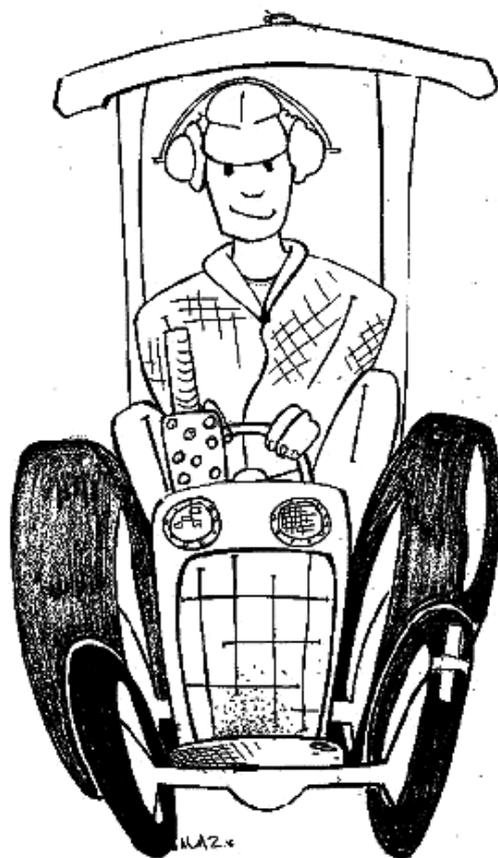


New South Wales
Health Promotion Demonstration
Research Grants Scheme

EVALUATION OF THE
NEW SOUTH WALES
RURAL HEARING
CONSERVATION PROGRAM



NSW HEALTH

Produced by:
Centre for Chronic Disease Prevention and Health Advancement
Population Health Division

NSW DEPARTMENT OF HEALTH

73 Miller Street
NORTH SYDNEY NSW 2060
Tel. (02) 9391 9000
Fax. (02) 9391 9101
TTY. (02) 9391 9900
www.health.nsw.gov.au

This work is copyright. It may be reproduced in whole or in part for study training purposes subject to the inclusion of an acknowledgement of the source. It may not be reproduced for commercial usage or sale. Reproduction for purposes other than those indicated above, requires written permission from the NSW Department of Health.

© NSW Department of Health 2006

Suggested citation: Voaklander D, Franklin R, Depczynski J, Challinor K and Fragar L. *Evaluation of the New South Wales rural hearing conservation program*. Sydney: NSW Department of Health, 2006.

This is the report of a project sponsored by the New South Wales Health Promotion Demonstration Research Grants Scheme funded by the NSW Department of Health.

SHPN (PH) 050172
ISBN 0 7347 3924 9

Further copies of this document can be obtained from the NSW Department of Health website at: www.health.nsw.gov.au

Disclaimer: Content within this publication was accurate at the time of publication.

May 2006
Reprint May 2007

CONTENTS

Executive summary	2
Background	3
The New South Wales Rural Hearing Conservation Program Review of the literature	
Objectives	4
Methods	4
Sampling Analyses	
Results	6
Subjects Uptake of personal hearing protection Noise reduction strategies used on the farm Further management of hearing problems Program satisfaction	
Discussion	14
Factors relating to use of personal hearing protection Program satisfaction Limitations Future directions	
Recommendation	16
References	17
Appendices	19
1. Questionnaires 2. Postcards 3. Additional data	

EXECUTIVE SUMMARY

The New South Wales Rural Hearing Conservation Program is a hearing screening and education program for farmers and farm workers, which is provided at agricultural field days. Farmers and farm workers avail themselves of this program while attending a field day. Once they enter the program they fill in a questionnaire about noise exposure, hearing ability, and other relevant information. After the questionnaire is completed, they then have their hearing screened by a hearing health professional. The results of the screening and questionnaire are then interpreted and the farmer or farm workers are provided with a set of recommendations about maintaining their hearing health.

The program has been offered to farmers since the late 1980s and in its current form has provided in excess of 6,000 screenings. Due to rural people traditionally accessing fewer health services than their urban counterparts, the program was designed to be available during 'down time' and as such has enabled a number of farmers to have their hearing screened who would otherwise have missed out.

Research on noise injury (noise induced hearing loss) has been intermittent, and only in the last decade have consistent efforts been made to measure its long-term consequences. The uptake of personal hearing protection in farming has lagged behind other high noise industries. This situation is starting to be addressed through programs specifically targeted at the agricultural workforce.

The objectives of the evaluation were to determine if:

- the use of personal hearing protection by farmers has changed since being exposed to the program;
- farmers engaged in any of the specific recommendations made immediately after the hearing screenings;
- there are any farmer characteristics that relate to a change in the use of personal hearing protection (for example: age, gender, commodity, hearing level, etcetera);
- the farmers exposed to the program found the program of value.

The evaluation consisted of a mail survey sent to a random stratified sample of participants.

There were 5,013 farmers from New South Wales who had their hearing screened as part of the program between 1 January 1995 and 31 December 2001. Of the 1,000 individuals sampled, 15 were duplicates and 97 were returned unopened. Of the remaining 888 farmers, 64 per cent returned the survey. Of the 565 farmers who responded, 67 per cent reported that they had started using or increased their use of hearing protection since their field day hearing screening. The use of personal hearing protection for non-cabined tractors found a net gain of 13 per cent, for chainsaws 21 per cent, for firearms 7 per cent, and for workshop 21 per cent.

Forty-one per cent of survey respondents had instigated strategies to reduce noise exposure beyond the personal use of personal hearing protection alone. Twenty-five per cent of those recommended to seek further hearing consultation followed through with the advice provided.

Participants expressed a high level of satisfaction with the program, with very few reporting that the program was not helpful. Ninety-eight per cent felt that the field day hearing screening should continue and 97 per cent would recommend the program to other farmers.

It is clear from the results that the program has had a positive effect on farmers' hearing conservation behaviour. However, the results varied across commodity groups and noise exposures. The farmers who participated were highly satisfied with the program and recommended that it continue.

Based on the results of this evaluation, the authors recommend that the New South Wales Rural Hearing Conservation Program be continued and, where possible, expanded. The program clearly showed that farmers' behaviour in relation to noise injury prevention improved as a result being part of the program.

BACKGROUND

The New South Wales Rural Hearing Conservation Program

The New South Wales Rural Hearing Conservation Program is a hearing screening and education program for farmers and farm workers provided at agricultural field days. Farmers and farm workers avail themselves of this program while attending a field day. Due to the large number of farmers and farm workers presenting with significant hearing loss from noise exposure,¹ the program now targets farmers and farm workers less than 40 years of age.

The program has been offered to farm communities since the late 1980s. In its current form, it has been operating since 1992. In excess of 6,000 hearing screenings have been provided to rural farmers and their families since the program's inception.

Rural people traditionally access fewer health services than their urban counterparts,² and have a low uptake of screening programs utilized by urban populations.³ That is why the program was designed to provide hearing screening for farm families through field days and agricultural shows held throughout New South Wales. By having the program available to farm families during 'down time' (that is, times when they are not actively farming), the participation rate is greatly increased.

