 539, go to 3.

   Case 4. Blue questionnaire -- code as questionnaire is coded on page 5, section C, question 2. Item code 539, go to 3.

3. LIVESTOCK: CHECK ONE

	No	Yes	Evidence			
CATTLE:	/__/0	/__/1	/__/2	Fields _ _ _ _ _ _	(enter code)	:14: _ :
HOGS:	/__/0	/__/1	/__/2	Fields _ _ _ _ _ _	(enter code)	:15: _ :
SHEEP:	/__/0	/__/1	/__/2	Fields _ _ _ _ _ _	(enter code)	:16: _ :
CHICKENS:	/__/0	/__/1	/__/2	Fields _ _ _ _ _ _	(enter code)	:17: _ :

Cattle:

If section E (page 7 Blue) (page 4 Brown) question 2 is checked yes, check yes for cattle and enter code 1. Enter fields from line 6 blocks A + B; go to Hogs section F, check no, enter 0, go to Hogs section F.

Hogs:

Case 1 Blue questionnaire, page 8, section F, question 6, item code 210 is positive. Check yes, add code 1, 0 code 0 go to sheep. Case 2, Brown questionnaire--page 5, section F. If question 1 is checked yes, check yes, add code 1, if no code 0, go to chickens.

Sheep:

There are no tract questions on sheep. Skip this section if on Brown questionnaire. If Blue and section G, question 1, page 9, item code 340 is positive circle evidence but DO NOT CODE. Go to chickens.

Chickens:

If section G (chickens), question 1 (page 10 Blue) (page 6 Brown) is checked yes, check yes and code 1; if checked no, code 0, go to 4.

		18
4.	CATTLE CROSSING tract boundaries /CODE: Yes 1, No 0/..(enter code)	—

IF CATTLE: question is checked No (coded 0) code 0 and skip to LAND USE.

IF CATTLE: question is checked Yes and there are entries in block B (page 4 Brown) (page 7 Blue) line 6 enter code 1.

5. LAND USE: (one digit code for each field)

CODES:		
	Woods-1	Past. W/Evid. LS-4
	Building-2	Small grain, Hay-5
	Row Crops-3	Past. W/O Evid. LS-6

	19-23	24-28	29-33	34-38
Fields 1-5	— — — — —			
Fields 6-10		— — — — —		
Fields 11-15			— — — — —	
Fields 16-20				— — — — —

Case 1. Questionnaire ends on Part ID or Green code from the land use description in column 14, Part ID or if Green code 2, go to 6.

Code 1 - woods, waste, ditches, highway, timber, commercial timber, railroad, idle, gravel pit, etc.

Code 2 - subdivision W/ construction start, house and lot, F.S., elevator, cemetary, school, church, store, commercial, factory, railroad yards, vacant house, vacant buildings, or any other use which implies building.

Code 6 - pasture, idle pasture. Do not use code 3, 4, or 5. Use code 6 very sparingly. Go to 6.

Case 2. Brown or Blue questionnaire photo copy pages 2 and 3 and all supplements. Attach to recording form and go to next tract.

		:19-43 :
6.	ACREAGE: Tract total..... acres	:- - - - - :

(You should be on part ID or Green). Enter acres from Column 12 part ID or question 6 green enter acres from Item code 846 to 1/10 of an acre, to next tract.

Photocopy segment enlargements as they come into field office.

EXHIBIT B

OHIO RESEARCH PROJECT
JUNE 1970
AERIAL PHOTOGRAPHY JUNE SEGMENTS

Instructions for Editing Copied JES Questionnaires

Heading information, enter all codes and make sure it is completely filled out.

1. OCCUPIED DWELLING -- enter code if not coded.
2. GRAIN STORAGE -- enter code if not coded.
3. LIVESTOCK -- if tract ends on ID or Green, there should be no entries. Code all livestock Items 0.

   If tract is on a brown or blue edit for reasonableness. There should be fields reported if cattle are coded 1. Sheep should be coded 0.

4. CATTLE CROSSING

   Should be coded 0 if cattle code is 0.
   Should be coded 0 or 1 if cattle code is 1.

5. LAND USE

   If tract ends on part ID, the left hand blank in block should be coded 1, 2, or 6. All others should be blank.

   If tract ends on brown or blue, code each field in order starting with left hand blank in block and continuing from left to right until all fields are coded. If more than 20 fields, use a second sheet and mark.

19-23
2 - - - -

19-23
1 2 4 3 3

   If principal land use is:

   Code 1 Woods, waste, ditches, highway, railroad, gravel pit, etc.

   Code 2 Farmstead, FS, tenant house, house and lot, barns, corn crib, elevator or any other description that indicates buildings.

   Code 3 Corn, soybeans, drybeans, popcorn, sorghum, vegetables or any other row crop.

   Code 4 Pasture on tracts with livestock (cattle, hogs, or sheep). One or more coded 1.

Code 5 Wheat, oats, rye, any hay crop, orchard or any agricultural use other than row crop or pasture.

Code 6 Pasture on tracts with all livestock other than chickens coded 0.

Code 9 Any land use that doesn't fit the above classifications.

6. ACREAGE Tract total..... acres :39-43 :_____:

enter acreage from item code 840 page 3, JUNE SURVEY PART A

ALL ROW CROPS..... acres :44-45 :_____:

Sum acreage in principle land use (exclude ditches, waste, etc.) for fields coded 3 on OHIO RESEARCH RECORDING FORM.

CORN..... acres :49-53 :_____:

Sum corn planted acreage as reported on pages 2 and 3, item code 530, JUNE SURVEY PART A.

SOYBEANS..... acres :54-59 :_____:

Sum soybeans planted alone acreage as reported on pages 2 and 3, item code 600, JUNE SURVEY PART A.

ALL SMALL GRAIN AND HAY..... acres :59-62 :_____:

Sum average in principle use for fields coded 5 and/or 9 on OHIO RESEARCH CODING FORM.

WHEAT..... acres :54-68 :_____:

Sum wheat planted acreage as reported on pages 2 and 3, item code 540 or 550, JUNE SURVEY PART A.

	:69-93 :
OATS..... acres	:- - - - - :

Sum oats planted acreage as reported on pages 2 and 3, item code 533, JUNE SURVEY PART A.

Enumerator_____

Make sure that the original enumerator is recorded.

EXHIBIT C

OHIO RESEARCH PROJECT
OHIO 1970
AERIAL PHOTOGRAPHY JUNE SEGMENTS
INSTRUCTIONS FOR HANDLING AERIAL PHOTOGRAPHS

When photos become available, identify each photograph, indicate north, segment number, number of photographs for segment, date of flight, direction of flight and altitude. If more than one camera setup is used, indicate what setup was used for this photograph. The above information should be available from contractor on flight logs, etc.

After all photos are identified, draw segment boundaries in permanent red ink; with blue grease pencil draw tract boundaries and label and with red grease pencil number fields. Field boundaries should be visible on photograph but if not--due to unplanted or crops not up, etc.--draw field boundary with dashed red grease pencil. The above information can be taken directly from the photo enlargement used by the enumerator or a photo copy.

At this time obtain a recording form for each tract (same as used for copying June data) and fill out headings. Use date of flight for date and code 2 under TYPE.

1. OCCUPIED DWELLINGS /CODE: Yes 1, No 0/.....(enter code) : 11 : — :

Examine tract for buildings. If none enter code (0) and explain on back e.g. (1. no buildings). Examine each set of buildings for occupied dwelling and code 1 for occupied dwelling and 0 for none. Explain on back reasons for doing so:

i.e., 1. Driveway with car partly in garage (code 1)
2. Hog lot next to only building (code 0)

We have no specific guidelines but the notes should help us determine what might be helpful. Some things that indicate occupancy are visible toys, a washing on a clothes line, cars in driveway, well kept lawns, paths to barn, etc. Some things that indicate unoccupancy are unkept lawns, roof shape more typical of a barn, weeds, tombstones, large parking lot such as for school or church.

The interpreter should weigh the pluses and minuses, make a decision and record reasons on back of form.

: DON'T look at observer's notes or the :
: June Survey Questionnaire or copied :
: data to help him decide. :

2. GRAIN STORAGE /CODE: Yes 1, No 0/.....(enter code) :12: —

If no buildings enter 0 and go to cattle. If buildings examine each set to determine if it could be grain storage. Does it look like a round steel bin? Does it have hatches or dormers for elevator equipment? Does its shadow cast a characteristics grain storage building shadow? Code and state reason for code on back.

3. LIVESTOCK: CHECK ONE:

	No	Yes	Evidence		
CATTLE:	/_/ 0	/_/ 1	/_/ 2	Fields....(enter code)	:14: —
HOGS:	/_/ 0	/_/ 1	/_/ 2	Fields....(enter code)	:15: —
SHEEP:	/_/ 0	/_/ 1	/_/ 2	Fields....(enter code)	:16: —
CHICKENS:	/_/ 0	/_/ 1	/_/ 2	Fields....(enter code)	:17: —

Examine each field for livestock. If livestock are actually identified, check yes for specie and enter field number. If livestock are not actually identified but current or recent use of a field is indicated, check evidence and enter field number. Explain in notes on back.

If one or more fields are identified as having a specie, enter 1 in code box. If no fields are identified as having the specie, but evidence is found in one or more fields, enter a 2 in code box.

If no fields contain any evidence for a specie enter an 0 in code box.

4. CATTLE CROSSING tract boundaries /CODE: Yes 1, No 0/(enter code) :18: —

If cattle is coded 0 or if all fields containing cattle, or evidence of cattle do not have a point or boundary in common with a segment boundary, code 0.

If cattle is coded 1 and one or more fields containing cattle, or evidence of cattle has a common point or common boundary with the segment, examine such boundary or point to determine if such cattle have access to land adjoining the segment. If so, code 1 and explain on back; otherwise, code 0.

5. LAND USE: (one digit code for each field)

CODES:		
	Woods-1	Past. W/Evid. LS-4
	Buildings-2	Small grain, Hay-5
	Row Crops-3	Past. W/O Evid. LS-6

Fields 1-5	19-23
Fields 6-10	24-28
Fields 11-15	29-33
Fields 16-20	34-38

Examine each field for cropping pattern, pastures for trees and brush that would indicate permanent pasture, etc. If bare soil and a row crop pattern can be ascertained, code 3. Explain bare soil and row crop codes if row crop cannot actually be seen. Make sure pasture codes 4 and 6 are consistant with LIVESTOCK. (NOTE LIVESTOCK MAY BE FOUND IN WOODS ON AG. TRACTS AND BE CONSISTANT). Most Government program land will have appearance of small grain and hay. All GP land will be coded 5.

If there appears to be a field that does not appear on the copied June data, on the photograph use a green grease pencil and mark this field and number it using the next higher field number. Code this field the same as above. A list of uses will be found in the copying instructions.

Planimetered Acres

This section will be done after all other data has been collected.

6. ACREAGE: Tract total

ALL ROW CROPS.....(acres)	
CORN.....(acres)	
SOYBEANS.....(acres)	
ALL SMALL GRAIN AND HAY.....(acres)	
WHEAT.....(acres)	
OATS.....(acres)	

Prior to survey period a photo enlargement (8" to 1 mile scale) will be prepared by tracing segment boundaries.

Field boundaries will be located as accurately as possible from the photography (1970). For type 2 forms, only TRACT TOTAL, ALL ROW CROPS, ALL SMALL GRAIN AND HAY will be entered. Under all small grain and hay all agricultural land will be entered on the type 2 form. Land use will be determined from 5, LAND USE. The entire tract will be planimetered as a unit. The all row crops and all small grains and hay will be planimetered field by field, then totaled. A separate form will be used to record this planimetering.

