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THE MAIL SURVEY IN AGRICULTURAL ECONOMIC RESEARCH A New Zealand Example

B. G. O'DONNELL

MARCH, 1969
NEW ZEALAND

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THE MAIL SURVEY IN AGRICULTURAL ECONOMIC
RESEARCH - A NEW ZEALAND EXAMPLE

by

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AUTHOR'S NOTE

In this Occasional Paper a revised edition of Chapter III of my thesis is reproduced. An abridged form of my thesis appeared as Discussion Paper No.50 which may be obtained from the Department of Agricultural Economics and Farm Management, Massey University.

The complete thesis is available on loan from the Massey University library.

B.G.O'DONNELL

March 1969

THE MAIL SURVEY IN AGRICULTURAL ECONOMIC
RESEARCH - A NEW ZEALAND EXAMPLE

1. Introduction

The thesis was concerned with examining the relevance and feasibility of some form of farm input evaluation service. A part of the study was concerned with assessing the need for such a service by commercial farmers in general and enterprise groups in particular. For this purpose, it was necessary to make use of the mail survey because of financial and time constraints. This Occasional Paper deals with the effectiveness of the mail survey as a data source and the problems associated with its use in terms of response rates and bias.

A mail survey enables any interviewer bias to be removed, but the ability of the respondents to answer "open-ended" questions accurately may be enhanced if an interviewer is present. In comparison with the personal interview technique, the respondent in a mail survey can spend some time in thinking about a question, before giving an answer: it is possible to come back to check the questionnaire a number of times. The answer finally given to a question is then more likely to portray more accurately the respondent's actual feelings on the subject than if he has not time to reflect, as in a personal interview.

With a mailed questionnaire it is possible for the respondent to look ahead in the questionnaire and read the questions. If the questions are not each read independently it is possible to get "sequence bias", where a completely independent answer is not given to each question. Problems of "sequence bias" do not arise with the personal interview method of obtaining data. In addition, a mail survey does not allow the researcher to have adequate control over the respondent's identity, his possible consultations with other people, and the spontaneity of answering the questions cannot be ascertained.

If an unbiased sample has been drawn from a population initially, then a low response rate may bias the sample. If there is bias, then the extent to which the respondents are representative of the sample is not known. Bias may then introduce a further error besides any possible error associated with the original sampling procedure.

2. Techniques for High-Response Rates in Mail Surveys

The success and usefulness of a mail survey depends to a large extent on achieving a high response rate. In order to achieve a high response rate the following procedures have been found to be helpful.

Pre-testing of the questionnaire is important. A pre-test provides evidence of the ease with which the respondents will be able to answer the questionnaire. Questions which are difficult to answer, questions which will produce ambiguous or biased replies,

the desirable length of the questionnaire, and words which may be misinterpreted are all problems which can be resolved by a pre-test.

Often leading questions relating to some general item will encourage answers from respondents who prefer not to reveal their lack of familiarity with some of the ideas on which they are being questioned¹. To overcome this tendency for respondents in favour of a particular scheme, and the more progressive farmers who tend to fill out any questionnaire sent to them to answer, Smith² has suggested that leading questions be used to obtain returns from possible non-respondents.

One particular point in questionnaire design, which, by adding an element of individuality and personal expression seems to enhance the response rate, is the provision of space so that respondents may add their own comments³. The introductory letter used in the survey, to interest the respondent and to persuade him to answer the questionnaire may also affect the response rate.

Inclusion of a stamped addressed return envelope appears to greatly enhance the response rate. Freebairn reports a case where a return of 73.8% was obtained using stamped envelopes compared to 66.8% from using reply-paid envelopes⁴.

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1. J.W.Freebairn, "Report on a N.S.W.Mail Survey", Aust. J.Agric. Econ., 11 : 93, (1967).
 2. R.K.Smith, "The Mailed Enquiry and Methods of Increasing Returns - Discussion", J. Fm.Econ., 31 : 1273, (1949).
 3. Freebairn, op.cit., 93.
 4. Ibid., 94.

A most important technique by which the percentage response may be enhanced is by the use of follow-up reminder mailings. Since the most important reasons for non-reply involve misplacing or over-looking the questionnaire⁵, it is necessary to include a questionnaire and postage paid envelope with each reminder letter or notice.