The format of the program is as follows: farmers attending a field day visit the site where the hearing screening is being conducted and are asked to participate. The farmer is then asked some pre-screening questions (Questions 1–11, Appendix 1) by a trained volunteer at the field day. Prior to the field day, a training session is held to provide the volunteers with the skills required to undertake the program.⁴ The farmer's hearing is then screened by a nurse audiometrist in a hearing booth. The hearing booth varies from site to site; some sites have built hearing booths that meet Australian standards, others are a room, and some may be a tent. The hearing screening results are placed on the bottom of the field day questionnaire, which has a piece of carbon copy paper attached so that the farmers can take their results home. After leaving the booth, the results are explained by a nurse audiometrist, who discusses with the farmer ways to help reduce noise exposure on the farm. These recommendations are also recorded on a sheet for the farmer to take home and follow-up.

In summary, the program provides the results of the screening and discusses results with participants. Recommendations are made, where necessary, to help farmers and their families reduce their exposure to high noise levels. To date, while much information has been collected about the participants in the program,^{1,5,6} there have not been sufficient resources available to conduct a thorough evaluation of the outcomes of the program.

Review of the literature

Research in noise induced hearing loss has been intermittent,^{7,8,9} and only in the last decade have consistent efforts been made to measure the consequences of long term exposure to noise in the agricultural population.^{1,5-6,10-16} Studies examining the consequences of noise exposure in farmers have consistently reported that farmers are a high risk group for noise injury. The hearing loss observed in farmers is significantly greater than what would be expected by age alone in the general population.^{6,13-14,16-17} The hearing loss is greater for males than for females,¹²⁻¹³ and the left ear is usually affected more than the right. It has been shown that hearing loss begins at an early age, with farm children exposed to high noise levels when helping with farm tasks.^{5,10,15} By the time individuals are in their early 20s they are showing clear signs of hearing loss from noise injury.⁶

The uptake of personal hearing protection by farmers has also lagged behind other high noise industries. In 1988, Karlovich et al. reported that less than 20 per cent of farmers consistently used personal hearing protection.¹³ However, there has been some improvement in this area. Challinor presented data that suggested between 1991 and 1994 there was an increase of 10 per cent in the usage of personal hearing protection among farmers exposed to uncabined tractors.¹ Day et al. reported that 90 per cent of Victorian farmers owned personal hearing protection devices but only 43 per cent of them used the devices frequently.¹¹

Few evaluations of interventions to increase the use of hearing protection have been conducted. One study evaluated a school-based hearing conservation program.¹⁸ At the program's conclusion, 87 per cent of the intervention students reported using personal hearing protection at least some of the time, compared to 45 per cent of the control students. Knobloch evaluated another school-based program to increase the use of personal hearing protection.¹⁹ Post-program, 80 per cent of parents of the intervention group intended to use personal hearing protection, compared to 68 per cent in the control group. There have been no published studies of the effects of a hearing screening program on the uptake of personal hearing protection.

OBJECTIVES

The objectives of the evaluation of the program were to determine if:

- the use of personal hearing protection by farmers has changed since being exposed to the program.
- farmers engaged in any of the specific recommendations made immediately after their hearing screening.
- there are any farmer characteristics that relate to a change in the use of personal hearing protection (eg. age, gender, commodity, hearing level, etc).
- the farmers exposed to the program found the program of value.

METHODS

The evaluation of the program consisted of a mail survey sent as a quality assurance follow-up to persons in contact with the program during the years 1995 through 2001. Data from returned surveys were linked to original data collected at the time of program contact. This evaluation received ethics approval from the New England Health Human Research Ethics Committee.

Sampling

There were 5,354 people who had participated in the program between 1995 and 2001. Only those people who live in New South Wales (that is, who had a postcode of 2000 to 2999) were used in this evaluation. A random sample of 1,000 participants who lived in New South Wales, stratified by commodity group, was selected from the master database. The criterion for the stratification was that a minimum of 50 participants from each commodity group would be selected. The total number of participants during 1995–2001 that met the above criteria was 5,013.

Commodity stratification was used as it reflects the agricultural community more accurately and enables people working in farm health and safety to more effectively target farmers with appropriate health and safety messages.²⁰

Using a finite population survey sampling strategy, the number of responses needed, to be assured of 99 per cent confidence that the results are within ± 5 per cent of the actual score, was 549.²¹ This size of sample had the ability to detect an odds ratio of 1.4 at an 'always use hearing protection' proportion of 30 per cent, an odds ratio of 1.5 at a proportion of 18 per cent, and an odds ratio of 1.6 at a proportion of 12 per cent.²² There was also sufficient power (80 per cent) at $\alpha < .05$, based on a correlation of $r=0.5$ with the primary independent variable, to include 2 further variables in the logistic model.³ Adjusting for 20 per cent non-valid addresses and a 70 per cent response rate, the number randomly selected was 1,000.

The Dillman method for mail surveys was used to maximize survey returns.²³ All those selected received a postcard announcing the study one week prior to the first survey mail-out. One week following the first survey mail-out, a postcard was sent to all recipients of the first survey thanking them for their participation and encouraging those who had not done so to fill out and return their

surveys. Two weeks following the first survey mail-out, a second survey was mailed out to all those who had not yet responded with a letter encouraging them to take the time to fill out the survey. Prior to any surveys being mailed out, a reference group of farmers was asked to pilot the questionnaire and give feedback to project staff.

Analyses

Descriptive analyses using frequencies, means, and standard deviations are presented. Weighted results were calculated to estimate the numbers of farmers positively affected by various components of the program. Logistic regression was used to determine characteristics of farmers that were perceived to benefit most from contact with the program. Thematic analysis of open-ended questions was also conducted.

Weighting is the process of adjusting sample values to reflect their representation in the total survey population. It is particularly important when the sample design does not have an equal probability of selection across various stratum of interest. During the process weights are assigned to the sample cases to bring the sample proportion in demographic subgroups in agreement with the known population proportion in each of the subgroups.²⁴

The weighting applied by commodity group is:

- Poultry weight = 2.07
- Fruit weight = 7.81
- Vegetables weight = 3.33
- Cereal grains weight = 12.44
- Mixed farms weight = 9.69
- Mixed sheep–cattle weight = 2.07
- Sheep weight = 9
- Cattle weight = 9.59
- Dairy weight = 8.06
- Cotton weight = 6.31
- Nursery weight = 2.86
- Other weight = 12.76

The number of respondents still farming was used as part of the weighting to calculate the total affect of the program. As part of the questionnaire that was returned, one of the questions asked if they were still farming (Appendix 1, Follow-up Questionnaire, Page 1, Question 2). The number of active farmers positively affected by the screening program was calculated by multiplying the number of farmers from the commodity group by frequency of use of personal hearing protection that had increased or stayed at ‘always use’ (Note: staying at ‘always use’ was included as a positive result as part of the program was to support good behaviour).

For example, there were 243 sheep producers who had a hearing screening between 1995 and 2001, of those who were sampled 83 per cent had increased or stayed at ‘always use’ for personal hearing protection use with chainsaws. This 83 per cent (.83) multiplied by 243 resulted in 202 farmers always using or improving their use of personal hearing protection. This result was then weighted (that is, reduced) by factoring in the number of people by each of the commodities who had left farming (that is, still in farming–total respondents). For example, with sheep farmer there were 27 people who responded but only 23 who were still farming, this produces a weighting of 85.2 per cent. Thus if we take the 202 farmers and multiplied this by 85.2 per cent we have 172 sheep farmers who are still farming positively affected by the program (that is, wear hearing protection when using a chainsaw).