EXHIBIT D

OHIO RESEARCH PROJECT
JUNE 1970
AERIAL PHOTOGRAPHY JUNE SEGMENTS
SUMMARIZATION FORM

	SEGMENT NO.	:1-4 : : – – – – :
	TRACT ____ (enter code)	:5-6 : : – – :
DATE_____	(enter code)	:7-10 : : – – – – :
TYPE/CODE: Enumeration 1, Photography 2, Re-numeration 3/	(enter code)	:11 : : – :
1. OCCUPIED DWELLING /CODE: Yes 1, No 0/.....	(enter code)	:12 : : – :
2. GRAIN STORAGE /CODE: Yes 1, No 0/.....	(enter code)	:13 : : – :

3. LIVESTOCK: CHECK ONE:

	No	Yes	Evidence		
CATTLE:	/_/ 0	/_/ 1	/_/ 2	Fields.....(enter code)	:14 : : -- :
HOGS:	/_/ 0	/_/ 1	/_/ 2	Fields.....(enter code)	:15 : : – :
SHEEP:	/_/ 0	/_/ 1	/_/ 2	Fields.....(enter code)	:16 : : – :
CHICKENS:	/_/ 0	/_/ 1	/_/ 2	Fields.....(enter code)	:17 : : – :

4. CATTLE CROSSING tract Boundaries /CODE: Yes 1, No 0/.....	(enter code)	:18 : : – :
5. LAND USE: (One digit code for each field)	Fields 1-5	:19-23 : :– – – – – :
:CODES: Woods-1 Past. W/Evid. LS-4 :	Fields 6-10	:24-28 : :– – – – – :
: Buildings-2 Small grain, Hay-5 :		:29-33 :
:_____ Row Crops-3 Past. W/O Evid. LS-6 :	Fields 11-15	:– – – – – :
	Fields 16-20	:34-38 : :– – – – – :

6. ACREAGE: Tract Total		:39-43 : :– – – – – :
ALL ROW CROPS.....(acres)		:44-48 : :– – – – – :
CORN.....(acres)		:49-53 : :– – – – – :
SOYBEANS.....(acres)		:54-58 : :– – – – – :
ALL SMALL GRAIN & HAY.....(acres)		:59-63 : :– – – – – :
WHEAT.....(acres)		:64-68 : :– – – – – :
OATS.....(acres)		:69-73 : :– – – – – :

Enumerator_____ C

State	District	Segment No.

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
Budget Bureau No. - 40-R2766
Approval Expires - 4/30/71
Item Count - 19

COUNTY _____

PART I.D. - 3 N.C. States

APPENDIX II
EXHIBIT A

JUNE 1970 ACREAGE,

LIVESTOCK & LABOR

ENUMERATIVE SURVEY

PART I.D. _____ OF _____

ENUMERATOR CHECK LIST: *Complete this check list when enumeration of segment is completed.*

1. Total tract codes listed in Column 1, Page 2... _____
2. Number of tract codes listed on photo or map... _____

Item 1 and 2 must agree.

3. Number of **BLUE** questionnaires completed..... _____
4. Number of **BROWN** questionnaires completed..... _____
5. Number of **GREEN** questionnaires completed..... _____
6. Number of tracts listed in Column 12, Page 4... _____
7. Total of Items 3 + 4 + 5 + 6 equals..... _____

Item 7 must agree with items 1 and 2.

Comment on any enumerating problems caused by segment boundaries, split fields, aerial photo coverage, etc.

_____

_____

_____

_____

(ENUMERATOR's SIGNATURE)

VISITS TO SEGMENT

Month	Day

OFFICE USE	Date	Initials
Received		
1st EDIT		
2nd EDIT		
3rd EDIT		
Mailed from SSO		

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
Budget Bureau No. - 40-R2766
Approval Expires - 4/30/71
Item Count -

PART A - 2

STATE	DISTRICT	SEGMENT NO.	TRACT NO.

EXHIBIT B

1970 JUNE ACREAGE,

LIVESTOCK & LABOR

ENUMERATIVE SURVEY

Use THIS Questionnaire For OPERATORS Living INSIDE The SEGMENT

Facts about your farm or ranch will be kept CONFIDENTIAL and used only in combination with similar reports from other producers.

SEGMENT NUMBER _____ **TRACT CODE LETTER:** _____

NAME: _____

ADDRESS: _____
(Route or Street) (City)

_____
(State) (Zip)

TELEPHONE NUMBER: _____ **COUNTY:** _____

NAME OF FARM OR RANCH: _____

1. **How many acres are inside these boundaries drawn on the photo (or map)?**..... [ ]

2. **Will any acres INSIDE these boundaries be IRRIGATED during 1970?**

YES ( ) Ask irrigation questions
NO ( ) Skip irrigation questions

SECTION A - ACREAGES OF

A-2

FIELD NUMBER.....			1	2	3	4
1. TOTAL ACRES IN FIELD			.	.	.	.
2. CROP or LAND USE - Name						
3. TWO CROPS HARVESTED FROM THIS FIELD?			YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
4. ACRES IRRIGATED AND TO BE IRRIGATED?			.	.	.	.
5. FARMSTEAD, DITCHES, WOODS, ROADS, WASTE			.	.	.	.
6. PASTURE	Permanent-Not in Crop Rotation		842 .	842 .	842 .	842 .
7.	Cropland-Used only for Pasture		845 .	845 .	845 .	845 .
10. WINTER WHEAT	Planted		540 .	540 .	540 .	540 .
11.	Intended for grain		541 .	541 .	541 .	541 .
12. DURUM WHEAT	Planted		551 .	551 .	551 .	551 .
13. OTHER SPRING WHEAT	Planted		550 .	550 .	550 .	550 .
16. SOYBEANS ALONE	Planted and to be planted		600 .	600 .	600 .	600 .
19. FLAXSEED	Planted and to be planted		693 .	693 .	693 .	693 .
23. SORGHUM	Planted and to be planted		603 .	603 .	603 .	603 .
24.	Intended for grain		604 .	604 .	604 .	604 .
25.	ALFALFA AND ALFALFA MIXTURES		653 .	653 .	653 .	653 .
26. cut and to be cut HAY	CLOVER-TIMOTHY OR CLOVER-GRASSES		655 .	655 .	655 .	655 .
27.	GRAIN		657 .	657 .	657 .	657 .
28.	LESPEDEZA		652 .	652 .	652 .	652 .
29.	OTHER		654 .	654 .	654 .	654 .
30.	WILD		651 .	651 .	651 .	651 .
31. CORN	Planted and to be planted		530 .	530 .	530 .	530 .
32.	Intended for grain		531 .	531 .	531 .	531 .
33. RYE	Planted		547 .	547 .	547 .	547 .
34.	Intended for grain		548 .	548 .	548 .	548 .
35. OATS	Planted		533 .	533 .	533 .	533 .
36.	Intended for grain		534 .	534 .	534 .	534 .
37. BARLEY	Planted		535 .	535 .	535 .	535 .
38.	Intended for grain		536 .	536 .	536 .	536 .
39. OTHER CROPS	Name of crop					
	Acres planted or in use		.	.	.	.
40. OTHER UTILIZATION AND ABANDONMENT	Name, use or crop					
	Acres		.	.	.	.
41. SUMMER FALLOW	Acres		847 .	847 .	847 .	847 .
42. SOIL IMPROVEMENT CROPS ONLY	No other use in 1970		856 .	856 .	856 .	856 .
43. IDLE CROPLAND	Acres idle in 1970		857 .	857 .	857 .	857 .

PART I.D. - 3

LAND WITH OCCUPIED DWELLING

T R A C T	*Verify tract boundaries and draw off land operated (Check)*	Is any land within blue line operated by some-one else?	Name and Mailing Address of Person in charge of this tract.	Do you ______ (Col. 4 person) operate a farm or ranch at any location? *Go to Blue Questionnaire*	Will any crops be grown in 1970 by you (Col. 4 person)?	Do you (Col. 4 person) have any cattle hogs, sheep or poultry, or expect to have any this year?	During the last 12 months did you sell any agricultural products or receive govern-ment farm payments?	Do you own or are you buying your house?	Do you pay Cash rent for your house?
1	2	3	4	5	6	7	8	9	10
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green
		( ) NO → ← YES ( )	ZIP	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES - Blue ( ) NO →	( ) YES–Page 4 ( ) NO →	( ) YES - Page 4 ( ) NO - Green

[illegible]ED DWELLING

		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →
		( ) NO → ← YES ( )	ZIP	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →	( ) YES - Brown ( ) NO →

FIELDS AND CROPS IN TRACT

4

A-2

	5	6	7	8	9	OFFICE USE
Total Acres						840
Land Use						920 1.0
Two Crops	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	
Irrigated 1970						843
Other Land						841
Permanent Pasture	842	842	842	842	842	
Cropland Pasture	845	845	845	845	845	
Winter Wheat Planted	540	540	540	540	540	
Winter Wheat Harvested	541	541	541	541	541	
Durum Wheat	551	551	551	551	551	
Other Spring Wheat	550	550	550	550	550	
Soybeans	600	600	600	600	600	601
Flaxseed	693	693	693	693	693	
Sorghum Planted	603	603	603	603	603	
Sorghum Harvested	604	604	604	604	604	
Alfalfa Hay	653	653	653	653	353	
Clo-Tim Hay	655	655	655	655	655	
Grain Hay	657	657	657	657	657	
Lespedeza Hay	652	652	652	652	652	
Other Hay	654	654	654	654	654	
Wild Hay	651	651	651	651	651	
Corn Planted	530	530	530	530	530	
Corn Harvested	531	531	531	531	531	
Rye Planted	547	547	547	547	547	
Rye Harvested	548	548	548	548	548	
Oats Planted	533	533	533	533	533	
Oats Harvested	534	534	534	534	534	
Barley Planted	535	535	535	535	535	
Barley Harvested	536	536	536	536	536	
Other Crops						
Acres						
Other Utilization						
Acres						
Summer Fallow	847	847	847	847	847	
Soil Improvement	856	856	856	856	856	
Idle Cropland	857	857	857	857	857	

SECTION A. (cont'd)

ACRES IRRIGATED FOR THE FIRST TIME

Ask item 45 only if any fields in the tract will be irrigated in 1970

45. **How many acres in this tract will be irrigated in 1970 which were not irrigated in 1969 or earlier years?**.....Acres [844 .]

WINTER WHEAT INTENTIONS

46. **Do you intend to seed any WINTER WHEAT in this tract this fall?**..... *YES* ( ) - 1, *Don't Know* ( ) - 1, *NO* ( ) .....*Enter Code* [543 .0]

SECTION B. ACRES OWNED AND OPERATED

Now I would like to talk about all the acres of land that you own or operate, including cropland, woodland, pastureland, wasteland and non-agricultural land. Include land you rent in or manage as well as land you own. Let's sketch each parcel or piece of land you own or operate and its relative location from this segment, tract _____. Include land you own or operate in other counties.

1. **Sketch**

N

Tract _____
Parcel No. 1

Parcel Number	Location or name of parcel	Acreage			
		Owned	Rented from Others	Operated as hired manager	Rented to Others
a	*b*	*c*	*d*	*e*	*f*
1	Tract _____	.	.	.	.
2		.	.	.	.
3		.	.	.	.
4		.	.	.	.
5		.	.	.	.
Sum each column	**TOTAL**	901 .	902 .	904 .	905 .

2. *Add totals of cols. c + d + e and subtract col. f:* **Then the TOTAL land you now OPERATE in your entire farm is?....** [900 .]

SECTION C. GRAIN CROPS AND GRAIN STORAGE

If any small grain, corn, sorghum, flax or soybeans were reported in Section A, check YES for item 1 and SKIP to item 2.