The cost of follow-up mailings may become prohibitive if a second reminder notice is used. However, the success of a second reminder notice is well shown by Dillon and Jarrett⁶ and Freebairn⁷.

Freebairn, in his survey of wheat farmers in New South Wales deduced from the attitude of non-respondents and from subsequent discussion that the main reasons for non-response were⁸:

- (a) 32% overlooked answering or were too busy.
- (b) 26% thought the questionnaire not applicable to them.
- (c) 21% had difficulty contacting their sharefarmer who had much of the information.
- (d) 11% found the questionnaire too difficult.
- (e) 5% had already filled in the questionnaire.
- (f) 5% feared reprisals from the Taxation Office.

For the reasons discussed above, it is necessary initially to interest all farmers in the survey, and to impress upon each farmer the importance and necessity of completing the questionnaire.

5. Ibid., 92.

6. J.L.Dillon and F.G.Jarrett, "Response Patterns in Some Australian Farm Economic Mail Surveys", Aust. J. Agric.Econ., 8 : 82 (1964).

7. Freebairn, op.cit., 88.

8. Ibid., 92

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The best means of gaining the farmers' interest in the survey is to use a well-constructed introductory letter.

3. Response Rates in Mail Surveys

Dillon and Jarrett⁹ review five Australian mail surveys. In surveys with no reminder notices mailed, returns of 39% and 57% were obtained. Two surveys, each using proven respondents and one reminder notice produced response rates of 66% and 73% respectively.

In the survey Dillon and Jarrett report¹⁰ a total response of 66% was obtained, 31% from the original mailing, 24% from the first reminder and 22% from the second reminder. Freebairn¹¹ reports a 72% overall response with two reminders, and a similar response rate with each reminder notice to that obtained by Dillon and Jarrett.

Graham in his study of fertiliser use in Tranaki reported a response rate of only 16% despite radio and press coverage and field work in the area.¹²

Catt, in a recent research paper published by the New Zealand Institute of Economic Research, reports a response rate of 26% amongst share investors in New Zealand. The questionnaire was sent to all clients of four leading sharebrokers. The response obtained was regarded as quite good for this type of questionnaire, especially since a proportion of the names on the stockbrokers' mailing lists

9. Dillon and Jarrett, op.cit., 82.

10. Ibid.

11. Freebairn, op.cit., 88.

12. A.B.Ward, The Use of the Telephone as a Survey Method (Discussion Paper No.45., Department of Agricultural Economics and Farm Management : Massey University, Palmerston North, N.Z.), 2-3.

were firms, public authorities, and other bodies to whom the questionnaire did not apply¹³.

4. Problems of Non-Response Bias

From the literature there would seem to be general agreement that a response rate of less than 50% is to be expected^{14,15}. If there is such a response rate there is no way of knowing whether the results obtained from respondents can be used to generalise about the remainder of the population. Even although a random sample may have been chosen in the first instance, there is the problem of dealing with a sample which may be biased when there is only a small percentage response.

A low response rate may mean that statistical techniques, presupposing a valid sample, may not always be used on partial returns, since the respondents may constitute an unknown sample. Use of statistical techniques is important in social science, since the investigator, in testing hypotheses, is interested in avoiding both the rejection of a null hypothesis when it should be accepted, and the acceptance of a null hypothesis when it should be rejected.

To solve the difficulty of non-response bias various methods have been devised:

- I. The personal interviewing of a sample of non-respondents and comparing the answers obtained from non-respondents with those obtained from respondents. Time, cost or wide

13 A.J.L.Catt, A Portrait of the N.Z.Share Investor (Research Paper No.9, N.Z.Institute of Economic Research : Wellington, N.Z.), 6.

14 Ward, op.cit., 3

15 E.C.Lehman, "Tests of Significance and Partial Returns to Mail Questionnaires", Rur. Sociol., 28 : 184, (1963).

geographical distribution of the sample may make this procedure impracticable.

II Checking for bias on several known factors in the population (e.g. from census data) and then deciding whether non-response would alter the relationships. Several studies¹⁶ have indicated that this method is not necessarily accurate.

III The assumption of a random distribution of any errors about the research variables due to sampling, and then proceeding as though the questionnaires returned constituted an unbiased sample. This procedure involves ignoring the problem rather than solving it.

IV Utilisation of the observable differences between early and late returns, and on the basis of these differences making inferences as to the direction of response of the non-respondents. This method assumes non-respondents would tend to be more like the respondents who sent their replies in later than like those who sent their replies in earlier.