There were 3 basic assumptions used in this study:

1. The sample population is representative of the overall population of farmers who had their hearing screened between 1995 and 2001.
2. The number of participants who had left farming since having their hearing screened is consistent across commodity.
3. Those participants in the program who reported 'already use' personal hearing protection in a given situation continued to do so because of their participation in the program.

RESULTS

Subjects

Since 1995, the screening program has tabulated data for 5,013 individuals who were screened at farm field days. A total of 1,000 individuals who had gone through the hearing screening program were selected by stratified random sampling by major commodity group. Of these, 15 were either duplicate individuals or did not have complete addresses. Out of these 985 follow-up questionnaires sent out, 97 were returned without being opened. This gave a contact rate of 90 per cent. Five hundred sixty five of the 888 remaining eligible questionnaires were returned giving a response rate of 64 per cent.

Table 1 depicts differences between responders and non-responders to the survey. Non-respondents were significantly younger, had farmed fewer years and were less likely to be suffering from a hearing deficit. Twenty-two per cent of respondents indicated they were no longer farming. All subsequent results relate to those indicating they were still actively involved in farm activities.

Table 1
Characteristics of respondents, respondents still farming, and non-respondents

Baseline characteristic	Population (N=5,013)	Respondents (n=565)	Respondents still farming (n=441)	Non- respondents (n=323)
Age in years (sd)	43.4(16.1)	46.4(15.3)	44.7(14.3)	37.9(16.0)*
Years farming in years (sd)	21.2(15.0)	23.1(15.2)	22.3(14.5)	15.1(13.0)*
Time since screened in years (sd)	3.7(1.7)	3.7(1.8)	3.7(1.9)	3.8(1.8)
Male (%)	82	83	85	78
Normal hearing in right ear (%)	24	22	23	32*
Normal hearing in left ear (%)	21	20	22	29*
Family history of hearing loss (%)	9	12	12	9
Poultry	58	28	20	14
Fruit	281	36	27	5
Vegetables	60	18	12	26
Cereal grains	336	27	25	30
Mixed farms	1444	149	130	63
Mixed sheep-cattle	617	61	48	37
Sheep	243	27	23	19
Cattle	863	90	74	49
Dairy	258	32	19	5
Cotton	164	26	19	17
Nursery	63	22	12	18
Other	626	49	32	37

Note: *p<.05; sd = standard deviation.

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

There was a difference between age, years farming, and hearing results in both ears, when extrapolating from the non-responders. Because they are younger and have less hearing loss, the actual findings show that—at least as far as personal hearing protection is concerned—younger persons and those with hearing loss are more likely to take up personal hearing protection. Therefore, lower responses in younger people will lower the estimated percentage of personal hearing protection uptake, while lower responses in those with better hearing will elevate the estimated percentage of personal hearing protection uptake.

Uptake of personal hearing protection

Program participants were asked in the follow-up survey to report in which situations they used personal hearing protection. Table 2 outlines in which situations the use of personal hearing protection improved after contact with the screening program. For uncabined tractors, the net gain in personal hearing protection use was 13.3 per cent; for chainsaws 20.8 per cent; for firearms 6.7 per cent; and for workshops 21.3 per cent. All increases were statistically significant ($p < .05$). Of particular note, at the initial screening, 22.9 per cent of individuals stated that they never used hearing protection. At follow-up this had dropped to 13.2 per cent.

Table 2
Use of personal hearing protection at follow-up

Situation	Baseline 'always use' %	Frequency of use increased or stayed at 'always use' %	Frequency of use stayed at 'sometimes' %	Frequency of use decreased or stayed at 'never use' %	Baseline 'never use' %
Uncabined tractors	30.8	44.1	21.4	34.5	42.9
Chainsaws	38.0	58.8	14.6	26.6	42.2
Firearms	17.3	24.0	51.2	24.8	66.8
Workshops	19.6	40.9	15.7	43.4	56.5

Note: All changes $p < .05$

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Tables 3 to 6 display the frequency of use of personal hearing protection by commodity groups for tractors, chainsaws, firearms and workshop activities respectively. It should be noted that not all people were exposed to each of the pieces of equipment examined. Full tables for each of the commodity groups can be found in Appendix 3.

The use of personal hearing protection increasing or staying at 'always use' varies from commodity to commodity. When examining uncabined tractors (Table 3) vegetable producers (100 per cent) were the most likely to use hearing protection and cereal grain producers (25 per cent) were the least likely to use hearing protection. However, all commodity groups had some improvement since participating in the program.

Table 3
Improvement in use of personal hearing protection with uncabined tractors by commodity group

Commodity group	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Number of active farmers positively affected by screening program between 1995 and 2001
	%	%	
Vegetables	100	100	40
Sheep	50	80	166
Dairy	33	63	96
Other	50	54	213
Fruit	33	50	106
Poultry	9	44	18
Mixed farms	35	38	464
Cattle	36	36	256
Sheep-cattle	27	27	128
Cereal grains	25	25	78
Cotton	0	0	0
Nursery	0	0	0
TOTAL	31	44	1,724

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

In Table 4 all industries except for vegetable producers were exposed to chainsaws, people in the sheep industry (83 per cent) were the most likely to use hearing protection following their screening, however people that produced both sheep and cattle were the least likely (44 per cent) to use hearing protection following their screening. Overall, 59 per cent of farmers reported improvements in their use of personal hearing protection with chainsaws, or otherwise maintained 'always wearing' personal hearing protection.

Table 4
Improvement in use of personal hearing protection with chainsaws by commodity group

Commodity group	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Number of active farmers positively affected by screening program between 1995 and 2001
	%	%	
Sheep	57	83	172
Nursery	40	79	27
Dairy	25	67	103
Mixed farms	45	64	781
Poultry	20	63	26
Cotton	25	63	76
Cattle	53	62	440
Other	40	57	226
Fruit	31	56	118
Cereal grains	30	50	156
Sheep-cattle	43	44	209
Vegetables	33	0	0
TOTAL	38	59	2,312

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Use of personal hearing protection for any industry group when using a firearm is poor, with poultry and nursery industries being the most likely to have continued 'always using' or improved their use of personal hearing protection after going through the program. Cereal grain farmers are the least likely to use personal hearing protection (Table 5).

Table 5
Improvement in use of personal hearing protection with firearms by commodity group

Commodity group	Baseline 'always use' %	Frequency of use increased or stayed at 'always use' %	Number of active farmers positively affected by screening program between 1995 and 2001
Poultry	0	50	21
Nursery	0	50	17
Fruit	14	34	72
Sheep	43	33	68
Other	18	27	107
Mixed farms	27	26	311
Sheep-cattle	4	22	104
Cattle	12	21	149
Dairy	20	20	31
Cereal Grains	36	9	28
Vegetables	0	0	0
Cotton	0	0	0
TOTAL	17	24	941

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

The use of personal hearing protection when undertaking activities in the workshop also varied depending on commodity being produced. Sheep producers (83 per cent) were most likely to use or have improved their use of personal hearing protection since undertaking the program, whereas nursery workers (25 per cent) were the least likely (Table 6).