1. **Will you produce any small grains, corn, sorghum, soybeans or flax on land you now operate?**

   YES ( ) - 1
   Don't Know ( ) - 1
   NO ( )

   ..... Enter Code 538 .0

2. **Will any small grains, corn, sorghum, soybeans or flax be stored by you or anyone else in 1970 on any land you now operate?**

   YES ( ) - 1
   Don't Know ( ) - 1
   NO ( )

   ..... Enter Code 539 .0

SECTION D. CATTLE ON TOTAL ACRES OPERATED

1. Are there any CATTLE and CALVES on these _____ acres you now operate?
(page 4, item 2)

( ) YES NO ( ) → 2. Will there be any cattle and calves on these acres from now through the end of the year?

YES ( ) - 1 } *Enter code and then*
Don't Know ( ) - 1 } *go to item 6*.....
NO ( ) - *Go to item 6*

193 .0

3. HOW MANY ARE:

a. BEEF COWS? Include heifers that have calved one or more times..... 356 .0

b. MILK COWS, dry and in milk? Include heifers that have calved one or more times?..... 357 .0

c. OTHER CATTLE and CALVES including 1970 calves now on hand?..... 358 .0

4. *Add items 3a + 3b + 3c:* Then the TOTAL CATTLE and CALVES on these _____ acres now is?..... 351 .0
Is that correct?

CALF CROP

5. Of the cows and heifers on these _____ acres now, how many will have CALVES from now through December 31, 1970?..... 367 .0

6. How many CALVES were born on these _____ acres from January 1, 1970 to now? Include those still on the farm, sold or died..... 366 .0

CATTLE GRAZING ON OTHER LAND

7. Some cattlemen have cattle on other land, such as public grazing land, land operated by grazing associations, feed yards or on rent free land. Do you have any other cattle and calves elsewhere?

YES ( ) Continue *NO ( ) Go to page 7*

8. In addition to the (item 3a +3b) _____ COWS, how many cows do you have ON OTHER LAND? Include heifers that have calved one or more times..... 363 .0

9. Of the COWS and HEIFERS on this OTHER LAND, how many will have calves from now through December 31, 1970?..... 369 .0

10. In addition to the (item 6) _____ calves born that you already reported, how many CALVES WERE BORN on other land from January 1, 1970 to now?..... 368 .0

If zero in items 8 thru 10, go to page 7

11. Who owns or operates THE OTHER LAND on which the (item 8) _____ cows are located?

Check here

(a) Federal, State or Local Government, School?... ☐

(b) Company or Corporation?..... ☐

(c) Privately operated Farm, Ranch or Feed Yard?
Specify _____ ☐

(d) Other *(Specify)* _____ ☐

SECTION E. COWS AND HEIFERS ON TRACT

If zero in items 3a and 3b on page 6, go to Hogs on page 8.

1. **Do you operate any ADJOINING land OUTSIDE the tract?** *Review sketch of parcels.*

( ) YES NO ( )

2. **Are there any COWS and HEIFERS now INSIDE the tract?**

YES ( ) Go to Block A below.
NO ( ) Go to Hogs, page 8.

3. **Are there any COWS and HEIFERS on any of the land INSIDE this tract or on ADJOINING land outside the tract?**

( ) YES NO ( ) *Go to Hogs, page 8.*

4. **Because of open gates, lack of fences, or for other reasons, can any of these COWS and HEIFERS NOW MOVE FREELY ACROSS the tract boundary to land both INSIDE and OUTSIDE this tract?**

( ) YES - *Go to Block A and Block B.* NO ( )

5. **Are any of these COWS and HEIFERS INSIDE the tract?**

( ) YES - *Go to Block A* NO ( ) - *Go to Hogs, page 8*

LINE	ITEM	Block A COWS now INSIDE tract and CANNOT move to land OUTSIDE.			Block B COWS CAN cross tract boundary to adjoining land.		
6	June Field Number →						OFFICE USE
7	BEEF COWS? Include heifers that have calved one or more times.	256 .0	256 .0	256 .0			256 .
8	MILK COWS, dry and in milk? Include heifers that have calved one or more times.	257 .0	257 .0	257 .0			257 .
9	→ Acres in field INSIDE tract.....						
10	→ Acres OUTSIDE tract cattle can now graze.						
11	→ *Add 9 + 10:* TOTAL acres in area cattle can now graze.						

12. **We have recorded the cows in fields ___, ___, ___ (Blocks A and B). The photo shows fields ___, ___, ___, ___ remaining on the photo. In these remaining fields are there now any cows or can any cows from adjoining land outside the tract freely move into these fields?**

NO ( ) Continue *YES ( ) Complete a column above for each additional field*

SECTION F. HOGS AND PIGS

HOGS AND PIGS INVENTORY

1. Are there any SOWS, BOARS, HOGS or PIGS on these _____ acres you now operate?

( ) YES ( ) NO

2. Have there been any HOGS or PIGS on these acres since December 1, 1969?

YES ( ) Go to item 8
NO ( )

3. Will there be any HOGS or PIGS on these _____ acres from now through the end of this year?

YES ( ) - 1 } Enter code and then
Don't Know ( ) - 1 } go to Sheep, page 9 ..... 192 .0
NO ( ) - Go to Sheep, page 9

Let's start with the HOGS and PIGS you keep for breeding.

		On Total Acres Operated	On the Tract
4. How many are:..	a. SOWS, GILTS and YOUNG GILTS for breeding? Include those bred and to be bred.....	305 .0	217 .0
	b. BOARS and YOUNG MALES for breeding?....	306 .0	218 .0
	c. SOWS and BOARS no longer used for breeding?.....	307 .0	219 .0

Now I would like some information about your hogs and pigs for market and home use. Exclude breeding hogs you already told me about.

5. How many are:	a. Under 60 lbs. including pigs not yet weaned?.....	311 .0	221 .0
	b. 60-119 lbs?.....	312 .0	223 .0
	c. 120-179 lbs?.....	313 .0	226 .0
	d. 180-219 lbs?.....	314 .0	227 .0
	e. 220 lbs. and over?..... *Exclude hogs no longer used for breeding*	315 .0	228 .0
6. *Add item 4+5:* Then the TOTAL SOWS, BOARS, HOGS and PIGS is?		300 .0	210 .0

EXPECTED FARROWINGS ON THE ENTIRE FARM

7. How many sows and gilts on these _____ acres are expected to farrow: *(page 4, item 2)*

	On Total Acres Operated
a. From now through June, July and August?	317 .0
b. During September, October and November?	318 .0

PREVIOUS SIX MONTHS FARROWINGS

8. How many SOWS and GILTS farrowed on these ____ acres December 1969 and January and February of this year?		321 .0
9. How many PIGS from these (item 8) ____ litters are:	a. Now on hand?	322 .0
	b. Already sold or slaughtered?	323 .0
10. How many SOWS and GILTS farrowed during March, April, May until Now?		325 .0
11. How many PIGS from these (item 10) ____ litters are:	a. Now on hand?	326 .0
	b. Already sold?	327 .0

HOG AND PIG DEATHS

12. How many hogs and pigs of weaning age and older have died on these acres since December 1, 1969?	308 .0

SECTION G. SHEEP AND CHICKENS

SHEEP AND LAMBS

1. How many SHEEP and LAMBS of all ages are on these _____ acres now? *(page 4, item 2)*	340 .0

CHICKENS

1. Are there any CHICKENS (excluding commercial broilers) on this tract now?

   ( ) YES ( ) NO

2. Will there be any CHICKENS on this tract between now and the end of this year?

   YES ( ) - 1 } Enter code, then go to item 9.....
   Don't Know ( ) - 1 }
   NO ( ) Go to item 9

   On The Tract: 195 .0

3. How many CHICKENS (excluding commercial broilers) are on this tract now?..... 280 .0

4. Of these (item 3) _____ CHICKENS, how many are HENS AND PULLETS of laying age?..... 281 .0

   If less than 400 chickens in item 3, go to item 10
   If 400 or more chickens, ask item 5

5. Are any of these (item 3) _____ chickens owned by another person or firm?

   YES ( ) Continue NO ( ) Go to item 10

6. How many of the chickens are OWNED by someone else?..... 282 .0

7. Of the (item 6) _____ chickens owned by someone else, how many are HENS and PULLETS of laying age?..... 283 .0

8. Who owns these (item 6) _____ CHICKENS?

   NAME _____ ADDRESS _____

   Go to item 10

   On Total Acres Operated

9. Are there any CHICKENS on any other land you operate?.. NO ( ) YES ( )-1 Enter Code 917 .0

10. RESPONDENT CODE:

	Code
Operator	1
Wife	2
Other relative	3
Hired worker	4
Neighbor	5
Other (specify) _____	6
Observed Data Only-Refusal	7
Observed Data Only-No Respondent	8

.....Enter Code 88 1.0

INT 999

Enter Name of respondent if not person in charge:

NAME _____

MINK

1. Do you raise mink or know anyone who does raise mink?

   YES ( ) *List each name on Supplement C*

   NO ( ) *Conclude interview*

SECTION H. AGRICULTURAL LABOR

1. During the week of May 17-23, did anyone do agricultural work for pay on the _____ acres you operate?

   ( ) YES NO ( ) Go to item 5

2. How many were:

   a. Paid family members?..... _____ 24-27

   b. Other workers hired and paid by you?..... 28-31

   c. Workers hired and paid by a contractor or custom operator?..... 31-35

3. *Add b + c:* Then the total non-family workers is?..... Is that correct?

   If item 3 is zero, go to item 5

4. How many of the (item 3) _____ workers:

   a. Will work 150 days or more on the land you operate?..... 36-39

   b. Were migratory workers?..... 40-43

   c. Were paid on a piece-rate basis?..... 44-47

5. During 1969 did you hire any agricultural workers to work on the land you operated?

   YES ( ) - 1 - Enter code and then go to item 7..... 48
   NO ( ) Ask item 6

6. Do you expect to employ workers to do agricultural work during the next 12 months?
   YES ( ) Ask item 7 NO ( ) Go to item 8

7. During the year, on which crop or kind of livestock do your hired workers spend most of their time?
   (Example: cotton, tobacco, fruit, vegetables, dairy, etc.)

   ANSWER: _____ OFFICE USE 49

8. Considering -- All your 1969 crops sold and to be sold,
   -- All livestock, poultry, (including commercial broilers) and products sold in 1969,
   -- All sales of any miscellaneous agricultural products in 1969,
   -- All government payments received in 1969,

   What was the total value of sales?

	Check Code
Less than $50	0 ( )
$ 50 - $ 250	1 ( )
$ 250 - $ 2,499	2 ( )
$ 2,500 - $ 4,999	3 ( )
$ 5,000 - $ 9,999	4 ( )
$ 10,000 - $19,999	5 ( )
$ 20,000 - $39,999	6 ( )
$ 40,000 - $59,999	7 ( )
$ 60,000 - $79,999	8 ( )
$ 80,000 - $99,999	9 ( )
$100,000 & Over	10 ( )

9. What two crops or principal agricultural uses will have the largest planted acreage this year on the land you operate?

Crop or Land Use	Acres

.....Enter Code 50-51

10. **In terms of total value of sales, what were the three most important agricultural products sold from the land you operated in 1969?**

	Specify Products	Percent of total
1st:	_____	_____%
2nd:	_____	_____%
3rd:	_____	_____%
4th:	ALL OTHER	_____%

OFFICE USE [52]

Now I would like to refer back to 1968.