Kivlin¹⁷ reports that respondents in mail surveys tended to adopt a greater number of recommended farming practices, they tended to be of higher socio-economic status, and perform better on the job, while non-respondents tended to adopt fewer practices, to be of lower socio-economic status, and to perform less well.

16 Ibid., 285

17 J.E.Kivlin, "Contributions to the Study of Mail Back Bias", Rur. Sociol., 30 : 324, (1965).

However, while respondents may have different characteristics from non-respondents which are of interest to the investigation, these differences do not appear to seriously affect the relationships. It would seem that non-response is a broad, fairly uniform factor which need not necessarily disturb the relationships among the variables being investigated¹⁸. Freebairn¹⁹ suggests it is safe to conclude that if returns to a mail survey are relatively high, answers from respondents can be used to obtain unbiased estimates of the population parameters from which the sample was drawn.

The experience of the New Zealand Institute of Economic Research²⁰ is that questionnaires with quite low response rates do give satisfactory results. In reviewing the results obtained from these low response rate surveys, the Institute has formed the opinion that willingness to co-operate in filling in questionnaires is not correlated closely with particular attitudes to economic matters. Only in the case of females - where the response was low - did there appear to be any significant differences.

The fact that bias may not affect the relationship one wishes to establish is important for the following reasons:-

- I It seems justifiable²¹ to extrapolate from known relationships in a biased sample (relationships which are the same in an unbiased as in a biased sample), to those relationships which are being tested and hence are unknown.

18 Ibid.
 19 Freebairn, op.cit., 92.
 20 Catt, op.cit., 6.
 21 Kivlin, op.cit., 325.

This principle needs to be applied with caution as it does not make a biased sample as acceptable as an unbiased sample.

- II It seems reasonable to conclude that if a large number is included in the original sample, with a response rate of 30-40% a sufficient number of replies is available to ascertain the opinions of respondents. Further evidence is available if the replies follow a normal distribution of the type which the researcher suspected to have held originally, viz., that there are a large number who fall into one particular category and only a few who fall in other categories. If the categories are not the same as those originally posulated by the researcher, then bias could be suspected.

Comparison of the differences between early and late returns provides only inferences about the differences between respondents and non-respondents. To actually know the amount of the direction of the bias it is necessary to interview non-respondents. With a knowledge of who are the non-respondents it may be possible to begin assembling a sample of those belonging to a distinct group e.g, the relative non-adopter, non-participant, or low producer.

5. Organisation of the Mail Survey

The mail survey used by the author to obtain data on the need for a farm input evaluation service consisted of an introductory letter, a questionnaire, and a postage-paid envelope.

The mailing list was obtained by combining the address lists compiled in earlier surveys conducted by telephone by the Department of Agricultural Economics and Farm Management, Massey University. These surveys were in no way related to the present study. The sample of farmers to which a questionnaire was sent consisted of the following groups:-

- I A New Zealand wide sample, with the omission of the major farming areas of Taranaki, King Country and Gisborne. The farmers in this group had already been contacted by telephone in the summer of 1965-66. The total number of farmers contacted from this group was 427. Two additional farmers were later added to total 429.
- II A group of 429 dairy farmers contacted by telephone in November 1966. This group was virtually the entire farmer population of the Lower Hauraki Plains.
- III A sample of 89 farmers in the Taihape and Pahiatua areas, contacted by telephone in August 1965.
- IV A group of 176 farmers, members of the Manawatu Farm Improvement Club Trading Group and the Manawatu-Wanganui Rural Trading Society Ltd., These farmers had not previously been contacted in the course of a telephone survey.

The questionnaire consisted of two pages of questions with a further blank page so respondents could add their own comments. The introductory letter sent to Groups I, II and III was personally addressed and paper with an official letterhead was used; the letter sent to

Group IV used the more general "Dear Sir" and did not have an official letterhead. Some of the introductory letters were personally signed and others were signed using a rubber stamp.

6. The Survey Response

In total 1123 farmers were selected. Excluding 6 farmers who could not be contacted²² there were 1117 farmers from whom replies could have been expected. A total of 401 questionnaires was actually returned, which represents a response rate of 36%.