Table 6
Improvement in use of personal hearing protection with workshop activities by commodity group

Commodity group	Baseline 'always use' %	Baseline 'always use' %	Number of active farmers positively affected by screening program between 1995 and 2001
Sheep	17	83	172
Cereal grains	7	57	177
Other	27	50	198
Dairy	25	46	77
Cattle	29	43	305
Cotton	20	40	48
Fruit	36	36	76
Sheep-cattle	8	35	166
Poultry	13	33	14
Mixed farms	12	32	391
Nursery	50	25	9
Vegetables	33	0	0
TOTAL	20	41	1,607

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Table 7 presents the results for any personal hearing protection use or increased use since undertaking the program for commodity groups. Farmers who produced vegetables (100 per cent) had the highest likely rate of 'always use' or improvement since the program, with all people who had a hearing screening, always using or improving on one aspect of noise hazards. Cotton, fruit and poultry farmers (63 per cent each) had the least change in the use of hearing protection.

Table 7
Improvement in any use of personal hearing protection by commodity group

Commodity group	Baseline 'always use' %	Baseline 'always use' %	Number of active farmers positively affected by screening program between 1995 and 2001
Vegetables	100	100	40
Sheep	57	83	172
Mixed farms	45	82	1,033
Nursery	50	79	27
Cattle	53	76	540
Other	50	69	282
Cereal grains	36	67	208
Dairy	33	67	103
Sheep-cattle	43	66	320
Fruit	36	63	133
Poultry	20	63	26
Cotton	25	63	76
TOTAL	38	73	2,906

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Table 8 describes the results of a logistic regression analysis. The adjusted model (column 3), taking all other significant characteristics into consideration, shows:

- older farmers were 2 per cent less likely to increase their use of personal hearing protection for every year of increasing age.
- those with a family history of hearing loss, were 49 per cent less likely to increase their use of personal hearing protection.
- those who had a history of tinnitus, were 26 per cent more likely to increase their use of personal hearing protection
- those categorized as having severe occupational noise-induced hearing loss after the hearing screening, were 300 per cent more likely to increase their use of personal hearing protection (that is, those who had experienced obvious symptoms of noise injury),
- males were 573 per cent (significantly) more likely to increase their use of personal hearing protection.
- poultry (63 per cent), fruit (64 per cent), cereal grains (69 per cent), sheep and cattle (68 per cent), cattle only (47 per cent), dairy (80 per cent), and cotton (74 per cent) farmers were all significantly less likely to increase personal hearing protection use than mixed farmers.

Table 8
Unadjusted and adjusted odds ratios for characteristics related to the improvement and maintenance of use of personal hearing protection

Baseline characteristic	Unadjusted Odds Ratio (95% Confidence Intervals)	Adjusted Odds Ratio (95% Confidence Intervals)
Age	0.99 (0.99,1.00)	0.98 (0.97,0.99)
Gender (male)	3.92 (2.94,5.24)	6.73 (4.73,9.55)
Years involved in agriculture	0.98 (0.98,0.99)	
Family history of hearing loss	0.73 (0.55,0.98)	0.51 (0.36,0.71)
Hearing difficulty watching TV	1.38 (1.13,1.68)	
Hearing difficulty using telephone	1.00 (0.80,1.25)	
Hearing difficulty during conversation or at meetings	0.95 (0.78,1.16)	
Hearing difficulty in work environment	1.04 (0.84,1.29)	
Hearing difficulty with background noise	1.69 (1.34,2.14)	
Has tinnitus	1.50 (1.23,1.84)	1.26 (1.00,1.58)
Hearing loss		
Normal	1.00	1.00
Mild NIHL	1.20 (0.91,1.58)	1.23 (0.90,1.68)
Moderate NIHL	1.01 (0.71,1.44)	1.24 (0.82,1.86)
Severe NIHL	3.33 (1.72,6.47)	4.01 (1.98,8.11)
Profound NIHL	0.92 (0.54,1.59)	1.32 (0.72,2.43)
Commodity group		
Mixed farms	1.00	1.00
Poultry	0.30 (0.14,0.62)	0.37 (0.15,0.95)
Fruit	0.39 (0.27,0.56)	0.36 (0.22,0.59)
Vegetables	1.30 (0.39,7.27)	1120.16 (0.00,∞)
Cereal grains	0.43 (0.31,0.61)	0.31 (0.21,0.48)
Sheep–cattle	0.42 (0.31,0.56)	0.32 (0.22,0.46)
Sheep	1.30 (0.62,2.72)	0.58 (0.27,1.27)
Cattle	0.62 (0.47,0.82)	0.53 (0.37,0.75)
Dairy	0.65 (0.41,1.02)	0.20 (0.12,0.34)
Cotton	0.78 (0.48,1.27)	0.26 (0.15,0.46)
Nursery	0.74 (0.22,1.20)	0.93 (0.22,3.87)
Other	0.74 (0.53,1.01)	0.44 (0.29,0.66)
Years since screened	1.05 (0.97,1.23)	1.11 (1.02,1.21)

Notes: NIHL = noise-induced hearing loss.

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

In Table 8 the odds-ratio gives an estimate, given that a person possesses the characteristic of the ‘risk’ of having a specific outcome. In this case the outcome of interest is the increase or maintenance of personal hearing protection at the ‘always use’ level. For example, in column 2, the unadjusted odds ratio for a male is 3.92, which means that a male is 3.92 times more likely to increase or maintain the use of personal hearing protection than a female participant. In column 3 the adjusted odds ratio for a male is 6.73 which means that with all other characteristics in the model (age, family history of hearing loss, history of tinnitus, hearing loss, and commodity group) being equal, males are 6.73 times more likely to increase or maintain the use of personal hearing protection than a female participant.

Noise reduction strategies used on the farm

Sixty-seven per cent of those responding reported that they had started using or increased their use of hearing protection since their field day hearing screening. This response correlates with the confirmatory analyses presented in Tables 3 through 7.

During the field day screening, 70 per cent of individuals were advised to look into noise reduction strategies for their farms. The hierarchy of noise reduction strategy is presented in Table 9.

Table 9
Farm noise exposure reduction strategies in relation to the hierarchy of control for injury prevention

	Hierarchy of control	Major risk reduction strategies specified
1	Elimination of the hazard	
2	Substitute for a lesser hazard	Purchase–use quieter equipment
3	Engineering–design options	Installing mufflers on equipment Cabins on tractors Noise treating (for example, insulation)
4	Safer work practices	Maintain equipment, mufflers Limit time exposed Avoid noise Rearrange work area Warn others OH&S strategies–courses Provision of personal hearing protection to employees
5	Personal protective equipment	Personal use of personal hearing protection

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Table 10 illustrates the methods used by farmers to reduce noise exposure on the farm. The most common strategy used by farmers, was the use and availability of personal hearing protection. A commitment by employers to also protect their workers is displayed by the provision of hearing protection.

Table 10
Frequency of strategies mentioned to reduce noise exposure

Strategy	Frequency of specific strategy (Total respondents = 300)
Hearing protection: increased awareness, use, accessibility, quality	148
Provide hearing protection to employees	80
Maintenance, mufflers	63
Limit exposure time	41
Quieter equipment	34
Rearranged work area	19
Avoid noise	15
Other	(sub-total 17)
Employee–employment limits	7
warn others of noisy machinery–activity	4
OH&S course or strategy	3
noise treatment	2
changes prior to screening	1
Total number of specific responses from 300 respondents	417

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

As shown by the ratio of respondents to specific responses illustrated in Table 10, many farmers had instigated a number of different noise injury prevention strategies from across the spectrum, rather than a single strategy. Three had done OH&S courses and/or had implemented formal OH&S plans on the farm. An example of a multi-faceted strategy demonstrates what can be achieved in the way of changing behaviours to reduce noise injury risk on a farm.