11. **During 1968 did you hire 5 or more agricultural workers?**

YES ( ) - 1 ..... Enter Code [53]
NO ( ) Go to Farm Population, Section I

12. **Did at least 5 of these workers each work more than 20 days or did each earn more than $150 on the land you operate?**

YES ( ) - 1 ..... Enter Code [54]
NO ( )

13. **Did you file an Employer's Social Security Return for these employees?**

YES ( ) - 1 ..... Enter Code [55]
NO ( ) Go to Farm Population, Section I

14. **Has there been any change since 1968 in the Employer's name you use in filing these returns?**

YES ( ) - 1 ..... Enter Code [56]
NO ( ) Go to Farm Population, Section I

SECTION I. FARM POPULATION

1. **RACE - observe - Is this family:** *Check*
White - 1 ( )
Negro - 2 ( ) ..... Enter Code [12]
Other - 3 ( ) - specify _____

2. **How many people are now living in your house?** ..... No. [13-14]

3. **Since June 1, 1969, how many babies were born to residents of this house?** ..... No. [15]

4. **Since June 1, 1969, how many persons died who were residents of this house?** ..... No. [16]

5. **Are there any other persons living in this household who operate a farm or ranch?**

YES ( ) Enter Name _____
List this person on page 2, Part ID and interview him

NO ( ) Conclude interview

OFFICE USE

Tenure	[17-18]
Rptd. Sales	[19-20]
Edtd. Sales	[21-22]

* U. S. GOVERNMENT PRINTING OFFICE : 1970 394-232 [illegible]

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
Budget Bureau No. - 40-R2766
Approval Expires - 4/30/71
Item Count - 96

PART A - 2

STATE	DISTRICT	SEGMENT NO.	TRACT NO.

EXHIBIT C

JUNE 1970 ACREAGE,

LIVESTOCK & LABOR

ENUMERATIVE SURVEY

Use THIS Questionnaire For OPERATORS Living OUTSIDE The SEGMENT

Facts about your farm or ranch will be kept CONFIDENTIAL and used only in combination with similar reports from other producers.

SEGMENT NUMBER _____ **TRACT CODE LETTER:** _____

NAME: _____

ADDRESS: _____
(Route or Street) (City)

_____ _____
(State) (Zip)

TELEPHONE NUMBER: _____ **COUNTY:** _____

NAME OF FARM OR RANCH: _____

1. **How many acres are inside these boundaries drawn on the photo (or map)?**..... [ ]

2. **Will any acres INSIDE these boundaries be IRRIGATED during 1970?**

YES ( ) *Ask irrigation questions*
NO ( ) *Skip irrigation questions*

SECTION A - ACREAGES OF

A-2

FIELD NUMBER.....		1	2	3	4
1. TOTAL ACRES IN FIELD					
2. CROP or LAND USE - Name					
3. TWO CROPS HARVESTED FROM THIS FIELD?		YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
4. ACRES IRRIGATED AND TO BE IRRIGATED?					
5. FARMSTEAD, DITCHES, WOODS, ROADS, WASTE					
6. PASTURE	Permanent-Not in Crop Rotation	842	842	842	842
7.	Cropland-Used only for Pasture	845	845	845	845
10. WINTER WHEAT	Planted	540	540	540	540
11.	Intended for grain	541	541	541	541
12. DURUM WHEAT	Planted	551	551	551	551
13. OTHER SPRING WHEAT	Planted	550	550	550	550
16. SOYBEANS ALONE	Planted and to be planted	600	600	600	600
19. FLAXSEED	Planted and to be planted	693	693	693	693
23. SORGHUM	Planted and to be planted	603	603	603	603
24.	Intended for grain	604	604	604	604
25. HAY cut and to be cut	ALFALFA AND ALFALFA MIXTURES	653	653	653	653
26.	CLOVER-TIMOTHY OR CLOVER-GRASSES	655	655	655	655
27.	GRAIN	657	657	657	657
28.	LESPEDEZA	652	652	652	652
29.	OTHER	654	654	654	654
30.	WILD	651	651	651	651
31. CORN	Planted and to be planted	530	530	530	530
32.	Intended for grain	531	531	531	531
33. RYE	Planted	547	547	547	547
34.	Intended for grain	548	548	548	548
35. OATS	Planted	533	533	533	533
36.	Intended for grain	534	534	534	534
37. BARLEY	Planted	535	535	535	535
38.	Intended for grain	536	536	536	536
39. OTHER CROPS	Name of crop				
	Acres planted or in use				
40. OTHER UTILIZATION AND ABANDONMENT	Name, use or crop				
	Acres				
41. SUMMER FALLOW	Acres	847	847	847	847
42. SOIL IMPROVEMENT CROPS ONLY	No other use in 1970	856	856	856	856
43. IDLE CROPLAND	Acres idle in 1970	857	857	857	857

FIELDS AND CROPS IN TRACT

A-2

	5	6	7	8	9	OFFICE USE
Total Acres						840
Land Use						920 1.0
Two Crops	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	
Irrigated 1970						843
Other Land						841
Permanent Pasture	842	842	842	842	842	
Cropland Pasture	845	845	845	845	845	
Winter Wheat Planted	540	540	540	540	540	
Winter Wheat Harvested	541	541	541	541	541	
Durum Wheat	551	551	551	551	551	
Other Spring Wheat	550	550	550	550	550	
Soybeans	600	600	600	600	600	601
Flaxseed	693	693	693	693	693	
Sorghum Planted	603	603	603	603	603	
Sorghum Harvested	604	604	604	604	604	
Alfalfa Hay	653	653	653	653	353	
Clo-Tim Hay	655	655	655	655	355	
Grain Hay	657	657	657	657	657	
Lespedeza Hay	652	652	652	652	652	
Other Hay	654	654	654	654	654	
Wild Hay	651	651	651	651	651	
Corn Planted	530	530	530	530	530	
Corn Harvested	531	531	531	531	531	
Rye Planted	547	547	547	547	547	
Rye Harvested	548	548	548	548	548	
Oats Planted	533	533	533	533	533	
Oats Harvested	534	534	534	534	534	
Barley Planted	535	535	535	535	535	
Barley Harvested	536	536	536	536	536	
Other Crops-Name						
Acres						
Other Utilization						
Acres						
Summer Fallow	847	847	847	847	847	
Soil Improvement	856	856	856	856	856	
Idle Cropland	857	857	857	857	857	

SECTION A. (cont'd)

ACRES IRRIGATED FOR THE FIRST TIME

Ask item 45 only if any fields in the tract will be irrigated in 1970

45. How many acres in this tract will be irrigated in 1970 which were not irrigated in 1969 or earlier years?.....Acres **844**

WINTER WHEAT INTENTIONS

46. Do you intend to seed any WINTER WHEAT in this tract this fall?..... *YES ( ) - 1, Don't Know ( ) - 1, NO ( )*.....Enter Code **543 .0**

SECTION E. COWS AND HEIFERS ON TRACT

1. Do you operate any ADJOINING land OUTSIDE the tract?

( ) YES NO ( )

2. Are there any COWS and HEIFERS now INSIDE the tract?

YES ( ) Go to Block A below
NO ( ) Go to item 13 below

3. Are there any COWS and HEIFERS on any of the land INSIDE this tract or on ADJOINING land outside the tract?

( ) YES NO ( ) Go to item 13 below

4. Because of open gates, lack of fences, or for other reasons, can any of these COWS and HEIFERS NOW MOVE FREELY ACROSS the tract boundary to land both INSIDE and OUTSIDE this tract?

( ) YES - Go to Block A and Block B NO ( )

5. Are any of these COWS and HEIFERS INSIDE the tract?

( ) YES - Go to Block A
( ) NO - Go to item 13 below

LINE	ITEM	Block A: COWS now INSIDE tract and CANNOT move to land OUTSIDE.			Block B: COWS CAN cross tract boundary to adjoining land.		
6	June Field Number →						OFFICE USE
7	BEEF COWS? Include heifers that have calved one or more times.	258 .0	256 .0	258 .0			258 .
8	MILK COWS, dry and in milk? Include heifers that have calved one or more times.	257 .0	257 .0	257 .0			257 .
9	→ Acres in field INSIDE tract.....						
10	→ Acres OUTSIDE tract cattle can now graze...						
11	→ *Add 9 + 10:* TOTAL acres in area cattle can now graze...						

13. Will there be any cattle and calves on this tract between now and the end of the year?

YES ( ) - 1, Don't Know ( ) - 1, NO ( ).....Enter Code **193 .0**

SECTION F. HOGS

HOGS AND PIGS INVENTORY

1. **Are there any SOWS, BOARS, HOGS or PIGS on this tract now?**

( ) YES NO ( )

3. **Will there be any HOGS or PIGS on this tract from now through the end of this year?**

YES ( ) - 1 } *Enter code and then*
Don't Know ( ) - 1 } *go to Chickens on page 6*..... 192 .0
NO ( ) - *Go to Chickens on page 6*

Let's start with the HOGS and PIGS you keep for breeding.

4. **How many are:**

a. **SOWS, GILTS and YOUNG GILTS for breeding?**
Include those bred and to be bred..... 217 .0

b. **BOARS and YOUNG MALES used and to be used for breeding?**. 218 .0

c. **SOWS and BOARS no longer used for breeding?**..... 219 .0

Now I would like some information about your hogs and pigs for market and home use. Exclude breeding hogs you already told me about.

5. **How many are:**

a. **Under 60 lbs. including pigs not yet weaned**,..... 221 .0

b. **60-119 lbs?**..... 223 .0

c. **120-179 lbs?**..... 226 .0

d. **180-219 lbs?**..... 227 .0

e. **220 lbs. and over?**..... 228 .0
Exclude hogs no longer used for breeding

6. *Add item 4+5:* **Then the TOTAL SOWS, BOARS, HOGS and PIGS is?**..... 210 .0

SECTION G. CHICKENS

CHICKENS

1. Are there any CHICKENS (excluding commercial broilers) on this tract now?

( ) YES ( ) NO

2. Will there be any CHICKENS on this tract between now and the end of this year?

YES ( ) - 1
Don't Know ( ) - 1
NO ( )

Enter code then go to item 10..... 195 .0

3. How many CHICKENS (excluding commercial broilers) are on this tract now?..... 280 .0

4. Of these (item 3) _____ CHICKENS, how many are hens and pullets of laying age?..... 281 .0

If less than 400 chickens in item 3, go to item 10
If 400 or more chickens, ask item 5

5. Are any of these (item 3) _____ chickens owned by another person or firm?

YES ( ) Continue NO ( ) Go to item 10

6. How many of the chickens are OWNED by another person?..... 282 .0

7. Of the (item 6) _____ chickens owned by another person, how many are HENS and PULLETS of laying age?..... 283 .0

8. Who is the person or firm that owns the CHICKENS?

NAME _____ ADDRESS _____

_____

10. RESPONDENT CODE:

	Code
Operator	1
Wife	2
Other relative	3
Hired worker	4
Neighbor	5
Other (specify) _____	6
Observed Data Only-Refusal	7
Observed Data Only-No Respondent	8

.....Enter Code 88 1.0

HT 999

Enter Name of respondent if not person in charge:

Name _____

SECTION B. LAND OPERATED

Now I would like to talk about all the acres of land that you own or operate, including cropland, woodland, pastureland, wasteland and non-agricultural land. Include land you rent in or manage as well as land you own. Let's sketch each parcel or piece of land you own or operate and its relative location from this segment, tract _____. Include land you own or operate in other counties.

1. **Sketch**

N

Tract _____
Parcel No. 1

Parcel Number	Location or name of parcel	Acreage			
		Owned	Rented from Others	Operated as hired manager	Rented to Others
a	*b*	*c*	*d*	*e*	*f*
1	Tract _____	.	.	.	.
2		.	.	.	.
3		.	.	.	.
4		.	.	.	.
5		.	.	.	.
Sum each column	**TOTAL**	.	.	.	.

2. *Add totals of cols. c + d + e and subtract col. f:* **Then the TOTAL land you now OPERATE in your entire farm is?...** 906 .

