

FRAME FOR SAMPLING FARMS
BY USE OF POSTAL RURAL ROUTES

by

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July 1969

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General description of plan*

Estimates for many agricultural characteristics are made difficult and costly due to a lack of a suitable frame for sampling farms which have low incidence items. Area sampling frames are satisfactory for estimates of characteristics occurring on a large proportion of farms but are wasteful or inefficient for items occurring less frequently. In this case, several farms must be "screened" to find one of interest in such a survey. The same comment applies to a general farm list.

It is proposed to investigate a procedure for drawing a sample of primary and secondary sampling units, and once the first and second stages of sampling are completed, to find a means of quickly and economically screening the elements for presence or absence of a set of farm characteristics of interest to the Statistical Reporting Service. It would be highly desirable, also, to obtain a measure of size of the items of interest by farms to enable one to sample disproportionately for purposes of increasing sampling efficiency.**

The Post Office Department publishes annually a book showing the number of "boxes" served by every post office in the United States. The boxes are classified by type of carrier route (rural, city and star). The book also indicates the number of lock or combination boxes rented per post office.

In most sections of the country, a very large proportion of farmers receive their mail by rural route carrier. This is not universally true, nor is it true that all persons on rural routes are farmers. Some farmers live in town and receive their mail in the town of residence, and some farmers live in the open country but go to town for their mail. There are farms of complex organization, e.g., corporate, which present problems in identification also. But most farmers are members of the following two groups:

- (a) Box holders on rural or star routes.
- (b) Residents of towns and receiving mail in the town of residence.

* Please see 1967 report by Iowa State University, Statistical Laboratory for some results on experience with this scheme in Iowa.

** The use of farms thus screened need not be limited to low incidence items; thus the scheme may have general applicability.

It is proposed that an initial or first stage frame be set up which would consist of the number of rural routes and star route box holders served by each post office, plus a supplement giving the estimated number of farms with headquarters (literally residence of operator) in the post office towns and, possibly, towns which have no post office. For operational purposes one would draw a sample of towns with the measure of size being related to the total number of farmers fitting into the two categories given above.

Once the primaries are drawn, contact with the "drawn" post offices would need to be made to get the number of routes out of each post office and the number of boxes on each route. At the moment, only a crude estimate of the number of town farmers can be made (from C and D procedure Ag. Census ED's, or occupation by town from the population census, or by using Master Sample materials). Thus for a post office we might have three secondary sampling units consisting of the number of box holders on each of three routes and the number of farmers in the town (and not on a rural route). One secondary might be drawn from the total (four in the example).

The local post offices know the names of the box holders and have route maps which show the path of the rural carriers. The "town" farms would have to be identified by local inquiry, such as at ASCS offices, the county extension agent or other sources.

The Post Office Department has, thus far, indicated that policy prohibits the disclosure of names of box holders but it is felt that it would be possible to waive this rule to another federal department.*

Some advantages of the scheme

- (1) The frame of primaries is available in large part from public statistics; thus towns and cities (primaries) can be economically selected. Data needed for selection of secondaries can be acquired economically by mail. An estimate of farmers living in towns needs to be made for all primaries. By drawing primaries and secondaries

* It would be desirable to know the names so that addresses of mail questionnaires might include names or, if telephoning is done their numbers could be looked up. Knowledge of names would also facilitate update procedures.

in this way, the actual field (or mail out) problems would be reduced to quite manageable proportions, which could be taken care of by state offices quite readily after research has been done and the problems identified and solved.

- (2) The shape of the secondary is efficient. It is a long, narrow route covering a variety of farm types and conditions. In heavy farming country, the number of farmers would be from 50-100 per route.
- (3) Since the route is known, the update problem would be simplified since a known set of road segments would be involved. If the post office would release names, updating would merely involve a name match procedure in which only non-matches would have to be investigated. This could be done each year or whenever it was decided to be necessary. Another practical way to update lists would be to add this job onto a survey which is being done in any case.
- (4) A combination of mail and personal contacts could be effectively used to acquire data for the box holders on the secondaries in the sample.
- (5) Measure of size (number of box holders, etc.) for the selection of primary and secondary sampling units need not be 100% complete and accurate to be useful for the purpose intended. A substantial correlation of size measure and actual numbers would be desirable, however.
- (6) Problems now existing in specifying the frame could, in the long run, be quite readily solved by inserting questions in the federal agricultural census pertaining to post office address, such that it would be known if the farm operator received his mail on a rural route or in a town. If the latter, it would have to be learned whether the residence was in the country or in a town.

