

Farmers' work-day noise exposure

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Background

Shh - hearing in a farming environment

NHMRC funded project (APP1033151)

Deakin University

National Centre for Farmer Health

National Acoustic Laboratories

University of Canberra

Institute for Governance and Policy Analysis

Background (cont)

Noise exposure and hearing health is a ubiquitous and pervasive problem in the farming/agricultural industry

Around 37% of the Australian population shows an influence of noise in their audiogram

In Victoria 50% of male and 29% of female farmers self-report hearing difficulties

Incidence: 37% < 60 years old 54% > 60 years old

Project aims

- To investigate
 - Noise management and exposure on farms
 - To improve hearing loss prevention
 - Rehabilitation
- Through engagement with farmers and farming families: on farm noise audits with feedback; and MHHP (Montreal Hearing Help Program)

Methods - processes

- On farm noise audit
- Personal noise exposure monitoring
- Feedback of their noisy plant/machinery
- Provide a printed report

Methods - participants

- Dosimeters: females 14; males 37; n = 51;
- On-farm audits: around 60 farms Vic, SE-QLD;
- Dairy; beef; wool; prime lamb; pork; cropping;
- Reports to 105, feedback from 85 (81%);

Activity area	Specific activity	Noise level (range) L _{Aeq} (dB)
Driving	Tractor	72 - 99
	Utility vehicles & trucks	69 - 82
	Header	77
	Bobcat	83
	Ride-on mower	98 - 101
	Motor bike	89 - 93
	Boat	96
	Quad bike	79 - 90
	Motor bike	76
	Spraying from tractor	81
Tools and machinery	Drop saw	102
	Post hole digger	88
	Brush cutter	87 - 96
	Cordless drill	79
	Grinder	90 - 102
	Chain saw	99 - 119
	Log splitter	82 - 102
	'Flymo' lawn mower	93
	Push mower	87
	Leaf blower	84 - 87
	Whipper-snipper	90
	Post driver	101 - 110
	Rattle gun	74
	Wool press	82 - 87
	Auger	85 - 98
	Power ladder	87
	Generator	92
	Dairy vacuum pump	73
	Air compressor	82 - 90
	Fire pump	92
Farm activities	Metal work	97
	General carpentry work	70 - 78
	Chopping wood	75
	Mustering sheep & cattle	70 - 91
	Feeding sheep & cattle	75 - 90
	Foot wash sheep	79
	Shearing shed	75 - 80
Domestic activities	Kitchen, vacuuming	65 - 80
	Paperwork, computing	65 - 70
	Gardening	65 - 86

Name [REDACTED]
 Age 64 Postcode [REDACTED]
 Dosimeter serial no: 1211414

If multiple events are recorded, please list the time sequence of the recording
 (e.g.; 7:45am – breakfast; 8:00am – Get into vehicle; 10:00am – Drive around paddocks; 10:15am – Feed cattle)

Date	Location/s and Event/s

Please include any other relevant information about the location (e.g., size of room/shed, other people around, hard or soft furnishings etc.)

Time	Event / Location	Distance from sound source (i.e. chainsaw, radio)	Were you moving around? Please give details	Dosimeter location (e.g., lapel)	Notable noise event/s during this period	Did you wear ear plugs
6AM	RADIO CAR RTE.					
6:45	DAIRY					
8:00	Breakfast					
8:30	tractor radio					
9AM	motorbike					
9:32	lute					
9:40	motorbike					
9:45	COFFEE					
10:10	motorbike					
10:12	tractor radio					
10:27	cleaning house music					
11:30	tractor radio					
12:00	Lunch					



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Summary of farmer noise exposure assessment results (*FSD)