‘I always wear earmuffs now and I will not allow employees to operate noisy equipment without them. We have rearranged the workshop, repaired noisy equipment, and we now limit time exposed to noise.’

Forty-one per cent of all survey respondents had instigated strategies to reduce noise exposure beyond the personal use of personal hearing protection alone.

Further management of hearing problems

Twenty-five per cent of those recommended to seek further hearing consultation followed through with the advice provided. In addition, 15 per cent of those suffering from tinnitus sought further information on its management.

Program satisfaction

Table 11 shows the level of satisfaction expressed by farmers exposed to the screening program. Participants expressed a high level of satisfaction with the program with very few reporting that the program was not helpful.

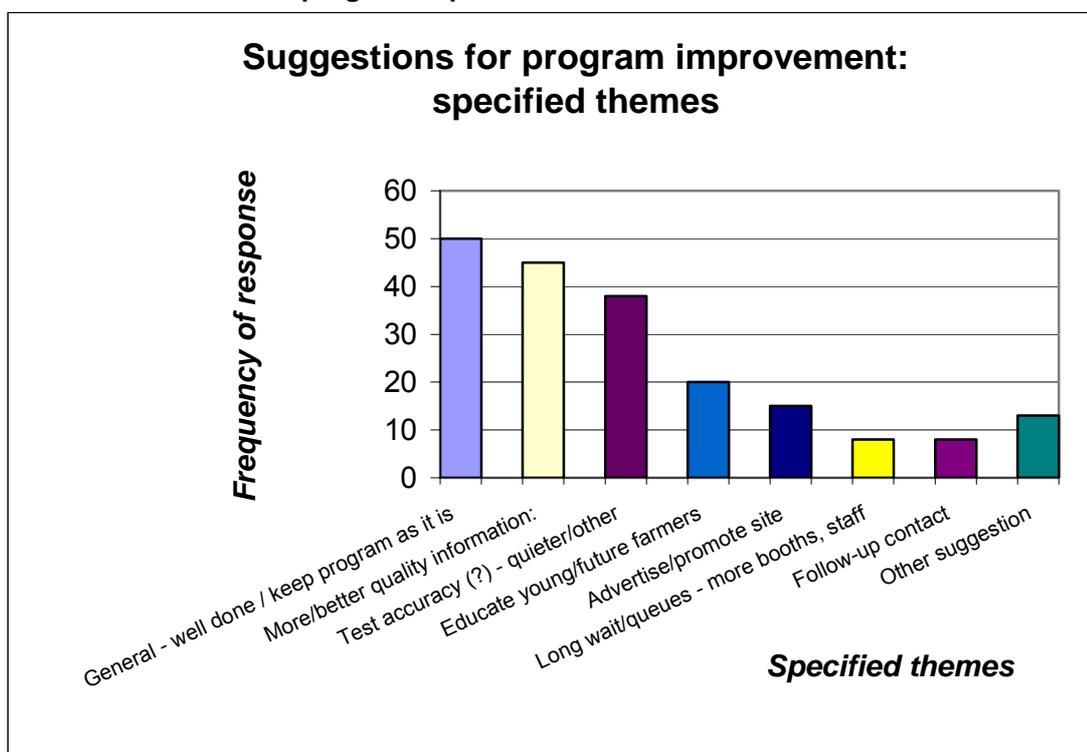
Table 11
Program satisfaction

	Very helpful %	Helpful %	Not helpful %	Not relevant-unsure %
Information on hearing protection	46	49	1	4
Information on tinnitus	12	35	7	46
Information on noise reduction	31	57	7	5
Program staff	64	32	–	4
Overall program	39	53	2	6

Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

Eighty per cent of respondents reported that they fully understood the information that was provided to them by program staff. Ninety-eight per cent felt that the field day hearing screening should continue and 97 per cent would recommend the program to other farmers. Finally, there were 197 responses to a question eliciting advice on program improvement (Figure 1). The predominant suggestions were to improve the quality of the information provided to farmers, to have a quieter area to conduct the actual hearing screening, and to educate younger farmers.

Figure 1
Recommended areas of program improvement



Source: Evaluation of the New South Wales Rural Hearing Conservation Program.

DISCUSSION

It is clear from these results that the New South Wales Rural Hearing Conservation Program has had an impact on farmers' hearing conservation behaviour. Improvement in the use of personal hearing protection ranged from 6.7 per cent during the use of firearms to 21.3 per cent in workshop environments. In addition, 41 per cent of farmers had initiated strategies to reduce noise exposure beyond the use of personal hearing protection, which included engineering, maintenance, and noise avoidance solutions.

There has been little previous work that has examined hearing conservation behaviour across farm commodity groups. Studies have reported that the use of personal hearing protection varies considerably based on specific farm tasks.^{1,5,16} In addition, variation among the trade classifications of construction workers has been noted in the uptake of personal hearing protection.²⁵ Work undertaken by Depczynski et al.²⁶ found a tendency for vegetable production enterprises to be of smaller acreage, where the uncabined tractor is the main workhorse being used up to about 7–8 hours per day. With cabined tractor noise emissions around 91 decibels, the need for personal hearing protection may be more apparent to such a farmer, as without it, he would most likely have tinnitus by the end of the day. For grain producers, the uncabined tractor tends to be the 'grandfather tractor', only used for 'odd jobs' of short duration—perhaps less likely to be perceived by farmers to be a hazard to hearing health, so they are less likely to wear hearing protection when working with this type of tractor.

In the present study, there was considerable variation in the use of personal hearing protection by commodity group and usage scenario. When controlling for age, gender, history of hearing loss, and hearing deficit, almost all commodity groups were significantly less likely to use personal hearing protection when compared to mixed farmers. This likely relates to the typical farm activities that vary across commodity groups. For example, from this study, vegetable farmers had little opportunity to be exposed to chainsaws; farms with sheep and cattle appeared to have less exposure to tractors; whereas farmers who work in a mixed farming environment would have greater exposure to a wider variety of noise creating equipment, and perhaps a greater perception of the need to use personal hearing protection for the greater range of tasks. Overall, the use of personal hearing protection was greatest for vegetable farmers and least for fruit, poultry, and cotton farmers. The majority of farmers participating in the program were from mixed farms where 82 per cent of farmers maintained or improved use of personal hearing protection.

Factors related to use of personal hearing protection

Other characteristics related to the use of personal hearing protection post-program were male gender, tinnitus, the presence of severe noise induced hearing loss, and years since screened. It should be noted that males were targeted as part of the program. Farm females have been found to have less hearing loss than equivalent farm males.^{12,13} The lower uptake of personal hearing protection among women is likely related to exposure, where farm females would be less likely to participate in noise hazardous tasks. This lower exposure may influence women's behaviour in choosing personal hearing protection, as its routine use may not be established in the same manner as that of males. In industrial settings where work tasks are similar, gender does not appear to affect the rate of personal hearing protection.²⁷

Individuals who were suffering the consequences of noise exposure (tinnitus and severe noise induced hearing loss) were also more likely to use personal hearing protection at the time of the follow-up survey. Perceived susceptibility has been found to positively influence personal hearing protection use in other industries.²⁸ Those who have been noticeably affected by noise damage may be more inclined to want to preserve what hearing capacity remains.