The New Mexico experience, 1968

Five cities or towns were selected in New Mexico in which the rural route scheme was to be tried. These towns were not selected randomly from a list of all towns in the state, but were chosen so that the list building procedure could be tried in a wide variety of conditions. For example, the Albuquerque rural routes consisted primarily of non-agricultural people working in the city, while the Siler City routes covered a sparsely populated

area. The routes out of the other towns were in agricultural areas. The main object of this trial was to examine the advantages and disadvantages of the list building scheme. Data concerning counties and cities selected are given below.

Table 1. Census Population - New Mexico

County	1964 No. Farms	Total County Population	Farm Population	City	Population
Bernalillo	334	262,199	1,022	Albuquerque	201,189
Grant	239	18,700	740	Silver City	6,972
Rio Arriba	1,194	24,193	4,560	Espanola	1,976
San Juan	511	53,306	1,833	Fruitland	300*
Valencia	688	39,085	2,970	Los Lunas	1,186

The post office in each town was contacted to determine the number of rural routes and the approximate number of boxes on each route. One route from each post office was selected. A list of the names and addresses of the box holders was provided by the postmaster for each route selected. One postmaster refused to provide the list of names as well as a route map so names were obtained by "cruising" the route and obtaining the names from the boxes and by local inquiry.

A questionnaire covering various aspects of farming operation was mailed to each person whose address was on the route selected. Following this, an attempt was made to complete questionnaires for the non-respondents by personal interview. If it was not possible to contact a box holder during the initial visit, a "neighbor questionnaire" was completed by someone living nearby. If this information indicated a possible farm operator, additional callbacks were made in an effort to personally contact the box holder. If the neighbor questionnaire indicated that the non-respondent was not a farm operator, every fifth neighbor questionnaire indicating a non-farm was to be verified by additional callbacks and eventual personal interview. In

* 1960 Census population lists towns of 1,000+ only, Atlas estimate used. Fruitland was selected - had no rural route - so backed up to Farmington rural route that serviced Fruitland.

most cases, however, this was not done; instead the names were checked against ASCS lists. The neighbor information usually proved to be correct.

The following table gives a breakdown of the total number of names on each route in New Mexico and the type of response obtained.

Table 2. Type of response by route

Type of Interview	Albuquerque	Espanola	Farmington	Los Lunas	Silver City
Returned by mail	97	44	13	38	51
Personal interview	114	221	42	111	69
Personal interview after neighbor contact	2	0	0	4	1
Neighbor information only	188	0	0	65	90
Duplicates	0	0	0	0	1
Neighbor form taken then mail questionnaire received	14	0	1	2	1
Refusal or non-interview	0	0	0	4	32
Moved, not on route, vacant	4	1	0	17	8
Returned by post office	1	1	0	0	0
Total box holders	420	267	56	241	253

The primary purpose of this study was to find the names of producers of agricultural products. The table presented on the following page lists the number of places that had or produced each of the various items. No decision was made as to whether a person listing, say, livestock would actually qualify as a farm operator according to census rules.

Table 3. Number of box holders producing agricultural commodities by rural route and commodity

Rural Route	Albuquerque	Espanola	Farmington	Los Lunas	Silver City
No. of box holders	420	267	56	241	253
No. of box holders with 1 or more agricultural products	103	131	40	75	22
Item					
Beef cattle & calves	53	50	24	32	15
Dairy cattle	18	9	6	3	3
Hogs & pigs	7	78	13	6	3
Sheep, lambs & goats	12	7	12	3	0
Horses	70	61	19	15	19
Layers	31	30	10	6	6
Broilers	6	2	2	1	2
Turkeys & geese	14	3	1	1	2
Corn	8	47	14	2	0
Sorghum	4	0	0	1	0
Soybeans	0	0	0	0	0
Wheat	9	2	0	5	1
Oats	13	7	2	5	1
Cotton	0	0	0	0	0
Barley	2	0	1	3	0
Rye	3	1	0	0	0
Alfalfa	64	72	25	44	1
Clover-timothy	3	7	0	2	0
Other hay	7	47	1	19	0
Alfalfa seed	5	2	0	1	0
Red clover seed	0	0	0	0	0
Timothy seed	0	1	0	0	0
Brome grass seed	0	0	0	0	0
Blue grass seed	0	0	0	0	0
Potatoes	6	1	3	1	0
Popcorn	4	1	0	2	0
Vegetables grown to sell	9	32	2	0	0
Berries	1	1	0	0	0
Fruits	3	100	7	2	0
Bees	5	3	2	2	1
Apple trees	4	88	10	2	3

Several problems pertaining to route organization were encountered during the survey that would have to be taken into account before the procedure could be used to provide estimates of the total number of producers of a given item.