SECTION C. GRAIN CROPS AND GRAIN STORAGE

Now I would like to ask about grain crops and grain storage on all the (item 2) _____ acres you now operate.

If any small grain, corn, sorghum, flax or soybeans were reported in Section A, check YES for item 1 and SKIP to item 2.

1. **Will you produce any small grains, corn, sorghum, soybeans or flax on land you now operate?**

YES ( ) - 1
Don't Know ( ) - 1
NO ( )

..... Enter Code 538 .0

2. **Will any small grains, corn, sorghum, soybeans or flax be stored by you or anyone else in 1970 on any land you now operate?**

YES ( ) - 1
Don't Know ( ) - 1
NO ( )

..... Enter Code 539 .0

HT 999

SECTION J. TENURE OF TRACT

1. Is there an occupied dwelling on any of the land you own, rent or manage INSIDE THIS SEGMENT?

NO ( ) *YES ( )*

4. Considering -- All your 1969 crops sold and to be sold,
-- All livestock, poultry, (including commercial broilers) and products sold in 1969,
-- All sales of any miscellaneous agricultural products in 1969,
-- All government payments received in 1969,

What was the total value of sales?

Less than $50---------- 0 ( )
$ 50 - $ 250---- 1 ( ) → 5. What two crops or principal agricultural uses will have the largest acreage this year on the land you operate?

Crop or Use	Acres

$ 250 - $ 2,499------ 2 ( )
$ 2,500 - $ 4,999------ 3 ( )
$ 5,000 - $ 9,999------ 4 ( )
$ 10,000 - $19,999------ 5 ( )
$ 20,000 - $39,999------ 6 ( )
$ 40,000 - $59,999------ 7 ( )
$ 60,000 - $79,999------ 8 ( )
$ 80,000 - $99,999------ 9 ( )
$100,000 & Over ------- 10 ( )

MINK

1. Do you raise mink or know anyone who does raise mink?

YES ( ) List each name on Supplement C

NO ( ) Conclude interview

☆ U. S. GOVERNMENT PRINTING OFFICE : 1970 ...

a. Of the PIGS, how many were BORN since March 1, 1969? If hogs and pigs are in the field, determine how many were born since March 1, 1969. These would still be rather small compared with older hogs and the size will be apparent on a photo.

Do not overlook in Section D items 14 through 18 on the tract Part A and items 14 through 17 on the entire farm Part A. Instructions for these items are in the Interviewers Manual starting on page 72.

Extreme Operators

For those extreme operators grazing livestock in these segments, it will be necessary to collect information for each field within the land areas outlined on the county map.

Complete the extreme operator's (white or pink) questionnaire; then ask him if he has any livestock within the area boundaries (there will be a purple boundary if the area is larger than a segment).

Some areas are subdivided by orange lines on the county maps. These orange lines indicate BLM fences and should be used as field boundaries.

Terminating Interview

Before closing the interview, tell the respondent that this area is in an SRS research project designed to study possible methods to get livestock inventory numbers from aerial photographs. Some of the segments will be photographed and reenumerated. Obtain the respondent's permission to make ground observation to identify species and location of livestock during the flights.

Also, he will be contacted after the flights to update the June Enumerative Survey information to the day of the flight.

This project has a dual purpose: (1) To collect information to be used in making the regular June Enumerative Survey estimate, and (2) to study the possibility of using aerial photography to obtain livestock inventory numbers.

Exhibit B

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
Budget Bureau No. - 40-R2766
Approval Expires - 4/30/70
Item Count - 80 C.E. 12-29

JUNE 1969

ACREAGE AND LIVESTOCK

QUALITY CONTROL

IDAHO AERIAL PHOTO SURVEY

Facts about your farm or ranch will be kept CONFIDENTIAL and used only in combination with similar reports from other producers.

SEGMENT NUMBER: _____ **TRACT CODE LETTER:** _____

NAME: _____

ADDRESS: _____
(Route or Street) (City)

_____
(State) (Zip)

TELEPHONE NUMBER: _____ **COUNTY:** _____

NAME OF FARM OR RANCH: _____

STATE	DISTRICT	SEGMENT NO.	TRACT NO.

Key punch but exclude from hash total

Date of Flight _____

SECTION A - ACREAGES OF

A-6-Idaho

	FIELD NUMBER.....	1	2	3	4	5
* 1.	TOTAL ACRES IN FIELD	.	.	.	.	.
* 2.	CROP or LAND USE - Name					
* 3.	TWO CROPS HARVESTED FROM THIS FIELD IN 1969?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
6.	FARMSTEAD, DITCHES, WOODS, ROADS, WASTE	.	.	.	.	.
7.	PASTURE - Permanent-Not in Crop Rotation	.	.	.	.	.
8.	PASTURE - Cropland-Used only for Pasture	.	.	.	.	.
11.	WINTER WHEAT - Planted	.	.	.	.	.
12.	WINTER WHEAT - Intended for grain	.	.	.	.	.
14.	OTHER SPRING WHEAT - Planted	.	.	.	.	.
18.	IRISH POTATOES - Planted and to be planted	.	.	.	.	.
21.	DRY BEANS - Planted and to be planted	.	.	.	.	.
22.	SUGAR BEETS - Planted and to be planted	.	.	.	.	.
23.	PEAS-DRY - Planted and to be planted	.	.	.	.	.
26.	HAY cut and to be cut - ALFALFA AND ALFALFA MIXTURES	.	.	.	.	.
27.	HAY cut and to be cut - CLOVER-TIMOTHY OR CLOVER-GRASSES	.	.	.	.	.
28.	HAY cut and to be cut - GRAIN	.	.	.	.	.
30.	HAY cut and to be cut - OTHER	.	.	.	.	.
31.	HAY cut and to be cut - WILD	.	.	.	.	.
32.	CORN - Planted and to be planted	.	.	.	.	.
33.	CORN - Intended for grain	.	.	.	.	.
36.	OATS - Planted	.	.	.	.	.
37.	OATS - Intended for grain	.	.	.	.	.
38.	BARLEY - Planted	.	.	.	.	.
39.	BARLEY - Intended for grain	.	.	.	.	.
40.	OTHER CROPS - Name of crop					
	OTHER CROPS - Acres planted or in use	.	.	.	.	.
41.	OTHER UTILIZATION AND ABANDONMENT - Name, use or crop					
	OTHER UTILIZATION AND ABANDONMENT - Acres	.	.	.	.	.
42.	SUMMER FALLOW - Acres	.	.	.	.	.
43.	SOIL IMPROVEMENT CROPS ONLY - No other use in 1969	.	.	.	.	.
44.	IDLE CROPLAND - Acres idle in 1969	.	.	.	.	.
* 50.	WERE THERE ANY LIVESTOCK IN THIS FIELD ON THE FLIGHT DATE?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )

FIELDS AND CROPS IN TRACT

Idaho-A-6

	6	7	8	9	10	11		COMMENTS
Total Acres	.	.	.	.	.	.	Total Acres	
Land Use							Land Use	
Two Crops	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Two Crops	
Other Land	.	.	.	.	.	.	Other Land	
Permanent Pasture	.	.	.	.	.	.	Permanent Pasture	
Cropland Pasture	.	.	.	.	.	.	Cropland Pasture	
Winter Wheat Pl.	.	.	.	.	.	.	Winter Wheat Pl.	
Winter Wheat H.	.	.	.	.	.	.	Winter Wheat H.	
Other Spg. Wheat	.	.	.	.	.	.	Other Spg. Wheat	
Irish Potatoes	.	.	.	.	.	.	Irish Potatoes	
Dry Beans	.	.	.	.	.	.	Dry Beans	
Sugar Beets	.	.	.	.	.	.	Sugar Beets	
Peas Dry	.	.	.	.	.	.	Peas Dry	
Alfalfa Hay	.	.	.	.	.	.	Alfalfa Hay	
Clo-Tim Hay	.	.	.	.	.	.	Clo-Tim Hay	
Grain Hay	.	.	.	.	.	.	Grain Hay	
Other Hay	.	.	.	.	.	.	Other Hay	
Wild Hay	.	.	.	.	.	.	Wild Hay	
Corn Pl.	.	.	.	.	.	.	Corn Pl.	
Corn H.	.	.	.	.	.	.	Corn H.	
Oats Pl.	.	.	.	.	.	.	Oats Pl.	
Oats H.	.	.	.	.	.	.	Oats H.	
Barley Pl.	.	.	.	.	.	.	Barley Pl.	
Barley H.	.	.	.	.	.	.	Barley H.	
Other Crops							Other Crops	
Acres	.	.	.	.	.	.	Acres	
Other Utilization							Other Utilization	
Acres	.	.	.	.	.	.	Acres	
Summer Fallow	.	.	.	.	.	.	Summer Fallow	
Soil Improvement	.	.	.	.	.	.	Soil Improvement	
Idle Cropland	.	.	.	.	.	.	Idle Cropland	
Livestock?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Livestock?	

Idaho

SECTION D. LIVESTOCK

Now that we have located the tract fields on the photo. I would like to ask additional questions about the livestock (excluding chickens) on those fields on _____.
(Date of Flight)

1. **Did you operate any ADJOINING land OUTSIDE the tract?**

( ) NO YES ( ) → 3. **Were there any livestock on any of the land INSIDE this tract or on ADJOINING land outside the tract?**

( ) NO YES ( )

Go to page 6

2. **Were there any livestock INSIDE the tract?**

( ) NO YES ( ) → *Go to Block A and list separately each field or fields with livestock*

Go to page 6

Line No.	Item	Block A: Livestock now INSIDE tract and CANNOT move to land outside					
1	Field Numbers						
2	TOTAL CATTLE and CALVES						
3	Of the CALVES, how many were BORN since January 1, 1969?						
4	SHEEP and LAMBS of all ages?						
a	Of the LAMBS how many were BORN: During January and February, 1969?						
b	Of the LAMBS how many were BORN: From March 1, 1969 to now?						
5	HORSES and PONIES of all ages?						
a	Of these, how many were BORN since January 1, 1969?						
6	HOGS and PIGS of all ages?						
a	Of the PIGS, how many were BORN since March 1, 1969?						

7	Acres in field INSIDE tract
8	Acres OUTSIDE tract on which livestock can now graze
9	*Add 14 + 15:* TOTAL acres in area livestock can now graze

10. *We have recorded the livestock that were in fields ___, ___, ___ (Blocks A and B). The photo shows fields ___, ___, ___, ___ remaining on the photo. In these remaining fields were there any livestock or could any livestock from adjoining land outside the tract freely move into these fields?*

NO ( ) Continue on page 6 *YES ( ) Complete a column for each additional field*

Idaho

ON TRACT

4. **Because of open gates, lack of fences, or for other reasons, could any livestock MOVE FREELY ACROSS the tract boundary to land both INSIDE and OUTSIDE this tract?**

( ) NO YES ( ) → 1. *In Block A list the tract fields that had livestock that could NOT MOVE FREELY ACROSS the tract boundary.*

2. *In Block B list the tract fields that were grazed by livestock that CAN MOVE FREELY ACROSS the tract boundary.*

5. **Were there any livestock INSIDE the tract?**

YES ( ) Go to Block A

NO ( ) Go to page 6

Line No.	Block B — Livestock CAN CROSS tract boundary but are: Now Inside		Now Outside		Don't Know	
1						
2						
3						
4						
a						
b						
5						
a						
6						
a						
7						
8						
9						

Was there any decrease in numbers due to deaths, sales or movement out of any of these fields?