An analysis of the replies from Groups I, II, III and IV showed the following response rates:

Table 3.1 Number of Respondents to the Mail Survey by Group

Group	No. in Sample	No. of Respondents	% Response
I	429	180	42%
II	429	108	25%
III	89	37	42%
IV	176	76	43%

One questionnaire was returned after five months. This questionnaire was used to check for non-response bias as described by Lehman²³.

Groups I, II and III were all proven respondents having participated in a telephone survey, and at the same time having indicated their

²² Four returned from dead-letter office, 1 deceased, 1 overseas.
²³ Lehman, op.cit., 289.

willingness to cooperate in further survey work.

Group IV who were non-proven respondents, returned the highest response rate. This high response can probably be explained by the high number of progressive farmers in this group due to membership in a Farm Improvement Club. Local patriotism may also be a contributing factor.

To look more closely at the reasons for non-response in Group II, the author used the data obtained from the Telephone Survey to analyse the farming practices and status of respondents and non-respondents. This analysis involved a total of 429 farmers, 20 of whom had supplied a limited amount of information in the Telephone Survey. This survey was particularly useful since it was in fact a census of almost an entire population of dairy farmers in the Lower Hauraki Plains.

It was found that there was no significant difference ($t = 0.66$, 410 df : N.S.) for the average number of miles from town for respondents (7.23 miles) and non-respondents (6.87 miles).

However, it appeared that a greater number of respondents in the mail survey knew the Government Valuation of their farm, when they were asked this question in the Telephone Survey than was the case for non-respondents.

Table 3.2

Knowledge of Government Valuation

Number of Respondents and Non-Respondents

	Knew G.V.	Did not know G.V.	Total
Respondents	49	55	104
Non-Respondents	109	194	303
TOTAL	158	249	407

$$\chi^2 = 4.19, 1df : 5\% > p > 2.5\%$$

However, there appeared to be no difference in either acreage average or range for the two classes.

Table 3.3 Frequency Distribution of Farm Size
Number of Respondents and Non-Respondents

	Number of acres									
	0-50	50-100	100-150	150-200	200-250	250-300	300-350	350-400	400+	Total
Respondents	0	1	31	45	15	7	4	0	3	106
Non-Respondents	0	4	103	83	59	25	12	7	13	306
Total	0	5	134	128	74	32	16	7	16	412

$$\chi^2 = 10.93, 8df : N.S.$$

The average acreage for respondents (140.80 acres) was lower than that for non-respondents (153.40 acres), but there was no significant differences between the two averages ($t = 1.28, 410df : N.S.$). This finding bears out the evidence of Freebairn²⁴.

To see if organisation and management of the farm had any bearing on the willingness to respond, the author considered the way the farm was run, the length of time farmers had been responsible for making decisions on their present farms, and how long they intended to continue in the decision-making role. Differences between respondents and non-respondents analysed on these criteria showed no significant difference. (see Tables 3.4 and 3.5).

The percentage ewe equivalent increase for both classes of farmers was considered as an indicator of the dynamism of the farmer, but the difference was not significant. Cow number was also considered,

²⁴ Freebairn, op.cit., 90-91.

Table 3.4

Farm OrganisationNumber of Respondents and Non-Respondents

	Way Farm is organised						Total
	Owner Operator	Private Coy.	Estate	Partner-ship	Combin-ation	Share	
Respondents	52	3	1	13	6	30	105
Non-Respondents	138	2	3	35	19	104	301
Total	190	5	4	48	25	134	406

$$X^2 = 4.18, 5df : N.S.$$

Table 3.5

Average Time in Decision-Making Role in YearsRespondents and Non-Respondents

Average Time and Standard Error (S.E.)	Respondents	Non-Respondents	t
Average length of time in present decision-making role (years).	9.15	8.93	t = 0.21, 403df
S.E.		1.08	N.S.
Average time intends to remain in decision-making role (years).	9.45	9.04	t = 0.41, 306df
S.E.		1.01	N.S.

even though it is associated with acreage and production, to compare the results with that obtained by Kivlin²⁵. It was found that the average number of cows carried by the two classes of respondents (96.69cows) and non-respondents (95.00)cows) was not significantly different

25 Kivlin, op.cit., 323.

($t = 0.449$, 407 df : N.S). However it was felt that there may be some differences between the two classes in the size of herd. (See Table 3.7).