1. In New Mexico, several towns may be grouped under one star route and the post office directory does not indicate the grouping. For example, the carrier for the selected route out of Silver City serviced not only rural box holders but also had six "sub" or "4th class" post offices along the route that he serviced. These sub-post offices did not deliver mail, instead people living in surrounding areas came into town and picked up their mail at the post office. The post office generally does not deliver mail in an area if there are fewer than two boxes per mile. This problem should be considered when making a "draw" of post offices and routes. Two possible solutions would be:

- (a) use post office directory as it is and use only a part of a star route or
- (b) combine towns in advance of the draw into numbered rural routes and star routes carried by one person.

If (b) is done, all places served by one star carrier could be brought in with a single draw, but it would be necessary to contact the post office department to get data on which to combine towns on one star route.

2. A check in some areas showed that many lock or combination boxes in the post office were rented by farmers, and many of the rural boxes were for non-farmers. This clearly shows that city or town boxes (or street deliveries) should have a chance to come into the sample. The process of selecting the sample for farmers with city addresses should be completely separate from the rural route phase, since farm density in urban areas is small and a lower sampling rate could be used in the selection of the primary units.

The Tennessee experience

The rural route sampling project was also conducted in five towns in Tennessee. Again, the towns were selected to reveal the potential problems that could arise and the usefulness of the procedure. The population of the chosen cities did not vary as much as did those chosen in

New Mexico. Data concerning counties and cities selected follows.

Table 4. Census Population - Tennessee

County	1964 No. farms	Total County Population	Farm Population	City	Population
Blount	1,501	57,325	5,124	Maryville	10,348
Campbell	800	27,936	2,850	Jacksboro	577*
Hamblen	1,197	33,092	3,566	Morristown	21,267
Polk	307	12,160	1,171	Ocee	300*
Washington	2,471	64,832	8,277	Fall Branch	500*

* Atlas estimate used

One rural route was selected from each post office and the names and addresses of the box holders were obtained from the postmaster. Procedures similar to those used in New Mexico were followed. Nonrespondents to the mail questionnaire were personally interviewed. Every fifth questionnaire taken from neighbors and which indicated a non-farm operator was followed up by a personal interview in Tennessee. The various types of responses obtained is presented below, by route.

Table 5. Type of response by route

Type of interview	Fall Branch	Jacksboro	Ocee	Maryville	Morristown
Returned by mail	82	19	30	88	81
Personal interview	149	77	95	214	392
Personal interview after neighbor contact	16	2	5	8	14
Neighbor information only	68	26	12	45	48
Duplicate	0	0	0	0	1
Neighbor form taken, then mail questionnaire received	0	0	1	0	0
Refusal or non-interview	1	0	2	4	4
Moved, not on route, vacant	22	3	12	2	18

As in New Mexico, the purpose of this project was to find the name of producers of agricultural products. The following table gives the number of places that had or produced the specified items, but does not necessarily mean that this person would qualify as a farm operator according to census rules.

Table 6. Number of box holders producing agricultural commodities by rural route and commodity

Rural Route	Free Branch	Jacksboro	Ocee	Maryville	Morristown
No. of box holders	349	127	158	400	567
No. of box holders with 1 or more agricultural products	127	53	52	128	212
Item					
Beef cattle & calves	59	34	30	80	76
Dairy cattle	51	13	12	30	74
Hogs and pigs	52	22	21	40	96
Sheep, lambs & goats	2	1	0	1	0
Horses	33	18	9	26	43
Layers	27	14	29	16	84
Broilers	0	0	0	2	1
Turkeys & geese	4	1	3	1	19
Corn	53	16	22	50	52
Sorghum	0	0	0	2	7
Soybeans	1	0	5	8	6
Wheat	4	0	1	12	11
Oats	21	2	5	10	24
Cotton	3	0	3	1	1
Barley	2	0	1	4	13
Rye	0	2	1	0	2
Alfalfa	4	5	1	3	8
Clover-timothy	52	32	3	65	59
Other hay	67	37	27	54	73
Alfalfa seed	0	0	0	0	0
Red clover seed	0	0	0	0	0
Timothy seed	0	0	0	0	0
Brome grass seed	1	0	0	0	0
Blue grass seed	1	0	1	0	0
Potatoes	50	14	2	26	26
Popcorn	0	0	0	4	1
Vegetables grown to sell	3	1	8	7	4
Berries	3	1	0	1	6
Fruits	1	2	1	1	1
Bees	7	8	3	7	17
Apple trees	4	2	4	2	5