YES ( ) *NO ( ) Conclude interview*

DECREASES

Tract and Field Number	Species	Number Decreased		Deaths		Moved from this Field			Date Moved
						To Tract and Field Number	To Outside Segment		
		Mature 1/	Young 2/	Mature 1/	Young 2/		within 4 counties 3/	and outside 4 counties 3/	

1/ *Mature are all animals not classed as young.*

2/ *Young animals are: cattle born since January 1, 1969 to flight date. Sheep born since January 1, 1969 to flight date. Horses and ponies born since January 1, 1969 to flight date. Hogs born since March 1, 1969 and flight date.*

3/ *4 counties are Jerome, Cassia, Minidoka and Twin Falls.*

Now I would like to ask about any changes in livestock numbers in the fields of this tract between _____ (date of enumeration) and _____ (date photography taken).

Was there any increase due to births, purchases or movement in any of these fields?

YES ( ) ↓

NO ( ) →

INCREASES

Tract and Field Number	Species	Number Increased		Births	Moved into Field			Date Moved
		Mature 1/	Young 2/		From Tract and Field Number	From Outside Segment: but within 4 counties 3/	From Outside Segment: and from outside 4 counties 3/	

1/ *Mature are all animals not classed as young.*

2/ *Young animals are: cattle born since January 1, 1969 to flight date. Sheep born since January 1, 1969 to flight date. Horses and ponies born since January 1, 1969 and flight date. Hogs born since March 1, 1969 and flight date.*

3/ *4 counties are Jerome, Cassia, Minidoka and Twin Falls.*

Exhibit C

Supervising and Editing Manual, Section 9, Editing Supplement

Section A - Items 45 through 50b

Answers are necessary for every field. If missing answers cannot be editied in, then enumerator must be contacted.

45. Must be answered. Information on land use and crops in items 2 thru 44 should be used as a guide to correctness of answer.

46. Must be answered if item 45 is checked "YES".

47. Must be answered. Aerial enlargement will be an aid to the correct answer.

48. Must be answered especially whenever item 45 is answered "NO".

49. Must be answered if item 48 is checked "YES". If item 48 is "NO", edit zero in item 49.

50. Must be answered. Section A will indicate possible answer depending on land use. This question should agree with Section D.
    50a Must be answered if item 50 is checked "YES".
    50b Must be answered if item 50 is checked "NO".

Classify each field into a domain. Write code symbol (A,B,C,D,E) just below the answers for item 50b.

Domain A: Fields with man-made cover providing a potential shielding of animals in a relatively small area or barnyard. Item 2 marked farmstead, corrals, or barnyard feedlot, and item 45 marked "YES".

Domain B: Fields with man-made cover in a large area: Item 2 answered for use other than farmstead, corrals, and barnyard and item 45 marked "YES".

Domain C: Fields with more than 5% natural cover. Item 45 marked "NO", item 47 may be "YES" or "NO". Item 48 marked "YES" and item 49 answered greater than 5%.

Domain D: Field with trees on the fence or borderline but 5% or less within the field. Item 45 marked "NO", item 47 marked "YES", item 48 marked "YES" or "NO", and item 49 answered 5% or less.

Domain E: Fields without border cover and 5% or less interior cover. Item 45 marked "NO", item 47 marked "NO", item 48 marked "YES" or "NO", and item 49 answered 5% or less. This domain will contain all fields not classified into one of the previous domains.

Section D - Special items are 7, 8, 8a, 8b, 9, 9a, 10, and 10a

These items must be answered completely for every field marked "YES" in item 50, Section A and again listed in Section D.

Item 17 is to insure completeness of this section. If answers are not complete, contact enumerator. Item 18 (non-resident operator only) must have been checked if there are not cattle on the tract at the time of interview.

Instructions for editing items 7 through 10a are as follows:

7. Calves born cannot exceed item 4d. Also cannot exceed the number of calves born on the entire farm reported in Section C, item 8, page 7 (resident operator).

8. Total sheep and lambs cannot exceed the number reported in Section C for the entire farm (resident operator).
   8a and 8b Lambs born, sum of 8a plus 8b cannot exceed item 8.

9. Accept the figure reported unless it appears unreasonable based on knowledge of the particular tract or area.
   9a Births cannot exceed total horses and ponies in item 9.

10. Total hogs and pigs cannot exceed the entire farm totals reported in Section C, item 8, page 5. Item 10 entry will also be the same as the total reported in Section D, item 8, page 10 of the entire farm Part A and page 6 of the tract Part A. 10a Pigs born cannot exceed item 10. They also should not exceed the number reported in Section C, item 13a, page 6.

EXHIBIT D

Instructions for Listing Segments and

for Selecting the Sample Enumerative Segments for Aerial Photography

I. Listing Instructions Prior to Selection of Sample for Photo Coverage

A. Photo copies will be made of each tract questionnaire of the face sheet, Section A, and Section D. These copies will be used primarily to check for errors and maintain records. Original questionnaires must be submitted for June Enumerative Survey Summary.

B. Cultivated Segments

1. Each segment will be listed on a single listing sheet.

2. Information to be listed by fields within tracts: Segment number, tract code, field number, crop name, field acreage, domain classification and number of cattle, sheep, horses and swine (total and young). Date of enumeration and name and address of operator should be recorded for each tract.

3. Each listing sheet (segment) then will be classified into one of three groups: With hogs or sheep, with cattle but no hogs or sheep, without cattle, sheep or hogs.

C. Range Segments

1. Each "field" (as identified on county maps for photo coverage selection) will be listed. Fields will be arrayed by size (area).

2. Information listed for each field will include segment numbers, name and address of operator, field number, field size in square miles, expected number of photos for complete coverage, average number of photos per flight line, crop name, acreage, date of enumeration, domain classification, and number of cattle, sheep, horses and swine (total and young).

D. All information on aerial photos used during June Enumeration will be copied onto an Itek reproduction.

II. Listing Instructions Prior to Selection of Sample for Ground Observation

A. Cultivated Segments with Livestock

1. Fields will be listed in numerical order by domain and species. No field will be listed twice. Fields containing more than one species will be listed in the species group for which there is the largest number of animals in that field. The four species groups are hogs, sheep, cattle, and other (no cattle, sheep or hogs). Within each species group, fields will be arrayed starting with lowest segment number, tract code letters in alphabetical order and field number in ascending sequence. For example, if these four fields contained sheep, they would be listed in this order:

Segment 1549, Tract A, Field 10
Segment 1549, Tract B, Field 1
Segment 1549, Tract B, Field 4
Segment 1550, Tract A, Field 1

There will be five domains.

2. Fields in segments not containing livestock need not be listed again.

B. Fields in range segments do not need to be listed again. Use listing made for photo coverage sample.

III. Instructions for Selecting Sample Enumerative Segments for Aerial Photography

A. Cultivated Segments

1. List segments so that segments can be classified into one of the following groups: With sheep or hogs, with cattle but no sheep or hogs, without sheep, hogs or cattle.

Within each group, arrange segments into increasing sequential order by segment number, unless it is necessary to arrange them by domains in order to include the less frequent domains.

2. Selection of Segments

a. Select all segments containing sheep or hogs.

b. Select a systematic sample of 1/2 of the segments containing cattle, but no sheep or hogs.

c. Select a systamatic sample of 1/2 the segments without cattle, sheep or hogs.

3. Check to see that each domain having fields containing cattle has at least two fields in the sample. If a domain does not have two fields containing cattle in the sample, then an additional segment containing a field in the missing domain will be selected.

B. Range Segments

1. On the listing sheets, fields will be arrayed by size (area). Domain classification and the number of livestock by species will be listed for each field.

2. Selection of fields with livestock will proceed until the estimated photo coverage will require 700 prints--about nine fields.

a. System of selection of fields.

(1) Select any field containing hogs (one field) randomly.

(2) Select from Domain C, one field containing sheep and one field containing cattle (two fields).

(3) Randomly select from Domain B, one field containing cattle and one containing sheep (two fields).

(4) From Domain E, randomly select one field for cattle and one for sheep (two fields).

(5) From Domain D, randomly select one field for cattle and one for sheep (two fields).

b. If additional fields can be selected, use the following priority selecting one field per category until 700 B&W prints have been used.

Cattle Domain A
Sheep Domain A
Cattle Domain C
Sheep Domain C
Cattle Domain B
Sheep Domain B
Cattle Domain D
Sheep Domain D
Cattle Domain E
Sheep Domain E

3. Selection of fields without livestock. From Segments arrayed by size draw a systematic sample of fields to allocate 100 prints (use average number of photos per flight line as the estimated number of photos needed for each field).

EXHIBIT E

Enumerator Instruction for the Reenumeration Survey

The primary purpose of this enumeration is to update data collected during the regular June Enumerative Survey to the date aerial photography was obtained.

For the segments in the cultivated stratum, the entire segment (if selected for photographic coverage) will be reenumerated using the Quality Control Questionnaire.

In the range stratum, only those "fields" selected for photographic coverage need to be reenumerated.

The face sheet will have the segment number, tract code letter, and name copied from the June Enumerative Survey questionnaire. If the name is correct, the remainder of the face page may be left blank; if the name is not correct, then complete the remaining items of address, telephone number, county and ranch name (if any).

Section A

The format of this page is similar to that used for the regular June Enumerative Survey. An account must be made of all land within cultivated segments, or within range "fields." Refer to pages 32 to 51 of the June Interviewer's Manual for detailed instructions. The same photo materials as used for the June Enumeration will be supplied. Field boundaries were marked and need not be redrawn except for major errors.

Date of flight has been listed at the top of page 2. All information should relate to this date.

Question 50 should be asked for every field.

Section D

This section is similar to the same section of the regular June Enumerative Survey questionnaire. For each species, we need total number and number of young. For detailed instruction applying to the lead questions, read June Enumeration Interviewer's Manual, pages 72 through 83. These questions apply to all species.

Data collected should relate to the date of flight listed at the top of page 4.

Increase in Livestock Numbers (page 6)

This section will be used for each field that contained more livestock on the flight date than on the date of enumeration. Office personnel have entered the date of enumeration and date photography in appropriate blanks at the top of page 6.

If there were no increases in any field, ask about decreases. If the number in any field has increased, write in the tract and field code for each field and complete the remaining columns.

Fields containing livestock on the June Enumeration have been listed with species contained in the field. If question 50, Section A is answered "yes," but a field is not listed, this indicates an increase which should be explained. Field should be listed in Section D.

A field may contain more than one species. In such a case, use more than one line.

Tract and Field Number should be obtained from photo. It will be the same as indicated in Section A.

Species will be cattle, sheep, hogs, horses, and other.

Number increased is movement into the field, and includes births. Mature animals are all animals not classed as young. Young animals are those born since January 1, 1969, except for hogs which are those born since March 1, 1969. Increases are those between first enumeration date and flight date only and does not include any born or moved into the field after the flight date.

Births will be those born between enumeration date and flight date. These dates are at the top of page 6.

Moved into field from another tract or field inside the segment. This is field-to-field movement. Record tract and field code from which the animals originated.

Moved into field from outside segment but within four counties. This indicates animals were in one of the four counties (Jerome, Minidoka, Cassia or Twin Falls) but were not inside the segment or field at the time of the June Enumeration. It is within area movement. Indicate this type of movement by a check.

Moved into field from outside four counties. This indicates movement from outside the four county areas into the area. Total increase in numbers must be shown by entries in one or more of the four columns: Birth, moved from another field, moved into field within area, or moved into field from outside the area.

Date moved is asked to insure that increase was between enumeration date and flight date.

Decrease. Same series of questions are to be asked except we are obtaining decreases rather than increases in livestock numbers in each field. These pages are essentially recording forms and the enumerator will need to phrase his own questions to fit the occasion. Deaths should be recorded by age group.

Field numbers and species identification have been listed for those fields reporting livestock on the June Enumerative Survey. If question 50, Section A is "no," and Section D does not have livestock in any of these fields, then a decrease is indicated and should be explained.