The author felt that one way of looking at possible differences in management efficiency was to look at the past butterfat record, the present butterfat record, and future increases in butterfat which were thought possible. In using these indices as an approximate measure of managerial efficiency it is assumed that both classes of farmers are on the same production function, with other factors being comparable. The mean values for respondents and non-respondents is shown in the following table :-

Table 3.6 Average Butterfat, Respondents and Non-Respondents

Butterfat (000's) and Standard Error	Respondents	Non-Respondents	t
2 year increase (64-66)	64.37	52.82	$t = 1.54, 303df:$
S.E.		7.52	N.S.
Present butterfat	29.88	28.97	$t = 0.76, 395df:$
S.E.		3.77	N.S.
Expected increase 1972	90.50	81.88	$t = 0.997, 327df:$
S.E.		8.65	N.S.

Table 3.7

Herd Size, Number of Respondents and Non-Respondents

	Number of Cows										Total
	0-40	40-60	60-80	80-100	100-120	120-140	140-160	160-180	180-200	200+	
Respondents	0	0	8	24	42	15	9	3	3	2	106
Non-Respondents	0	3	31	85	81	51	28	9	6	9	303
Total	0	3	39	109	123	66	37	12	9	11	409

$$\chi^2 = 8.22, 9df : N.S.$$

Table 3.8

Present Butterfat Production, Number of Respondents and Non-Respondents

	Present Butterfat Productions (000's lbs)												Total
	15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65+	
Respondents	4	4	11	23	26	15	10	6	4	1	0	2	106
Non-Respondents	11	16	41	62	73	37	27	15	12	2	6	2	304
Total	15	20	52	85	99	52	37	21	16	3	6	4	410

$$\chi^2 = 5.75, 11df : N.S.$$

The large standard error for the figures for the two-year increase and the 1972 expected increase prevents a meaningful statement from being made as to the significance of the differences shown in the table.

Analysing the present butterfat production over a range from 0-65,000 lbs (Table 3.8), no significant difference was found between respondents and non-respondents at different butterfat levels.

To gain some ideas of external factors which could be responsible for some farmers not responding to the questionnaire, health and age were considered: These criteria were classified into three broad categories:-

Table 3.9

Age of Farmer

Number of Respondents and Non-Respondents

	Age (years)			Total
	Less than 35	35-50	Greater than 50	
Respondents	40	50	16	106
Non-Respondents	92	148	63	303
Total	132	198	79	409

$$\chi^2 - 2.70, 2df : N.S.$$

Table 3.10

Health Rating,

Number of Respondents and Non-Respondents

	Health			Total
	Fit	Slowing Down	Poor Health	
Respondents	58	47	1	106
Non-Respondents	189	104	11	304
Total	247	151	12	410

$$\chi^2 - 4.81, 2df : 10\% > p > 5\%$$

It appears from the health rating above that there could be some differences due to health of the farmer respondent.

The influence of mass communication media, might suggest that respondents would be those who listen to the radio more frequently and are more likely to have T.V.sets. The tables below show the actual results obtained:-

Table 3.11 Ownership of Television Sets,
Number of Respondents and Non-Respondents

	Television Set		Total
	No T.V.	Owms T.V.	
Respondents	14	91	105
Non-Respondents	32	269	301
Total	46	360	406

$$X^2 = 0.57, 1df : N.S.$$

Table 3.12 Farm Radio Sessions,
Number of Respondents and Non-Respondents

	Listens frequently	Listens sometimes	Never listens	Total
	Respondents	29	48	
Non-Respondents	83	136	77	296
Total	112	184	103	399

$$X^2 = .004, 2df : N.S.$$

Survey results suggest that mass communication media are not factors prompting farmers to reply.

The author postulated that a more progressive attitude is displayed if farmers are willing to make use of the services of an advisory officer, and are willing to borrow money. Considering both the number of times farmers had been visited by advisory officers and the willingness of farmers to turn to advisory officers for assistance, no significant differences were obtained.