Another item of interest is the small number of box holders who consider farming to be their primary occupation. They were also asked to list their secondary occupation, if any. The two following tables show the number and per cent of all primary and secondary occupations for (1237) New Mexico and (1601) Tennessee box holders on these routes. (Note: If a box holder listed one or more agricultural products and did not list farming as an occupation, farming was edited in as a secondary occupation. This does not necessarily mean that he would qualify as a farmer by Statistical Reporting Service or Census definitions, but rather that he did have some agricultural product(s).) The percentages for these tables are computed on the number of box holders that answered the questions. The "no response" (questionnaires were completed but this particular question was not answered) or "non-interview" categories are added at the bottom of the table.

Table 7. New Mexico: Occupations (all routes combined)

Occupation	Primary Occupation		Secondary Occupation	
	Number	Per Cent	Number	Per Cent
Professional	84	8.8	12	1.4
Farmer	76	8.0	300	34.0
Manager, official, proprietor	100	10.5	7	.8
Clerical	23	2.4	1	.1
Salesman	36	3.8	2	.2
Craftsman	163	17.2	6	.7
Operative	147	15.5	8	.9
Household & ser- vice workers	57	6.0	3	.3
Laborers: farm, con- struction, garage	65	6.8	3	.3
Retired, housewife, unemployed, disabled	199	21.0	0	--
No 2nd Occupation	xxx	xxx	541	61.3
Total	951	100%	883	100%
No response	217		285	
Non-interview	69		69	
	1237		1237	

Table 8. Tennessee: Occupations (all routes combined)

Occupation	Primary Occupation		Secondary Occupation	
	Number	Per Cent	Number	Per Cent
Professional	51	3.6	6	.4
Farmer	152	10.8	406	29.3
Manager, official, proprietor	54	3.8	4	.3
Clerical	29	2.1	3	.2
Salesman	31	2.2	5	.4
Craftsman	214	15.2	12	.9
Operative	377	26.9	11	.8
Household and service workers	43	3.1	6	.4
Laborers: farm, con- struction, garage	111	7.9	7	.5
Retired, housewife, unemployed, disabled	342	24.4	0	--
No 2nd Occupation	<u>xxx</u>	<u>xxx</u>	<u>924</u>	<u>66.8</u>
Total	1404	100%	1384	100%
No response	96		116	
Non-interview	<u>101</u>		<u>101</u>	
	1601		1601	

It will be noted that 8 per cent of the box holders in New Mexico and 10.8 per cent in Tennessee consider farming to be their primary occupation. The percentage with farming listed as their secondary occupation is considerably higher: 34 per cent in New Mexico and 29.3 per cent in Tennessee.

The rural route scheme seemed to work rather well in Tennessee. The routes were well defined and it was possible to cover all box holders on a route in a reasonable period of time. One of the routes near Knoxville was similar to that in Albuquerque in that a large portion of the box holders would be classified as rural non-farm. However, these could be easily screened out of the sample in the updating process. Again, it would be necessary to take a small sample of the urban areas to give those farmers not on rural routes a chance to enter the sample.

Box Number _____

GENERAL FARM INQUIRY
1968

Budget Bureau No. 40-S-63027
Approval expires Dec. 30, 1968

Name head of household First Name _____
Middle Name _____
Nickname (if any) _____
Last Name _____

1. What is the town or city in which your post office is located?

(Town or city) _____

2. Do you have a telephone? Yes ___ No ___

a. If YES, in what city or town is your telephone exchange located and what is your number?

(City or town _____) (Telephone number _____)

3. Where is your residence located:

(If not in city or town). County. _____

Township. _____

Section. _____

(If in city or town). City or town name _____

Street address. _____

4. Acreage operated in 1968. (If less than one acre report in fraction of an acre, e.g. 1/2, 1/4, 1/3)

a. How many acres of land do you own? _____ acres

b. How many acres of land do you rent from others or work on shares for others? _____ acres

c. How many acres do you rent to others, including land worked on shares for you? _____ acres

5. Did you produce in 1967 or will you have in 1968:

a. Any field crops. Yes ___ No ___

b. Any vegetables, berries, nursery or green house products for sale. Yes ___ No ___

c. Any Christmas trees being grown for sale. Yes ___ No ___

6. Did you have in 1967 or will you have in 1968:
- a. Any cattle, hogs or sheep. Yes ___ No ___
 - b. 30 or more chickens, turkeys, geese, or other poultry. Yes ___ No ___
 - c. Any bees which you own. Yes ___ No ___
 - d. 20 or more apple trees. Yes ___ No ___
 - e. 20 or more other fruit trees. Yes ___ No ___
7. Did anyone else living at this address have any of the items listed in questions 5 and 6 above?. Yes ___ No ___
- a. If YES, what is his name? _____

8. What is your primary occupation? _____
- a. Do you have a secondary occupation?. Yes ___ No ___
 - b. If YES, what is the secondary occupation _____

(If you check YES for any of the items in questions 5, 6, and 7 please complete the remainder of the inquiry. If NO, stop here and return the form in the self addressed envelope.)