Exhibit F

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service
Budget Bureau No. - 40-R2766
Approval Expires - 4/30/70
Item Count - 110 C.E. 12-29

PART A - 6
SPECIAL - IDAHO

JUNE 1969

ACREAGE AND LIVESTOCK

ENUMERATIVE SURVEY

Use THIS Questionnaire For OPERATORS Living OUTSIDE The SEGMENT

Facts about your farm or ranch will be kept CONFIDENTIAL and used only in combination with similar reports from other producers.

SEGMENT NUMBER: _____ **TRACT CODE LETTER:** _____

NAME _____

ADDRESS _____
(Route or Street) (City)

_____
(State) (Zip)

TELEPHONE NUMBER: _____ **COUNTY:** _____

NAME OF FARM OR RANCH: _____

1 **How many acres are inside these boundaries drawn on the photo (or map)?** .....

STATE	DISTRICT	SEGMENT NO.	TRACT NO.

Key punch segment from bush out

SECTION A - ACREAGES OF

A-6-Idaho

	FIELD NUMBER.....	1	2	3	4	5
* 1.	TOTAL ACRES IN FIELD	.	.	.	.	.
* 2.	CROP or LAND USE - Name					
* 3.	TWO CROPS HARVESTED FROM THIS FIELD IN 1969?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
* 4.	ACRES IRRIGATED AND TO BE IRRIGATED IN 1969?	.	.	.	.	.
* 5.	ACRES BEING IRRIGATED FOR THE FIRST TIME?	.	.	.	.	.
6.	FARMSTEAD, DITCHES, WOODS, ROADS, WASTE	.	.	.	.	.
7.	PASTURE Permanent-Not in Crop Rotation	.	.	.	.	.
8.	Cropland-Used only for Pasture	.	.	.	.	.
11.	WINTER WHEAT Planted	.	.	.	.	.
12.	Intended for grain	.	.	.	.	.
14.	OTHER SPRING WHEAT Planted	.	.	.	.	.
18.	IRISH POTATOES Planted and to be planted	.	.	.	.	.
21.	DRY BEANS Planted and to be planted	.	.	.	.	.
22.	SUGAR BEETS Planted and to be planted	.	.	.	.	.
23.	PEAS-DRY Planted and to be planted	.	.	.	.	.
26.	HAY cut and to be cut: ALFALFA AND ALFALFA MIXTURES	.	.	.	.	.
27.	HAY cut and to be cut: CLOVER-TIMOTHY OR CLOVER-GRASSES	.	.	.	.	.
28.	HAY cut and to be cut: GRAIN	.	.	.	.	.
30.	HAY cut and to be cut: OTHER	.	.	.	.	.
31.	HAY cut and to be cut: WILD	.	.	.	.	.
32.	CORN Planted and to be planted	.	.	.	.	.
33.	Intended for grain	.	.	.	.	.
36.	OATS Planted	.	.	.	.	.
37.	Intended for grain	.	.	.	.	.
38.	BARLEY Planted	.	.	.	.	.
39.	Intended for grain	.	.	.	.	.
40.	OTHER CROPS Name of crop					
	Acres planted or in use	.	.	.	.	.
41.	OTHER UTILIZATION AND ABANDONMENT Name, use or crop					
	Acres	.	.	.	.	.
42.	SUMMER FALLOW Acres	.	.	.	.	.
43.	SOIL IMPROVEMENT CROPS ONLY No other use in 1969	.	.	.	.	.
44.	IDLE CROPLAND Acres idle in 1969	.	.	.	.	.
* 45.	MAN MADE COVER in field; houses, barns, sheds, corrals, feeders, etc.?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
* 46.	IF YES to item 45, may any of these structures be used to house or enclose livestock?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
* 47.	TREES or BRUSH in the fence line or border?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
* 48.	NATURAL COVER INSIDE the field; trees or brush?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
* 49.	IF YES to item 48, what PERCENT of the field is covered?	%	%	%	%	%
* 50.	ARE THERE ANY LIVESTOCK IN THIS FIELD NOW?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
	a. If YES, will any livestock be moved OUT of this field within the next 3 weeks?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )
	b. If NO, will any livestock be moved INTO this field within the next 3 weeks?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )

FIELDS AND CROPS IN TRACT

Idaho-A-6

	6	7	8	9	10	11		OFFICE USE	
Total Acres	.	.	.	.	.	.	Total Acres	840	
Land Use							Land Use	920	1.0
Two Crops	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Two Crops		
Irrigated 1969	.	.	.	.	.	.	Irrigated 1969	843	.
Irrigated First Time	.	.	.	.	.	.	Irrigated First Time	844	.
Other Land	.	.	.	.	.	.	Other Land	841	.
Permanent Pasture	.	.	.	.	.	.	Permanent Pasture	842	.
Cropland Pasture	.	.	.	.	.	.	Cropland Pasture	845	.
Winter Wheat Pl.	.	.	.	.	.	.	Winter Wheat Pl.	540	.
Winter Wheat H.	.	.	.	.	.	.	Winter Wheat H.	541	.
Other Spg. Wheat	.	.	.	.	.	.	Other Spg. Wheat	550	.
Irish Potatoes	.	.	.	.	.	.	Irish Potatoes	552	.
Dry Beans	.	.	.	.	.	.	Dry Beans	607	.
Sugar Beets	.	.	.	.	.	.	Sugar Beets	691	.
Peas Dry	.	.	.	.	.	.	Peas Dry	608	.
Alfalfa Hay	.	.	.	.	.	.	Alfalfa Hay	653	.
Clo-Tim Hay	.	.	.	.	.	.	Clo-Tim Hay	655	.
Grain Hay	.	.	.	.	.	.	Grain Hay	657	.
Other Hay	.	.	.	.	.	.	Other Hay	654	.
Wild Hay	.	.	.	.	.	.	Wild Hay	651	.
Corn Pl.	.	.	.	.	.	.	Corn Pl.	530	.
Corn H.	.	.	.	.	.	.	Corn H.	531	.
Oats Pl.	.	.	.	.	.	.	Oats Pl.	533	.
Oats H.	.	.	.	.	.	.	Oats H.	534	.
Barley Pl.	.	.	.	.	.	.	Barley Pl.	535	.
Barley H.	.	.	.	.	.	.	Barley H.	536	.
Other Crops							Other Crops		.
Acres	.	.	.	.	.	.	Acres		.
Other Utilization							Other Utilization		.
Acres	.	.	.	.	.	.	Acres		.
Summer Fallow	.	.	.	.	.	.	Summer Fallow	847	.
Soil Improvement	.	.	.	.	.	.	Soil Improvement	856	.
Idle Cropland	.	.	.	.	.	.	Idle Cropland	857	.
Man Made Cover	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Man Made Cover		
House Livestock?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	House Livestock?		
Trees or Brush	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Trees or Brush		
Natural Cover	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Natural Cover		
Percent	%	%	%	%	%	%	Percent		
Livestock?	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Livestock?		
Moved out	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Moved out		
Moved in	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	YES ( ) NO ( )	Moved in		

SECTION D. LIVESTOCK

Now I would like to ask about the Livestock and Chickens in these fields we have just drawn off on the photo. Include all that you own and any owned by someone else that are on this tract today.

1. **Do you operate any ADJOINING land OUTSIDE the tract?**

( ) NO YES ( ) → 3. **Are there any livestock on any of the land INSIDE this tract or on ADJOINING land outside the tract?**

( ) NO YES ( )

Go to item 18 at bottom of page 5

2. **Are there any livestock now INSIDE the tract?**

( ) NO YES ( ) → *Go to Block A and list separately each field or fields with livestock*

Go to item 18 at bottom of page 5

Line No.	Item	Block A: Livestock now INSIDE tract and CANNOT move to land outside					
1	Field Numbers						
4a	MILK COWS both dry and in milk. Include heifers that have calved.						
b	BEEF COWS and beef heifers that have calved.						
c	OTHER CATTLE weighing 500 lbs. or more – heifers, steers, and bulls.						
d	CATTLE and CALVES weighing less than 500 lbs. .....heifers, steers, bulls and 1969 calves.						
6	TOTAL CATTLE and CALVES						
7	Of the CALVES, how many were BORN since January 1, 1969?						
8	SHEEP and LAMBS of all ages?						
a	Of the LAMBS how many were BORN: During January and February, 1969?						
b	From March 1, 1969 to now?						
9	HORSES and PONIES of all ages?						
a	Of these, how many were BORN since January 1, 1969?						
10	HOGS and PIGS of all ages?						
a	Of the PIGS, how many were BORN since March 1, 1969?						

14	Acres in field INSIDE tract
15	Acres OUTSIDE tract on which livestock can now graze
16	*Add 14 + 15:* TOTAL acres in area livestock can now graze

17. *We have recorded the livestock in fields ___, ___, ___ (Blocks A and B). The photo shows fields ___, ___, ___, ___ remaining on the photo. In these remaining fields are there now any livestock or can any livestock from adjoining land outside the tract freely move into these fields?*

NO ( ) Continue YES ( ) Complete a column for each additional field

AND CHICKENS ON TRACT

4. **Because of open gates, lack of fences, or for other reasons, can any of these livestock NOW MOVE FREELY ACROSS the tract boundary to land both INSIDE and OUTSIDE this tract?**

( ) NO YES ( ) → *1. In Block A list the tract fields with livestock that CANNOT MOVE FREELY ACROSS the tract boundary.*

2. In Block B list the tract fields grazed by livestock that CAN MOVE FREELY ACROSS the tract boundary.

5. **Are there any livestock INSIDE the tract?**

YES ( ) Go to Block A

NO ( ) Go to item 18 at bottom of page

Line No.	Block B: Livestock CAN CROSS tract boundary but are: Now Inside		Now Outside		Don't Know		OFFICE USE: Proration I	Proration II	I	II
1										
4a									251 .	231 .
b									252 .	232 .
c									253 .	233 .
d									254 .	234 .
6									250 .	230 .
7										
8										
a										
b										
9										
a										
10										
a										
14										
15										
16										

18. **Will there be any cattle on this tract between now and the end of the year?**

YES ( ) 1
NO ( ) 0 Go to Hogs, on page 6
Don't Know ( ) 1

OFFICE USE
193 .0

HOGS

1. **Are there any SOWS, BOARS, HOGS, or PIGS on this tract now?**

( ) YES NO ( )

3. **Will there by any HOGS or PIGS on this tract between now and the end of this year?**

YES ( ) 1
NO ( ) 0
Don't Know ( ) 1

Go to Chickens, on page 7

OFFICE USE 102 .0

4. **HOW MANY ARE:**

a. **BRED SOWS and BRED GILTS?** ..... 113 .0

b. **OTHER SOWS and GILTS to be bred and YOUNG GILTS to be selected for breeding?** ..... 114 .0

5. *Add a + b:* **Then the TOTAL SOWS and GILTS bred and to be bred is?** ..... 115 .0
Is that correct?

6. **HOW MANY ARE:**

a. **BOARS and YOUNG MALES to be used for breeding?** ..... 116 .0

b. **SOWS and BOARS no longer used for breeding?** ..... 117 .0

Now I would like some information about your other hogs and pigs. Exclude breeding hogs you have already told me about.

7. **How many unweaned PIGS, HOGS and PIGS for market and home use on this tract now are:**

a. **Under 60 lbs. including pigs not yet weaned...** 121 .0

b. **60-119 lbs.** ..... 122 .0

c. **120-179 lbs.** ..... 123 .0

d. **180-219 lbs.** ..... 124 .0

e. **220 lbs. and over.** ..... 125 .0

Exclude hogs reported in item 6b above

f. **TOTAL HOGS and PIGS for market and home use.** ..... 120 .0

Have you told me about ALL the unweaned pigs, feeder pigs and any other hogs and pigs? If not I want to include these omitted hogs and pigs.