Table 3.13 Advisory Officer Visits in Last Two Years,
Number of Respondents and Non-Respondents

	Number of visits in last two years									Total
	1	2	3	4	5	6	7	8	9 or more	
Respondents	23	10	4	6	2	5	0	0	7	57
Non-Respondents	53	21	8	4	2	5	0	3	8	104
Total	76	31	12	10	4	10	0	3	15	161

$$\chi^2 = 7.52, 8 \text{ df} : \text{N.S.}$$

Table 3.14 Need for an Advisory Officer
Number of Respondents and Non-Respondents

	Farmers not visited by adviser in last two years		Total
	Would not like to be visited	Would like to be visited	
Respondents	21	23	44
Non-Respondents	88	102	190
Total	109	125	234

$$\chi^2 = 0.05, 1 \text{ df} : \text{N.S.}$$

In addition to willingness to borrow money, the attitude of farmers towards a stocking rate of one cow per acre (with replacements both on and off the farm) was also analysed to look for any difference. These analyses revealed no significant differences.

Table 3.15 Differences Between Respondents and Non-Respondents
in Relation to Willingness to Borrow and Attitude
Towards Stocking Rate

Attitude	Significance
Willingness to borrow	$\chi^2 = 1.46, 1df : N.S.$
One cow per acre with replacements on the farm	$\chi^2 = 0.26, 2df : N.S.$
One cow per acre with replacements off the farm	$\chi^2 = 1.55, 2df : N.S.$

The evidence presented above confirms the observations of Catt²⁶ that non-respondents do not have different opinions from respondents on particular economic matters. Freebairn²⁷ also comes to this conclusion. It is interesting to note that this evidence is in strong contrast to Kivlin's²⁸, who found a higher average number of practices adopted by questionnaire respondents for almost all categories he studied (including number of milking cows and age of farmer). Scott²⁹ in his review found non-response more common amongst lower socio-economic groups

²⁶ Catt, op.cit., 6.

²⁷ Freebairn, op.cit., 92.

²⁸ Kivlin, op.cit., 323.

²⁹ C.Scott, "Research on Mail Surveys", Jl.R.statist.Soc., 124:198, (1961).

7. Analysis of Factors affecting Response Rate

The 856 farmers in Groups I and II were sent a report on the survey in which they had participated along with the introductory letter, questionnaire and postage-paid envelope in a brown quarto-sized envelope. The 89 farmers in Group III were split up in the following manner:-

- i. 22 were sent a white send-out envelope with a white franked reply envelope.
- ii. 22 were sent a white send-out envelope with a white stamped reply envelope.
- iii. 22 were sent a brown send-out envelope with a brown franked reply envelope.
- iv. 23 were sent a brown send-out envelope with a brown stamped reply envelope.

The 176 farmers in Group IV received their questionnaire, introductory letter and postage-paid envelope with a mailing from the organisation to which they belonged.

A total number of 390 envelopes of known variety were returned. 11 questionnaires were returned without the original postage-paid envelope.

An analysis of the envelopes returned from Group III was carried out, even although the sample was small, to look for differences between using all white, all brown, or combinations of brown and white stationery. The analysis showed the following:-

Table 3.16 Differences Between Types of Envelope Returned
Group III

	Brown send- out, brown stamped reply	Brown send- out, brown franked reply	White send- out, white stamped reply	White send- out, white franked reply	TOTAL
Number returned	10	8	11	8	37
Number not returned	13	14	11	14	52
TOTAL	23	22	22	22	89

$$X^2 = 1.16, 3df : N.S.$$

The chi-square test used to look for differences between the types of envelopes returned showed no real difference for members of this group.

From the remainder of the survey the following envelope types were returned.

Table 3.17 Differences Between Types of Envelope Returned
Groups I, II and IV

	Brown stamped	Brown franked	White stamped	White franked	TOTAL
Number returned	104	90	88	71	353
Number not returned	154	168	170	187	679
TOTAL	258	258	258	258	1032

$$X^2 = 9.46, 3df : 2.5\% > p > 1\%$$

The chi-square test showed there existed a real difference between the types of envelopes returned, indicating that good response rates could be obtained using the cheaper brown envelope.

An analysis of the total number of envelopes returned from the survey shows:-

Table 3.18 Differences Between Types of Envelopes Returned, Entire Survey

	Brown stamped	Brown Franked	White stamped	White franked	TOTAL
Number returned	114	98	99	79	390
Number not returned	167	182	181	201	731
TOTAL	281	280	280	280	1121

$$\chi^2 = 9.50, 3df : 2.5\% > p > 1\%$$

The chi-square test used to look for differences between the types of envelopes returned showed that for the entire survey brown envelopes gave the best response, with brown stamped envelopes giving the highest response rate.