Unlike many health promotion activities, the field day screening appears to have more of an effect on participant's behaviour as time extends from field day contact. It may take extended periods of time to make recommended changes on farms regarding noise reduction and the use of personal hearing protection. Costs incurred from the implementation of noise reduction strategies would be a factor, so a slow phasing in of hearing conservation strategies most likely occurs.

Factors negatively associated with the uptake of personal hearing protection included age and a family history of hearing loss. Among blue collar workers, increasing age has been found to negatively affect personal hearing protection use.²⁷ Older farmers may be less inclined to adopt new practices than younger farmers or may question the efficacy of personal hearing protection use.

Hearing loss in a farm family may be considered one of the inevitable risks of farm life. This may be particularly true if children have grown up with parents that are suffering from a significant hearing loss. Findings with Appalachian Mountain coal workers who in many cases are multigenerational miners, suggest a willingness to accept the inevitability of hearing loss as part of the risk of being a miner.²⁹ This view may be similar for other multigenerational industries such as farming.

Program satisfaction

Farmers' satisfaction with the overall New South Wales Rural Hearing Conservation Program could be considered high. No individual reported that the program delivery staff were unhelpful and only 7 per cent found the information on noise reduction strategies to not be of use. In addition, 50 per cent of respondents thought the program should remain as is.

Recommendations were focused on program delivery rather than program value. Farmers thought more information would be of use, and many thought that a quieter area for the actual screening would be advantageous. Interestingly, many farmers felt that the program should incorporate strategies to contact and educate younger farmers about the risk of hearing loss. This is an important finding as research has found that hearing loss on farms begins at an early age.^{5,10,25} The farm community itself appears to be in agreement with what health professionals have observed and what health researchers have confirmed about the threats to hearing in the younger farming population.

Limitations

There are several limitations that need to be highlighted regarding this evaluation. The first, and perhaps most important, is that this particular study design did not control for other concurrent programs or public service campaigns designed to improve hearing conservation behaviour in New South Wales farmers. However, to our knowledge, there were no organised broad-based programs conducted that were focused on farmers and hearing during the period of this evaluation.

Another limitation is that there are significant differences between responders and non-responders with regard to age, farming experience, and hearing loss. As all of these variables are related to the use–uptake of personal hearing protection, the estimates reported here may be somewhat biased. However, the older age coupled with the greater measured hearing loss of respondents may have a cancellation effect on each other. The magnitudes of the effects of either variable on the results of this study are not known.

Notwithstanding the error associated with these limitations, we attempted to control the study by matching individuals' baseline characteristics to their follow-up surveys. This would lower the overall error associated with measuring groups of individuals at 2 points in time. Finally, by using a systematic data collection approach, the response rate reached an acceptable 64 per cent.

Further directions

This evaluation only looked at the direct results of the program and not at any ancillary benefits, or the cost of running the program. The program is often run in conjunction with other health promotion activities at field days, such as nutrition education, child injury prevention, skin cancer prevention, and physical activity. The program has proved popular with the farming community and as such demand often outstrips the capacity to provide the service. Many, while waiting to have their hearing screened, participate in other health promotion programs. As such, a further look at the ancillary benefits provided by the program is warranted.

As with many health promotion activities, the costs and benefits to the individual, community and health system remain unknown and it would be very useful if a cost–benefit analysis was undertaken. As part of the cost–benefit analysis sustainability should be examined.

As the program has been running for many years, revision of the material, reprinting and making available in an electronic format, ensures that the program remains current and relevant to farmers.

RECOMMENDATION

Based on the results of this study it is recommended that the New South Wales Rural Hearing Conservation Program be continued and where possible expanded. While this has implications for resourcing, the results of this study clearly show that farmers' behaviour in relation to noise injury prevention improved as a result of being part of the program.

REFERENCES

1. Challinor K, Coleman R. *Rural hearing conservation in NSW: A field day approach*. Proceedings: Towards Health and Safety at Work, Brisbane, 1995.
2. Strong K, Trickett P, Titulaer I, Kuldeep B. *Health in Rural and Remote Australia*. Canberra: Australian Institute of Health and Welfare, 1998.
3. Gourlay B, Robinson M. 'Being a bloke' rural health consumer education project. Proceedings: National Men's Health Conference, Canberra, 1995.
4. Challinor K. A Staff Training Manual for the NSW Rural Hearing Conservation Program: How to organise a successful field day. Moree: Farmsafe NSW, 1994.
5. Challinor K. Rural noise injury in young farmers. *SHHH News* May 2000: 4-5.
6. Franklin RC, Challinor K, Depczynski J, Fragar L. *Noise Exposure, Hearing Protection and Noise Injury in Young Adult Farmers*. Moree: Farmsafe NSW, 2002.
7. Glorig A. Some medical implications of the 1954 Wisconsin State Fair hearing survey. *Am Acad Ophthalmol Otolaryngol* 1957; 61: 160-171.
8. Thelin JW, Joseph DJ, Davis WE, Baker DE, Hosokawa MC. High-frequency hearing loss in male farmers in Missouri. *Public Health Rep* 1983; 98: 268-273.
9. Townsend TH, Bess FH, Fishbeck WA. Hearing sensitivity in rural Michigan. *Am Ind Hyg Assoc J* 1975; 37: 63-68.
10. Broste SK, Hansen DA, Strand RL, Stueland DT. Hearing loss among high school farm students. *Am J Public Health* 1989; 79: 619-622.
11. Day L, Boulter J, McGrath. Hazard exposure among farmers in Victoria, Australia. *J Occup Health Safety Aust N Z* 1999; 15: 53-60.
12. Karllose B, Lauritzen T, Engberg M, Parving A. A five-year longitudinal study of hearing in a Danish rural population aged 31-50 years. *Br J Audiology* 2000; 34: 47-55.
13. Karlovich RS, Wiley TL, Tweed T, Jensen DV. Hearing sensitivity in Farmers. *Public Health Rep* 1988; 103: 61-71.
14. Marvel ME, Pratt DS, Marvel LH, Regan M, May JJ. Occupational hearing loss in New York dairy farmers. *Am J Ind Med* 1991; 20: 517-531.
15. Solecki L. Occupational hearing loss among selected farm tractor operators employed on large multiproduction farms in Poland. *Int J Occup Med Environmental Health* 1998; 11: 69-80.
16. Williams W, Forby-Atkinson L, Purdy S, Gartshore G. Hearing loss and the farming community. *J Occup Health Safety Aust N Z* 2002; 18: 181-186.
17. Eddington I, Moore D, Rooney P, Pensiero D. Noise induced hearing loss among Australian farmers. *J Occup Health Safety Aust N Z* 1995; 11; 37-42.
18. Knobloch MJ, Broste SK. A hearing conservation program for Wisconsin youth working in agriculture. *J School Health* 1998; 68: 313-318.
19. Knobloch MJ. Influencing parental safety behavior: The secondary impact of a youth-directed intervention. *J Health Education* 1999; 30: 115-119.
20. Fragar LJ, Franklin RC. *The health and safety of Australia's farming community*. Moree: Farmsafe NSW, 2000.
21. Narins P. *The finite population correction*. *SPSS Keywords* 1994; 55: 4-5.
22. Hsieh FY. Sample size tables for logistic regression. *Statistics Med* 1989; 8: 795-802.