YES ( ) Continue NO ( ) Include any omitted hogs and pigs in item 7

8. *Add items 5 + 6a + 6b + 7f:* **Then the TOTAL SOWS, BOARS, HOGS and PIGS is?** .... 110 .0
Is that correct?

9. Of the (item 5) _____ SOWS and GILTS, how many are expected to farrow:

a. From now through June, July and August?..... 127 .0

b. During September, October and November?..... 128 .0

CHICKENS

1. Are there any CHICKENS (excluding commercial broilers) on this tract now?

( ) *YES* ( ) *NO*

2. Will there be any CHICKENS on this tract between now and the end of the year?

YES ( ) 1
NO ( ) 0
Don't Know ( ) 1

Go to Tenure, page 8

OFFICE USE 195 .0

3. How many CHICKENS (excluding commercial broilers) are on this tract now?..... 360 .0

4. Of these (item 3) _____ CHICKENS, how many are hens and pullets of laying age? 361 .0

If less than 400 chickens, go to Tenure, page 8
If 400 or more chickens ask item 5

5. Are any of these (item 3) _____ chickens owned by another person or firm?

YES ( ) *Continue* *NO* ( ) *Go to Tenure, page 8*

6. How many of the chickens are NOW OWNED by another person?..... 362 .0

OFFICE USE 384 .0

7. Who is the person or firm that owns the CHICKENS?

NAME _____ ADDRESS _____

WINTER WHEAT INTENTIONS

1. Do you intend to seed any WINTER WHEAT in this tract this fall?.....

YES ( ) 1
NO ( ) 0
Don't Know ( ) 1

OFFICE USE 343 .0

OFFICE USE 88 1.0

HASH TOTAL 888

SECTION G. TENURE OF TRACT

1. Is there an occupied dwelling on any of the land you own, rent or manage INSIDE THIS SEGMENT?

   ( ) YES ( ) NO, go to item 5 below

   Who lives in this house? _____
   (Name)

2. How many acres are in your total farming operation?..... [ ]

3. How many of these (item 2) _____ acres do you:

   a. OWN..... [ ]

   b. RENT FROM OTHERS..... [ ]

   c. MANAGE FOR SOMEONE ELSE..... [ ]

4. Considering -- All your 1968 crops sold and to be sold,
   -- All livestock, poultry, (including commercial broilers) and products sold in 1968,
   -- All sales of any miscellaneous agricultural products in 1968,
   -- All government payments received in 1968,

   What was the total value of sales?

   'Please give me the code that most nearly describes total value of sales for this farm.'

	Check Code
$100,000 & Over	10 ( )
$ 80,000 - $99,999	9 ( )
$ 60,000 - $79,999	8 ( )
$ 40,000 - $59,999	7 ( )
$ 20,000 - $39,999	6 ( )
$ 10,000 - $19,999	5 ( )
$ 5,000 - $ 9,999	4 ( )
$ 2,500 - $ 4,999	3 ( )
$ 250 - $ 2,499	2 ( )
$ 50 - $ 249	1 ( )
Less than $50	0 ( )

5. RESPONDENT CODE:
   Operator.....( ) 1
   Wife.....( ) 2
   Other relative.....( ) 3
   Hired worker.....( ) 4
   Neighbor.....( ) 5
   Other (specify) _____.....( ) 6
   Observed Data Only-Refusal.....( ) 7
   Observed Data Only-No Respondent..( ) 8

EXHIBIT G

Instructions for Counting Livestock

and Completing Interpretation Form

Each black and white exposure has been delineated into cells. Red lines indicate segment boundaries. Green lines locate a cell comparable to the area that has color photography. This cell is usually located near the center of the "effective count area." Blue lines indicate other cell boundaries and overlap boundaries. Yellow lines indicate the edge between two flight lines.

Cells outlined in green will be designated as cell number three. Cells will be numbered from left to right except for cell number three. Prints will not contain more than five cells. Scale for most of the photography is 1/6000.

Successive photos overlap approximately 60 percent to provide stereo coverage.

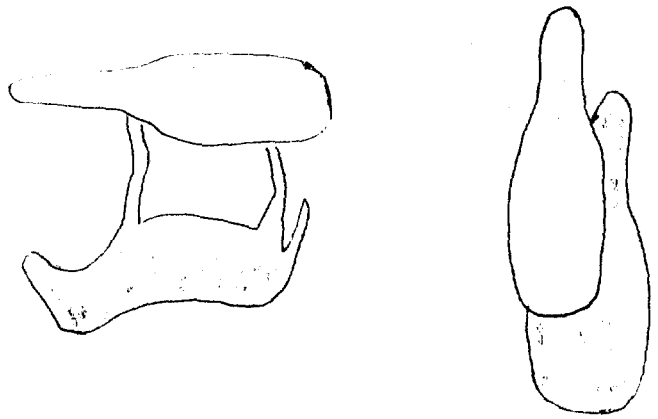
Photos will be assigned in groups. Interpreters will be working on successive photos within a segment. All photos for one cultivated segment are in one packet. Range segments may require several packets. The interpreter will count only assigned photos.

Complete a form with the heading "Nine Inch Black and White Photo Interpretation Form" for each exposure. Segment and exposure numbers can be found in upper right hand corner of each print.

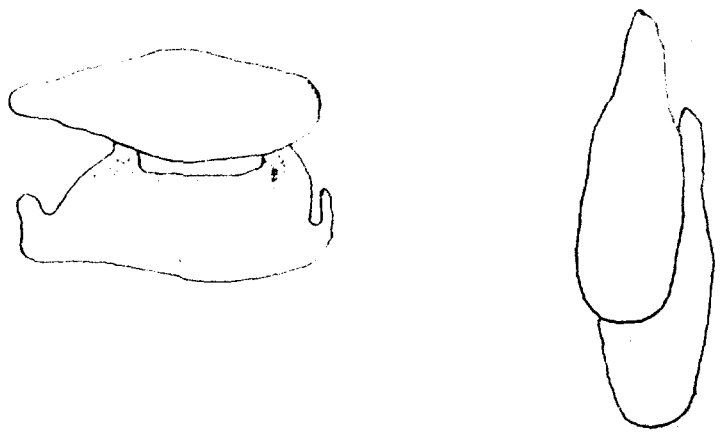
List date, your name, segment number, time started and exposure number in proper place prior to interpreting the exposure. Cells should be interpreted in numerical order; i.e., observe cell one then cell two, three, four, and five. Answer the question "are livestock present in this cell?" for all cells before starting to make detailed counts. For cells marked "no," no further counts are necessary unless animals are detected while counting other cells on that exposure. For cells marked "yes," make detailed counts for each species. Count all animals then recount young animals for each species. See definitions of young animals on the bottom of each interpretation form. Read the following key carefully for differences between species.

After completing the counting enter finish time and proceed to next exposure.

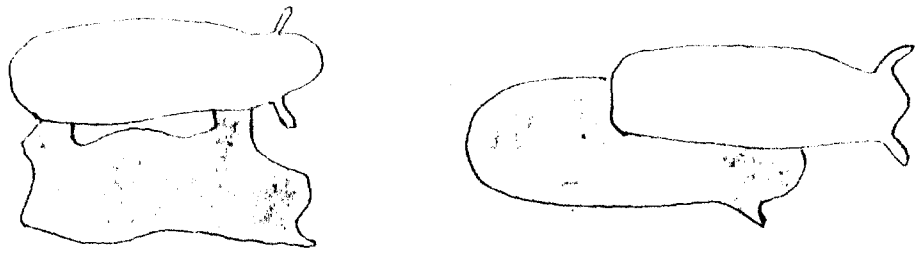
Horse - .35mm or .014 inches long and neck is long and thin. Shoulders and back are nearly the same width while rump is slightly wider than shadow indicates, long spindly legs, long neck, full tail, and a slender body.



Cow - .31mm or .012 inches in length and slightly smaller than a horse. Neck is short and thin, back appears slightly broader than shoulders. The body has a slightly rounded appearance. The shadow indicates a heavy rounded abdomen with short stocky legs and thin tail.



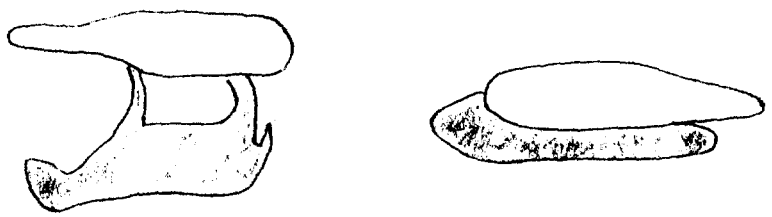
Bull has short thick neck, heavy body. Shadow shows heavy body, stocky legs.



Hog - .20mm or .008 inches in length. Approximately 2/3 size of mature cow. It is dark or light in tone and has a glossy appearance. Generally found in or near small enclosures. Body is sausage shaped with small head and very short thick neck. Shadow indicates short thick legs.

Sheep - .18mm or .007 inches in length and about 1/2 as long as mature cattle. They appear light in tone. Body has "tear-drop" shape with back being the widest point. The head is small. Neck is short, and is visible on newly shorn sheep, but not noticeable on unshorn sheep. Shadow indicates short spindly legs and a bulky body.

Colt - (born after January 1, 1969) .20mm or .08 inches. The neck is very long and thin. The shoulders, back, and rump are nearly the same width. Body is long and slender. The shadow indicates long, spindly legs, long neck, full tail and slender body.



Mares will usually be nearby. Relative size of colt is about 1/2 as long and 1/2 as wide as mature horse. That is, they will occupy 1/4 or less of the area of a mature horse.

Calf - (born after January 1, 1969) .18mm or .007 inches. About 3/5 as long and 1/2 to 3/5 as wide as a mature cow. Appears more angular than unshorn sheep. Neck is short and thin. Shoulders, back, and rump appear slender. Abdomen slightly wider than shoulders or hip.

Usually will be near mature cattle or enclosed in small pens.

Pig - .10mm or .004 inches (born since March 1, 1969). May be in pen with sows. Will usually be several heads together. About 1/2 as long and 1/2 as wide as mature sow; that is, about 1/4 the area of a mature sow. Neck will be short. Body thick, relatively short.

Lamb - born since January 1, 1969. Maximum size - .15 or .006 inches. Relative size to mature ewe will be about .7 as long and .8 as wide. Area of .6 or less than mature ewe. Neck will be long, body angular and thin. Appear more slender than ewes. It will still have the "tear-drop" shape.

1969 IDAHO AERIAL PHOTO PROJECT

Nine Inch Black and White Photo Interpretation Form

Date _____ Time Started _____

Photo Interpreter _____ Time Finished _____

Segment _____ Exposure Number _____

Cell no.	Are live-stock present		Number of animals								
			Cattle		Sheep		Hogs		Horses		
	Yes	No	Total	Young 1/	Total	Young 2/	Total	Young 3/	Total	Young 4/	Total

1/ Young cattle are calves born after January 1, 1969 (under 500 lbs.). About 3/5 as long and 1/2 to 3/5 as wide as a mature cow, occupies about 1/3 or less area of cow.

2/ Young sheep are lambs born after January 1, 1969. Relative size to mature ewe is about .7 as long and .8 as wide. Area of .6 or less of ewe.

3/ Young hogs are pigs born since March 1, 1969 (under 100 lbs.). About 1/2 as long and 1/2 as wide as mature sow; that is, about 1/4 the area.

4/ Young horses are colts born since January 1, 1969. Relative size of colt is about 1/2 as long and 1/2 as wide as a mature horse. Area is 1/4 or less of horse.