A comparison of stamped versus franked envelopes showed the following:

Table 3.19 Differences Between Stamped and Franked Envelopes

	Stamped	Franked	Total
Number returned	213	177	390
Number not returned	348	383	731
TOTAL	561	560	1121

$$\chi^2 = 5.09, 1df : 2.5\% > p > 1\%$$

The chi-square test used here to look for differences between stamped and franked envelopes is significant, bearing out the observation of Freebairn³⁰ and Scott³¹ that stamped envelopes produce a better response rate than reply paid envelopes.

To see whether ambiguity of questions could have affected the response rate, the construction of one question, judged by the author to be the most ambiguous, was varied in the questionnaire. This question related to the inputs farmers considered to be in need of testing. In one type of questionnaire four broad categories were mentioned; in the other type of questionnaire no categories or examples were given.

The ratio of the two types of questionnaires returned is shown below:

$$202 : 199. X^2 = 0.02, 1df : N.S.$$

A chi-square analysis to test a 1 : 1 ratio showed that the change in the question form had not affected the response rate at all.

To see if there was any difference when a personally signed letter was used in preference to a stamped signed letter, the replies from Groups I and III (which both had a 42% response rate) were examined, as shown in the following table:

30 Freebairn, op.cit., 94.

31 Scott, op.cit., 170.

Table 3.20 Differences in Signature for the Introductory letter

	Personally signed	Stamped signature	Total
Number returned	164	48	212
Number not returned	217	87	304
TOTAL	381	135	516
$\chi^2 = 2.19, 1df : N.S.$			

The chi-square test showed there was no significant difference in response rate between the two groups. This is probably due to the fact that the rubber stamp used provided a signature which was very similar to that obtained from a personal signature. This result is borne out by Scott's³² review of mail survey technique.

Scott also indicates that there is no difference in the form of address³³ and letterhead³⁴: this observation is supported here by the similar response rate obtained from Group IV in contrast to that of Groups I and II. Freebairn³⁵ also found no difference between using a personally addressed and a general "Dear Sir" addressed letter.

. The Test for Response Bias

To gain some idea of the bias of the sample who returned the questionnaire, it was decided to take the answers to one of the strategic questions and relate these answers to those who wanted a report on the survey. The strategic question chosen related to the

32 Ibid., 173.

33 Ibid.

34 Ibid., 174.

35 Freebairn, op.cit., 93.

need for a farm input evaluation service.

The author postulated that farmers who felt there was a need for a farm input evaluation service would also want a report on the survey undertaken. Alternatively farmers who did not feel the need for a farm input evaluation service would not be interested in obtaining a report on the survey. The following table shows how farmers actually replied:

Table 3.21 Farmers Who Wanted a Report on the Survey in Relation to Those who felt an Input Evaluation Service was Needed

	No answer	"No" for service	"Yes" for service	Don't know	Total
No answer	1	1	22	2	26
Do not want report	0	4	12	5	21
Want report	0	13	332	9	354
Total	1	18	366	16	401

Using only those respondents who replied definitely "Yes" or "No", the following table is obtained:-

Table 3.22 Farmers Who Wanted a Report on the Survey in Relation to Those Who Felt an Input Evaluation Service was Needed
(including only "Yes" and "No".)

	"No" for service	"Yes" for service	Total
Do not want report	4	12	16
Want report	13	332	345
Total	17	344	361

The fact that not all farmers who felt the need for a farm input evaluation service wanted a report, would seem to indicate that an unbiased sample of farmers had sent in their questionnaires. The 3.6% of the farmers who felt the need for a farm input evaluation service, but who did not want a report on the survey again supports the observations of various authors^{36, 37} that respondents in a mail survey do not necessarily constitute a biased sample.

9. Conclusions

The evidence presented here would seem to indicate that no serious bias was present, even although a response rate of only 36% was obtained. On the basis of the sample obtained here being an unbiased sample, the author has extrapolated from this sample of respondents to the entire population of farmers in New Zealand.

The results obtained from using different coloured envelopes showed that brown envelopes provided a better response than the more expensive and higher quality white envelopes.

The author is of the opinion that more use could be made of mail surveys in agricultural economic research in New Zealand. Using cheaper brown stationery, the cost of a second reminder notice may not be prohibitive and a high response may be obtained, hence reducing problems of non-response bias.

36 Catt, op.cit., 5.

37 Freebairn, op.cit., 92.