23. Dillman DA. *Mail and Internet Surveys, The Tailored Design Method (second edition)*. Brisbane: Wiley, 2000.
24. Statistics Canada. *Processing and Interpreting Survey Results*. Ottawa: Statistics Canada, 1996.
25. Lusk SL, Kerr MJ, Kauffman SA. Use of hearing protection and perceptions of noise exposure and hearing loss among construction workers. *A Ind Hygiene A J* 1998; 59; 466–470.
26. Lusk SL, Ronis DL, Baer LM. Gender differences in blue collar workers' self-reported use of hearing protection. *Women & Health* 1997; 25; 69–89.
27. Melamed S, Rabinowitz S, Feiner M, Weisberg E, Ribak J. Usefulness of the protection motivation theory in explaining hearing protection device use among male industrial workers. *Health Psychology* 1996; 15; 209–215.
28. Patel DS, Witte K, Zuckerman C, Murray-Johnston L, Orrego, V, Maxfield AM, Meadows-Hogan S, Tisdale J, Thimons ED. Understanding barriers to preventive health actions for occupational noise-induced hearing loss. *J Health Communication* 2001; 6; 255–168.
29. Depczynski J, Franklin RC, Challinor K, Williams W, Fragar LJ. *Farm Noise Hazards: noise emissions during common agricultural activities*. Moree: Farmsafe NSW, 2002.

APPENDICES

Appendix 1: Questionnaires

Field Day, Side A


AUSTRALIAN AGRICULTURAL HEALTH UNIT
HEARING CONSERVATION PROGRAM QUESTIONNAIRE


1. ID No. 2. Site Location 3. Date

4. Surname _____ Other Name _____
 Postal Address _____ Year of Birth
 Town _____ Postcode

5. Gender Male 1 Female 2

6. Type of farming enterprise Number of years working on farms
 Farmer Full-time 1 Part-time 2
 Student 1 2
 Number of weeks spent working on farms

7. Family history of hearing loss requiring aids before age 40 Yes 1 No 2
 Presence of hearing loss suggested by family/friends Yes 1 No 2

8. Hearing difficulties experienced in the following situations:
 Television Telephone
 Meetings/conversation Working Environment
 Classroom Background Noise
 Other _____

9. If Tinnitus Present Ears Affected Type Effects of the Tinnitus
 Right 1 Continuous 1 Nil 1
 Left 2 Intermittent 2 Annoyance 2
 Both 3 Other _____ 3

10. Noise Exposure Tractor (no cabin) Firearms Chainsaw
 Workshop tools Heavy machinery Tractor (cabin)
 Other _____

Previous Noise Exposure
 Recreation Type _____
 Previous Occupation Type _____
 Armed Forces Other _____

Name _____ ID No.

Australian Agricultural Health Unit
Hearing Conservation Program Results

	1K	2K	3K	4K	6K	8K
10						
20						
30						
40						
50						
60						
70						
80						
90						
Frequency (in hertz)	1K	2K	3K	4K	6K	8K

KEY
 ○ Right Ear
 × Left Ear

Screening Report

Recommendations

Signature _____ / /

Field Day, Side B

11. Do you wear Personal Hearing Protectors when involved in the following farm activities?

	Always	Sometimes	Never
Driving a tractor without a cabin	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Operating a chainsaw	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Using firearms	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Using workshop tools (e.g. Angle grinders etc.)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Other situations	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

Protectors used - Nil 1, Ear Plugs 2, Ear Muffs 3, Either 4, Both 5

What other adjustments have you made to reduce noise? _____

HEARING SCREENING OUTCOMES

	1k	2k	3k	4k	6k	8k
Right ear (in decibels)						
Left ear (in decibels)						

KEY

- 1 Normal
- 2 Mild NIHL
- 3 Moderate NIHL
- 4 Severe NIHL
- 5 Profound NIHL
- 6 Other

Right Ear Left Ear

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

RECOMMENDATIONS

- Noise reduction strategies
- Use of Personal Hearing Protection
- Tinnitus information/management strategies
- Refer for further hearing assessment
- Other _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Signature _____ Date / /

Coded by _____ Date / /

Follow-up questionnaire, Page 1

Evaluation of the NSW Hearing Conservation Program

Questionnaire ID# _____

The following questions ask you about your experience since you had your hearing tested at a field day through the NSW Rural Hearing Conservation Program. The information you provide will be used to improve the program.

Remember, all answers are confidential and no names will be attached to this questionnaire so we ask that you answer each question honestly. If a question is too difficult or you don't have an answer, skip it and go on to the next question. The questionnaire should take less than 10 minutes to complete. If you have any queries, please contact either:

Kathy Challinor
CNC Audiometrist,
Tamworth Community Health Centre
New England Area Health Service
Ph. 0428 66 7502

or

Richard Franklin
Director, Farm Injury Research
Australian Centre for Agricultural
Health and Safety, Moree
Ph. 0267 52 8215

Thank you for your cooperation.

PART A: INDIVIDUAL CHARACTERISTICS

This first section asks for background information and is for statistical purposes only.

1. What type of farming enterprise are / were you involved in?.....

2. Are you a full or a part time farmer? (Please tick one)

Full-time.....

Part-time.....

No Longer Farming..... Go to Question 4

3. How many weeks do you spend working on the farm each year? _____ Weeks

4. Have your family or friends suggested that you may have a hearing loss?

Yes.....

No.....

5. Are there situations where you experience hearing difficulties?

	Yes	No
Watching Television.....	<input type="checkbox"/>	<input type="checkbox"/>
Using the Telephone.....	<input type="checkbox"/>	<input type="checkbox"/>
Conversation.....	<input type="checkbox"/>	<input type="checkbox"/>
Working Environment.....	<input type="checkbox"/>	<input type="checkbox"/>
Classroom.....	<input type="checkbox"/>	<input type="checkbox"/>
When There is Background Noise.....	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify).....	<input type="checkbox"/>	<input type="checkbox"/>

17/10/01

1 of 4

Follow-up questionnaire, Page 2

Evaluation of the NSW Hearing Conservation Program

6. Do you ever drive a tractor without an enclosed cab?

Yes

No

7. Do you ever use firearms?

Yes

No

8. Do you ever use a chainsaw?

Yes

No

9. Do you ever use workshop power tools? (eg. grinders, drills, etc.)

Yes

No

10. Do you ever drive or work around heavy machinery? (eg. harvester, auger, excavator, grader)

Yes

No

11. Do you ever drive a tractor with a cab?

Yes

No

12. Do you wear personal hearing protectors (ie. earmuffs or earplugs), when involved in the following farm activities?

	Always	Sometimes	Never	Don't Use Equipment
Driving a tractor <u>without</u> a cab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operating a chainsaw	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using firearms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using workshop power tools (eg. grinders, drills, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving a tractor <u>with</u> a cabin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using heavy machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other situations (please specify _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Follow-up questionnaire, Page 3

Evaluation of the NSW Hearing Conservation Program

13. What types of personal hearing protectors do you use? (Please **choose one box** only)

- None
- Earplugs
- Earmuffs
- Either** Ear Plugs **or** Ear Muffs
- Both** Ear Plugs **and** Ear Muffs together...