Group	Subjects (N) (%)	Exposure ($L_{Aeq,8h}$) (dB) [range]	L_{Cpeak} (dB) [range]*	Exposure (Pa ² h) [range]	Exposure time (h) [range]
All (m + f)	51 (100%)	85.3 [70.9 – 96.7]	134.6 [122.0 - 143.5*]	1.09 (SD = 2.4) [0.04 - 14.9]	15.2 (SD = 8.5) [1.5 - 28.5]
Females (f)	14 (27%)	85.2 [70.9 - 94.1]	135.7 [122.0 - 143.5*]	1.14 (SD = 2.3) [0.04 - 8.3]	15.4 (SD = 8.9) [2.0 - 25.7]
Males (m)	37 (73%)	85.5 [71.1 - 96.7]	134.2 [122.4 - 143.5*]	1.07 (SD = 2.5) [65.9 - 93.6]	15.2 (SD = 8.5) [1.5 - 28.5]

Important points

- No statistical difference between female and male exposures
- Mean exposure ($L_{Aeq,8h}$) = 85.3 dB [1.09 Pa²h]
- Mean max peak (L_{Cpeak}) = 134.6 dB

ATTACHMENT

On-Farm Noise Audit

Report of your farming noise exposure

Shearing

The total noise exposure for a shearer on an 8 hour day was equal to $3.62\text{pa}^2\text{h}$ which is more than triple the daily recommendation of $1\text{pa}^2\text{h}$ indicating that your shearers are at risk hearing damage. The total noise exposure for a rouseabout on an 8 hour day was equal to $0.63\text{pa}^2\text{h}$ or just over half – so that's good news!

How can you prevent hearing loss?

If you wanted to limit your noise exposure and prevent hearing loss, you could take simple noise control measures such as wearing earplugs or muffs, particularly for the shearer who is often at ear level to the elbow joint.

In table 1, the tasks which fall under the recommended daily maximum have been highlighted in green and the tasks that fall over the recommended daily maximum have been highlighted in red. This is to remind you to use noise control measures.

We hope this information has been helpful to you. Thank you for allowing us to come and visit your sheep farm and if you have any questions please contact Heidi Mason (Research Assistant) at the National Centre for Farmer Health on (03) 5551 8533.



Farm identification and Location address

Day and date of on-farm noise audit

*Dr Warwick Williams, National Acoustics Laboratory,
Clinical Assoc. Prof. Susan Brumby, Ms Cate Mercer-Grant, Ms
Heidi Mason (RN), Mr Adrian Calvano (RN) – National Centre for
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Did you know?

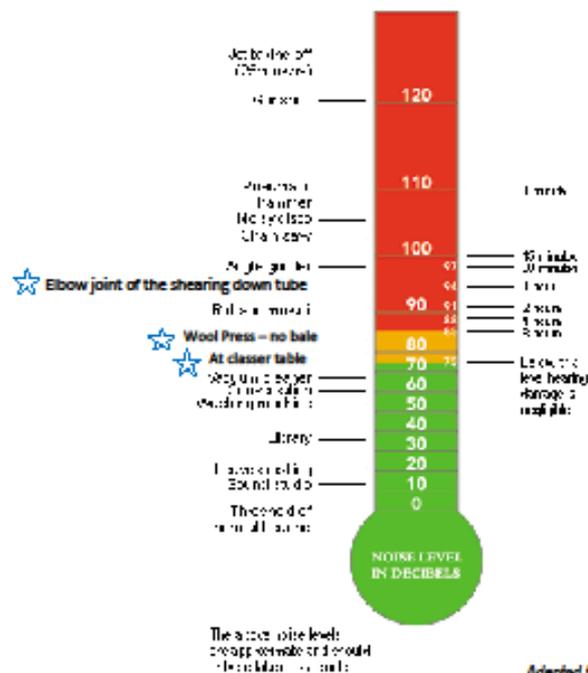
85 decibels (dB) - is the maximum permitted level of noise you should be exposed to daily.

75 dB - is standard level of noise you can be exposed to daily with negligible risk.

1 Pascal squared hour (Pa^2h) is equal to 85dB and is the standard recommended level of noise you should be exposed to during 1 day of work (based on an 8 hour day).