9. Did you (head of household) have or will you have at any time during 1968 any of the livestock and poultry items listed below:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
a. Beef cattle and calves. . .	___	___	f. Chickens (layers) . .	___	___
b. Dairy cattle and calves . .	___	___	g. Chickens (broilers). .	___	___
c. Hogs and pigs.	___	___	h. Turkeys.	___	___
d. Sheep and lambs.	___	___	i. Geese and/or ducks .	___	___
e. Horses and/or mules. . . .	___	___			

10. Will you produce in 1968 any of the field crops listed below:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
a. Corn.	___	___	g. Barley.	___	___
b. Sorghum	___	___	h. Rye.	___	___
c. Soybeans.	___	___	i. Alfalfa hay and mixtures	___	___
d. Wheat	___	___	j. Clover, timothy and mixtures	___	___
e. Oats.	___	___	k. Other hay.	___	___
f. Cotton.	___	___			

11. Will you harvest in 1968 any of the field seed crops listed below:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
a. Alfalfa seed.	_____	_____	d. Brome grass seed.	_____	_____
b. Red clover seed	_____	_____	e. Kentucky blue grass seed.	_____	_____
c. Timothy seed.	_____	_____			

12. Will you produce in 1968 any:

	<u>Yes</u>	<u>No</u>
a. Irish potatoes.	_____	_____
b. Popcorn.	_____	_____

13. Will you produce for sale in 1968:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
a. Tomatoes.	_____	_____	g. Cantaloupe and muskmelons.	_____	_____
b. Sweet corn.	_____	_____	h. Green peas.	_____	_____
c. Cucumbers	_____	_____	i. Dry onions.	_____	_____
d. Snap beans.	_____	_____	j. Strawberries.	_____	_____
e. Watermelons	_____	_____	k. Blueberries, raspberries.	_____	_____
f. Cabbage.	_____	_____	l. Blackberries	_____	_____

14. Will you produce and sell in 1968 any:

	<u>Yes</u>	<u>No</u>		<u>Yes</u>	<u>No</u>
a. Apples.	_____	_____	f. Cherries.	_____	_____
b. Peaches	_____	_____	g. Apricots.	_____	_____
c. Pears	_____	_____	h. Pecans.	_____	_____
d. Grapes.	_____	_____	i. Black walnuts	_____	_____
e. Plums and prunes.	_____	_____			

Neighbor Information

Budget Bureau No. 40-S-68027Approval expires Dec. 30, 1968

GENERAL FARM INQUIRY

1968

Post Office _____ Route No. _____ Household No. _____

Head of Household _____ Interviewer _____

Phone Exchange _____ Name of Neighbor _____ Date _____

1. Acreage operated in 1968. (If less than one acre, report in fraction of an acre, e.g. 1/2, 1/4, 1/3)
- a. How many acres of land does he own? _____ acres
- b. How many acres of land did he rent from others or work on shares for others? _____ acres
- c. How many acres of land did he rent to others, including land worked on shares for him? _____ acres
2. Did he produce in 1967 or will he have in 1968:
- a. Any field crops? Yes ___ No ___
- b. Any vegetables, berries, nursery or greenhouse products for sale? Yes ___ No ___
3. Did he have in 1967 or will he have in 1968:
- a. Any cattle, hogs or sheep? Yes ___ No ___
- b. 30 or more chickens, turkeys, geese, or other poultry? Yes ___ No ___
- c. 20 or more fruit trees? Yes ___ No ___
4. Did anyone else living in that household have any of the items listed in questions 2 or 3 above? Yes ___ No ___
- a. If Yes, what is his name? _____

INTERVIEWER: If "Yes" is checked in one or more of the above categories, return to the residence of the respondent and take a (white) schedule from the farm operator.

If "No" is checked in all of the above categories:

What is his primary occupation? _____

Does he have a secondary occupation? Yes ___ No ___

If Yes, what is the secondary occupation? _____