PART B: Noise Reduction on Your Farm

This section asks about how exposure to noise is reduced on your farm.

14. What have you done to reduce noise on your farm **since** your hearing test/screening?
(Examples include: replacing seals, brackets, mufflers on noisy equipment; rearranging workshop; replacing with quieter equipment; providing ear protection to employees; limiting time exposed to noise)

15. Have you **started** using, or **increased** use of hearing protection (ie: earmuffs or earplugs), **since** your field day hearing test/screening?

- Yes
- No

16. Have you had any further hearing tests or assessments **since** your field day hearing test/screening?

- Yes
- No

17. If you had *tinnitus* at the time of your field day screening, have you sought information on its management? (NB: *tinnitus* is noises/ringing in the ears or head)

- Yes
- No
- Don't have tinnitus

Follow-up questionnaire, Page 4

Evaluation of the NSW Hearing Conservation Program

PART C: Program Satisfaction

This section asks you about your satisfaction with the Hearing Conservation Program.

18. For each of the following statements, please indicate your choice.
When I had my hearing tested at the field day the:

	Very Helpful	Helpful	Not helpful	Not Relevant	Don't know / Unsure
Information on hearing protection was	<input type="checkbox"/>				
Information on tinnitus was	<input type="checkbox"/>				
Information on noise reduction was	<input type="checkbox"/>				
Program was	<input type="checkbox"/>				
Program staff were	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

19. Did you understand the information about the hearing screening?

- Yes
- No
- Unsure/don't remember

20. Do you think hearing tests at field days should continue?

- Yes
- No
- Unsure

21. Would you recommend hearing testing at field days to other farmers?

- Yes
- No

22. Is there anything you would like to tell us to help improve the hearing program at field days?

Thank you. Your co-operation may just help a future farmer's hearing!

Please place the completed questionnaire in the reply paid envelope provided and mail to the Australian Centre for Agricultural Health and Safety. No stamp is necessary.

Appendix 2: Postcards

Postcard 1

<p>Dear</p> <p>As sometime during the past 6 years you had a hearing test at a field day in NSW. As a participant in the NSW Rural Hearing Conservation Program you are in a unique position to assist in evaluating the program to ensure that the service offered to farmers is of the highest quality. A brief questionnaire will be posted to you in 1 week. You are urged to complete it and send it back as soon as possible in the Reply Paid Envelope. It should not take more than 10 minutes to complete.</p> <p>Yours in hearing health Australian Centre for Agriculture Health and Safety PO Box 256 Moree NSW 2400</p>	<p>Australian Centre for Agricultural Health and safety</p>	<table border="1"><tr><td>POSTAGE WILL BE PAID BY ACHEALTH</td></tr></table> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	POSTAGE WILL BE PAID BY ACHEALTH
POSTAGE WILL BE PAID BY ACHEALTH			

Postcard 2

<p>Dear</p> <p>In the past two weeks you would have received a questionnaire in the mail regarding a hearing test you had at a field day. If you have already returned the questionnaire, we would like to thank you for participation. If not, could you please return it as soon as possible in the Reply Paid Envelope. It should not take more than 10 minutes to complete. We need questionnaires returned by:</p> <p>To enable us to improve the hearing program. Your contribution could help save a future farmer's hearing!</p> <p>Yours in hearing health, Australian Centre for Agriculture Health and Safety PO Box 256 Moree NSW 2400</p>	<p>Australian Centre for Agricultural Health and safety</p>	<table border="1"><tr><td>POSTAGE WILL BE PAID BY ACHEALTH</td></tr></table> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	POSTAGE WILL BE PAID BY ACHEALTH
POSTAGE WILL BE PAID BY ACHEALTH			

Appendix 3 : Additional data

Cattle

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	36.4	35.7	25.0	39.3	27.3
Chainsaws	52.6	61.8	17.6	20.6	28.9
Firearms	11.5	28.6	42.9	28.6	65.4
Workshops	29.0	42.9	10.7	46.4	51.6

Cereal grains

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	25.0	25.0	12.5	62.5	58.3
Chainsaws	30.0	50.0	20.0	30.0	42.9
Firearms	36.4	9.1	81.8	9.1	57.1
Workshops	6.7	57.1	14.3	28.6	66.7

Cotton

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	0.0	0.0	60.0	40.0	28.6
Chainsaws	25.0	62.5	37.5	0.0	37.5
Firearms	0.0	0.0	40.0	60.0	100
Workshops	20.0	40.0	20.0	40.0	40.0

Dairy

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	33.3	62.5	37.5	0.0	33.3
Chainsaws	25.0	66.7	8.3	25.0	41.7
Firearms	20.0	20.0	60.0	20.0	50.0
Workshops	25.0	50.0	0.0	50.0	58.3

Fruit

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	33.3	50.0	14.3	35.7	40.0
Chainsaws	30.8	55.6	11.1	33.3	42.9
Firearms	14.3	33.3	50.0	16.7	88.7
Workshops	35.7	36.4	18.2	45.5	58.3

Mixed farms

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	35.1	54.0	24.0	22.0	31.6
Chainsaws	44.5	63.5	7.7	28.8	42.9
Firearms	26.5	25.5	48.9	25.5	57.1
Workshops	11.7	31.6	22.5	45.6	58.3

Mixed sheep-cattle

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	28.6	26.9	23.1	50.0	39.3
Chainsaws	44.5	44.4	18.5	37.0	35.7
Firearms	3.8	22.2	51.9	25.9	84.6
Workshops	8.3	34.8	17.4	47.8	66.7

Nursery

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	0.0	0.0	50.0	50.0	50.0
Chainsaws	40.0	80.0	20.0	0.0	20.0
Firearms	0.0	50.0	0.0	50.0	100.0
Workshops	50.0	25.0	0.0	75.0	50.0

Other farms

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	50.0	53.8	7.7	38.5	35.7
Chainsaws	40.0	57.1	21.4	21.4	20.0
Firearms	18.2	27.3	45.5	27.3	63.6
Workshops	26.7	46.7	13.3	40.0	33.3

Poultry

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	9.1	44.4	22.2	33.3	72.7
Chainsaws	20.0	62.5	12.5	25.0	60.0
Firearms	0.0	50.0	25.0	25.0	100.0
Workshops	12.5	33.3	0.0	67.7	75.0

Sheep

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	50.0	80.0	0.0	20.0	31.6
Chainsaws	57.1	83.3	0.0	16.7	28.6
Firearms	42.9	33.3	50.0	16.7	14.3
Workshops	16.7	83.3	0.0	16.7	50.0

Vegetables

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	100.0	100.0	0.0	0.0	0.0
Chainsaws	33.3	0.0	0.0	100.0	66.7
Firearms	0.0	0.0	50.0	50.0	100.0
Workshops	33.3	0.0	0.0	100.0	66.7

Nursery

Situation	Baseline 'always use'	Frequency of use increased or stayed at 'always use'	Frequency of use stayed at 'sometimes'	Frequency of use decreased or stayed at 'never use'	Baseline 'never use'
	%	%	%	%	%
Uncabined tractors	0.0	0.0	50.0	50.0	50.0
Chainsaws	40.0	80.0	20.0	0.0	20.0
Firearms	0.0	50.0	0.0	50.0	100.0
Workshops	50.0	25.0	0.0	75.0	50.0

