

FS2067

Can You Hear Me Now?

Understanding hearing loss and prevention strategies for farmers and ranchers



Photo by Angie Johnson, NDSU

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Farmers and ranchers work daily in noisy environments. From the engine of a tractor to squealing hogs in a swine barn, sound levels on the farm present a serious danger to one's hearing. A U.S. study by the National Safety Council revealed that 92% of the farmers who participated were exposed to extreme noise levels while carrying out daily tasks. Of those participants, 78% reported suffering from hearing loss.

As a result of hearing loss, farmers and ranchers can become increasingly susceptible to other hazards on the farm that can impact personal safety and the safety of workers, including family members, on the farm. Examples of situations include:

- **Hearing warning signals.** As a machine operator shifts equipment into reverse when needing to back the machine up, having hearing loss may prevent the farmer or rancher from hearing the warning signal from the machine that indicates the machine is traveling in reverse, resulting in an injury or fatality.
- **Reduced concentration.** Excessive noise may adversely affect farm workers' concentration, easily putting farmers, ranchers and their workers at risk for injuries from machinery.
- **Physical exhaustion.** Farmers and ranchers often have to exert more energy in order to perform their tasks in a noisy environment. The excess energy required can lead to fatigue and increase the risk of work-related injuries on the farm or ranch.
- **Decreased moral and mental health.** Losing hearing can also contribute to feelings of isolation and depression and affects the overall mental health of workers.



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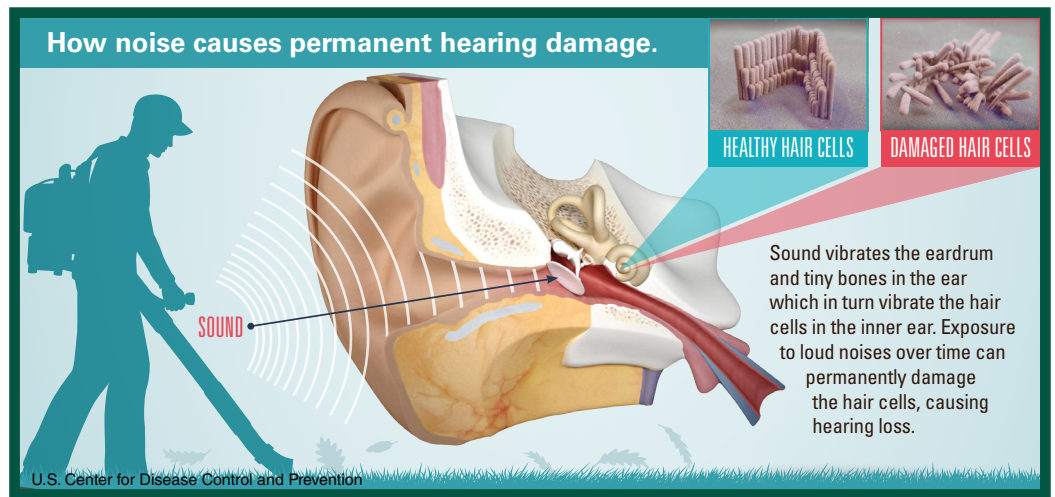
What are some signs of hearing loss?

- You struggle to follow conversation in social settings.
- Your partner complains you don't listen to them.
- You prefer the TV at a volume louder than your family.
- You struggle to hear on the phone.
- You find yourself asking others to repeat themselves.

Degrees of hearing loss

This chart helps you determine what degree of hearing loss you may be experiencing. Contact your healthcare provider to learn more about your degree of hearing loss.

Degree of Hearing Loss	Impact
Slight – 25-40 dB	Difficulty hearing soft or distant speech in church or theater
Mild – 40-55 dB	Difficulty understanding conversational speech in restaurant or group setting
Moderate 55-75 dB	Difficulty hearing normal levels of speech (at 65 dB)
Severe 70-90 dB	Cannot hear loud speech or understand speech on the telephone but can hear shouted speech
Profound >90 dB	Difficulty hearing even shouted speech



How noise causes permanent hearing damage

Noise-induced hearing loss occurs due to repeated exposure to high levels of sound. The louder the noise, the less amount of time before damage occurs to the hair cells within the ears. Noise is measured in decibels (dB), the sound pressure level or intensity. Moderate levels of sound measure less than 60 dB, such as a conversation between two individuals. Sounds exceeding 85 dB warrant use of hearing protection, especially with chronic exposure of greater than eight hours.

How loud is too loud?

This graphic illustrates levels of noise emitted by various farm equipment and the maximum amount of time you can be exposed before damage to hearing will occur. Keep in mind that doubling the sound intensity results in a 3-decibel increase. For example, operating an air compressor or shop vac (95 dB) is twice as loud as operating a cabbed tractor or combine (92 dB).

Distance between the source of noise can have an impact on the decibel level heard. Create space to keep noisy equipment away from your ears to prevent damage. As a person moves away from the sound, loudness drops off quickly. For example, if you are standing four feet away from someone using a chainsaw, you will hear 109 dB of sound. A person standing closer to the chainsaw at two feet will hear 115 dB of sound. If possible, distance yourself when working near loud equipment. When that is not possible, wear hearing protection devices (HPDs) to get noise within the acceptable 85 dB range.