Recommended usage time (T_{rec} h) is the maximum level of time you can perform a particular activity for before exceeding the standard.

The noise thermometer below shows the dB rating of some of your farming tasks, along with common activities.



Adapted from the website of Australian Hearing, <http://www.hearing.com.au/> accessed 2 April 2012

How does your noise exposure measure up?

The tasks measured were given an average allocated time that you might perform them for daily. With the total hours of shearing activities set at 8 hours per day. We have looked at a typical day for a rouseabout and a typical day for a shearer.

The dB reading in the left column tells you how each activity rated. Most tasks (following rouseabout, classer table, wool press running, and shearing - 1 metre from elbow joint) were under the 85dB recommended maximum except for the reading taken at the elbow joint of the shearing device.

The maximum recommended usage time is also shown for each individual task in the far right column, so you can see that if you were to spend 1 hour, 24 minutes with your ear at the elbow joint you have already met your recommended daily limit of 85 dB or 1 Pa^2h .

Table 1
Daily exposure of rouseabout and shearer

Rouseabout Task	dB (L_{Aeq})	Time (h)	Exposure (Pa^2h)	T_{rec} (h)
Following rouseabout - ear level	83.1	6	0.49	12.39
At classer table	79.1	1	0.03	31.12
Wool press - no bale	84.2	1	0.11	9.62
Actual Mean	82.13	8	0.63	
Shearer				
Task				
Elbow joint of the shearing down tube	93.10	4.0	3.27	1.24
Shearing - 1 metre from elbow joint	83.50	4.0	0.36	11.30
Actual Mean	88.30	8.0	3.62	
Mean	88.30		2.42	

This is the dB reading

This is the maximum recommended usage time

Summary of the results of the usefulness of the on-farm noise exposure reports

Measure	Agree % (n)	Disagree % (n)	Undecided % (n)
The farm visit was successful in updating my knowledge about farming tasks that affect my hearing	99 (84)	0 (0)	1 (1)
The farm noise control booklet updated my awareness of influencing my health status	99 (84)	0 (0)	1 (1)
The farm noise control booklet provided information about noise induced hearing loss	98 (83)	0 (0)	2 (2)
I found the language and concepts in the noise control booklet easy to grasp	99 (84)	0 (0)	1 (1)
The results of the farm noise audit have motivated me to use hearing protection	95 (81)	4 (3)*	1 (1)
I would recommend a farm noise audit to other farmers	99 (84)	0 (0)	1 (1)
I felt comfortable wearing the dosimeter (n=23 **)	100 (23)	0 (0)	0 (0)

Report comments

- I like the personal touch. Something I can show my staff and say *“this is why we wear ear protection”*.
- Awareness of noise causing hearing problems.
- Concise and a good reference. Well set out and easy to read.
- It is very interesting having actual noise values for my machinery and not just generic figures for average machines. It reinforced my need for hearing protection on these machines.
- It alerted me to the high noise of much machinery which I had taken for granted – without hearing protection.
- Makes you stop and think about many farming tasks.
- The booklet has made me aware of how far in excess of recommended safe levels the implements that I farm with have the potential to damage my hearing (a lot of damage already done) (ear muffs always close by).

Salient points

- Females/males same exposure levels
- Mean exposure $1.09 \text{ Pa}^2\text{h}$ or $L_{\text{Aeq},8\text{h}} = 85.3 \text{ dB}$
- Recommended Australian Noise Exposure Standard = 85.0 dB ($1.01 \text{ Pa}^2\text{h}$)
- Peak exposure $L_{\text{Cpeak}} > 140 \text{ dB}$

Extension to industry

- 51% agricultural workers exposed over the exposure limit every day
- Using ABS figures (2010) of 318,200 employed persons in sector implies there are 163,000 at risk of future Hearing Loss

Conclusion

- Noise audits provide effective feedback
 - Simple
 - Individualised
 - Raise awareness
- Noise exposures
 - Majority (51%) are above exposure standard