Farm Equipment	Noise Level (dB)	Max Safe Time*
ATV, push mower	90 dB	2.5 hours
Tractor/combine (with cab), grain auger	92 dB	1.5 hours
Air compressor, shop vac	95 dB	47 minutes
Pigs squealing, irrigation pump	100 dB	15 minutes
Riding mower, pressure washer	102 dB	9 minutes
Tractor (no cab), grain dryer	105 dB	4 minutes
Leaf blower	110 dB	1-2 minutes
Chain saw	115 dB	< 1 minute

*Maximum time without wearing hearing protection

Preventing hearing loss using hearing protection devices (HPD)

Noise-induced hearing loss leads to permanent damage to the ears. Therefore, prevention is key. Wearing earplugs and/or earmuffs as a hearing protection device (HPD) when working will provide a barrier between the sound and the ear to reduce dB levels emitted by farm equipment and machinery.

Buyer's guide

	Pros	Cons
 <p>Earmuffs</p>	<ul style="list-style-type: none"> • Good protection • Reusable • Easy on/off • Radio option allows you to listen to sports/music 	<ul style="list-style-type: none"> • May not fit well over glasses • Higher initial price • Facial hair may affect fit • Uncomfortable in hot environments
 <p>Formable Earplugs</p>	<ul style="list-style-type: none"> • Good protection • Lowest initial price • Comfortable • Can be worn with glasses and earrings 	<ul style="list-style-type: none"> • Easy to lose • Disposable • More time to insert • Requires clean hands for insertion
 <p>Push-in Earplugs</p>	<ul style="list-style-type: none"> • Low initial price • Easy on/off • Reusable • Use stem for quick and clean insertion 	<ul style="list-style-type: none"> • Lower protection • Must have correct size • Easy to lose • Can become uncomfortable after long periods of time

Earplugs are cheaper than hearing aids!

Adapted with permission from Great Plains Center for Agricultural Health, www.gpcah.org

Selecting hearing protection

The quality of hearing protection devices is measured using the Noise Reduction Rating (NRR).

NRR is a rating method to determine how much the overall noise level is reduced by the hearing protection device. The formula represents the reduction in noise level provided by a hearing protection device based on NRR rating.

$$\text{Protection} = (\text{NRR} - 7) \times 0.5$$

Here is an example of how the formula applies on the farm. Utilizing hearing protection with an NRR of 30 dB when working near a grain dryer decreases the noise exposure from 105 dB to 93.5 dB and increases the amount of time protected from damage to hearing from four minutes (without protection) to 1.5 hours (with protection).

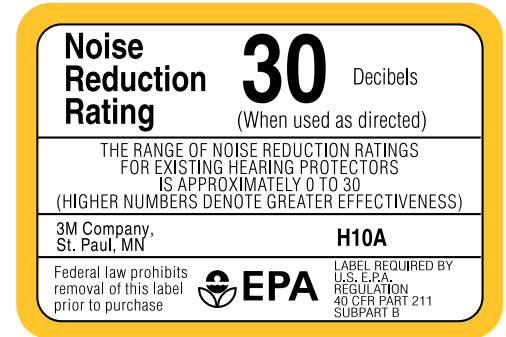
Earmuffs with NRR of 30:

$$\begin{aligned} \text{Protection} &= (30 - 7) \times 0.5 \\ &= 23 \times 0.5 \\ &= 11.5 \text{ dB} \end{aligned}$$

105 dB grain dryer – 11.5 dB of protection (answer from the formula) = 93.5 dB noise exposure

What to look for when buying hearing protection

In the U.S., all hearing protection must be labelled with the NRR by federal regulation. This is an example of how the label will look on the packaging:



Check your earplugs or earmuffs for their NRR.

- Highest NRR for earplugs is 33 dB.
- Highest NRR for earmuffs is 31 dB.
- Utilizing a combination of earmuffs and earplugs allows for an additional 5 dB NRR
 - For example, earplugs with NRR of 33 dB worn alongside earmuffs with NRR of 31 dB results in protection of 38 dB.

How to measure how loud your task or worksite is

Utilizing phone apps can help measure the level of sound to determine the type of hearing protection you need and how long you can be exposed to the sound. Here are some examples:

- NIOSH Sound Level Meter (iPhone only)
- Decibel X: dB Sound Level Meter
- Decibel Meter Sound Detector

Using hearing protection with hearing aids

- In-ear hearing aids with upper volume limits should be worn under hearing protection.
- Hearing aids worn behind the ear or that prevent earmuffs from sealing properly should be taken out and replaced with hearing protection.
- Hearing aids without an upper volume limit that serve to amplify sound should be removed and replaced with hearing protection.



Summary:

What can you do to prevent hearing loss?

- Identify how loud your worksite is to determine risk of hearing loss.
- Select and wear appropriate hearing protection (earplugs or earmuffs).
- Perform routine maintenance on machinery to reduce noise levels.
- Inquire about sound reducing options when purchasing equipment.
- Consult your healthcare provider or audiologist if you are concerned about your hearing.
- Educate neighbors, friends, family, and farmers and ranchers about the dangers of hearing loss and prevention strategies available to protect your hearing.

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