

## California AgrAbility Project

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*A partnership between the  
University of California Farm  
Safety Program (Cooperative  
Extension) and Easter Seals  
Superior California.*

**Call Toll Free**

**1-800-477-6129**

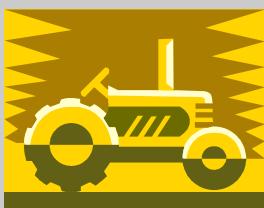
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**1-888-877-3257, ext 117**

**or**

**916-679-3117**

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## Promoting Success in Agriculture for People with Disabilities and Their Families

### Ear Ye! Ear Ye! Hearing Loss on the Farm

Ah! The tranquil serenity of a rural lifestyle. The babbling brook and singing birds are very appealing if you can hear them over the squealing pigs and the chugging tractor engine. Farm noise is hard on the ears. More than 30 million of us in the US suffer from hearing loss

(<http://www.dangerousdecibels.org/>). Some 5.2 million 6-19 year olds have noise-related hearing loss. (3rd National Health and Nutrition Examination Survey, Niskar et al. 2000). For this reason, experts recommend annual hearing tests for farming residents starting at age 10.

Farmers and workers, young and old, have more hearing damage than the general public. Seventy-percent of farmers studied had below-normal hearing. One-third had hearing loss significant enough to warrant hearing devices.

Hearing loss is part of the natural aging process. It is severe when our ears are continually exposed to excessive noise, i.e., noise-induced hearing loss (NIHL) ([http://www.urbanext.uiuc.edu/agup\\_date/0211\\_article2.html](http://www.urbanext.uiuc.edu/agup_date/0211_article2.html)).

NIHL is hazardous if a farmer cannot hear danger signals, a truck horn, a charging or irate animal, or the warning yell of a coworker. If you use headphones and blast your favorite tunes to drown out noise, you are compounding your problems.

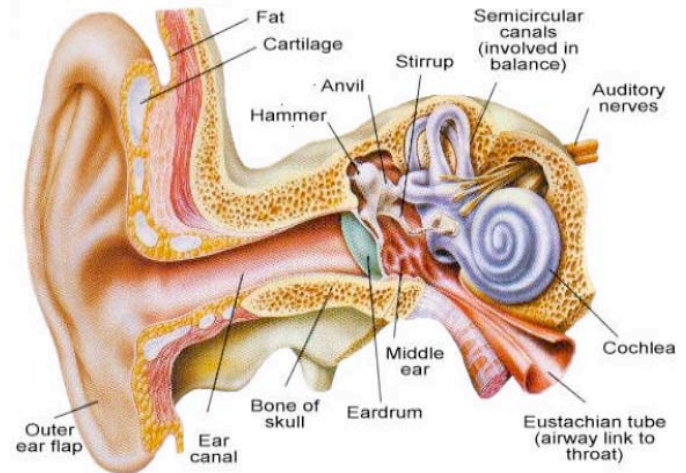


Figure 1: The Ear

<http://www4.tnqi.com.au/users/amcgann/bodv/senses.html>

### Ear Mechanics: Now 'ear This!

Hammers? Stirrups? Anvils? Canals? These sound like things you would find on farms, but really they are critical parts of your ears (Figure 1). Ears are made up of **the outer, middle, and inner ear**. The **Outer Ear** is the **pinna**, the visible part on both sides of your head and the canals going inside your head. The eardrum is a membrane separating the outer ear from the middle ear. The **Middle Ear** consists of three small bones, "**ossicles**" (the **hammer, anvil, and stirrup**), which amplify and conduct vibrations of the eardrum to the inner ear. The **Inner Ear** consists of a snail-shell shaped organ, the **cochlea**, with some 30,000 tiny cells called **hair cells**. [www.enchantedlearning.com](http://www.enchantedlearning.com)

Like a radar dish, sound waves are collected by the **pinna**, travel down the **canals** and cause the eardrum to vibrate. Vibration passes to the ossicles and the cochlea and its tiny hair cells. Moving the hair cells generates nerve signals sent to the brain via the auditory nerve. Our brain does the rest, translating vibrations into music, language, or just plain noise.

**The damage caused by noise involves nerve loss, resulting in hearing loss.** The hair cells can tolerate brief intense noise, but constant clatter breaks them down and they are unable to respond to sound. Nerve fibers connected to hair cells also degenerate, and the central nervous system is less able to adapt to sound. Once your hearing is damaged by noise, there is no treatment.

*Article continued on page 2*

Events

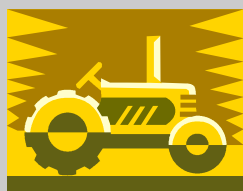
Upcoming Events

August 26-28, 2005  
**Abilities Expo - Metro**  
 Detroit, Novi Expo Center,  
 Novi, Michigan.  
 Call 800-385-3085 or visit  
<http://www.abilitiesexpo.com>  
 or e-mail  
[abilities@advanstar.com](mailto:abilities@advanstar.com).

August 29-31, 2005  
**Progresando Juntos: The**  
 2005 Agricultural Worker Health  
 Initiative Conference,  
 Sacramento, CA sponsored by  
 The California Endowment and  
 RCAC.  
 Contact Anne-Marie Flynn at  
 916/447-9832 ext. 287 or via e-  
 mail at [AMFlynn@rcac.org](mailto:AMFlynn@rcac.org) go  
 to  
[http://www.rcac.org/news/event  
 s/rcac/#California](http://www.rcac.org/news/event/s/rcac/#California)

September 16-18, 2005  
**Abilities Expo - Chicago Metro**  
 Donald E. Stephens  
 Convention Center, Rosemont,  
 Illinois.  
 Call 800-385-3085 or visit  
<http://www.abilitiesexpo.com> or  
 e-mail [abilities@advanstar.com](mailto:abilities@advanstar.com)

April 1-3, 2006, **Unite For**  
**Sight's 3rd Annual**  
**International Health**  
**Conference**, "Empowering  
 Communities to Bridge Health  
 Divides" Yale University New  
 Haven, CT 06520  
[http://www.uniteforsight.org/2006  
 annual\\_conference.php](http://www.uniteforsight.org/2006_annual_conference.php)>  
[http://www.uniteforsight.org/2006\\_a  
 nual\\_conference.php](http://www.uniteforsight.org/2006_annual_conference.php)



Stay in the Safety Zone

NOISE SOURCE	Typical Farm Noise Levels (in dBA)
<b>Safe Zone</b>	
Lowest audible sound	0
Empty barn, babbling trout stream, gentle breeze	50
Normal conversation	60
Chicken coop or farrowing area	70
<b>Risk Zone</b>	
Tractor or combine idling, barn cleaner, conveyor, elevator ( <i>at 85 dBA hearing affected if exposed for 8+ hours/day</i> )	85
Blower compressor, pneumatic wrench, chopping silage (no cab), full throttle lawn mower ( <i>at 90 dBA damage occurs if exposed for 4+ hours/day</i> )	90
Tractor at 80% load, squealing sows, power tools, hand-held metal grinder ( <i>at 100 dBA 1 hour limit/day before damage occurs</i> )	100
Walkman set above halfway mark, full-throttle combine, 10-HP vane axial barn fan ( <i>at 110 dBA damage occurs at over 15 min./day</i> )	110
Thunderclap (near), sandblasting, bad muffler, old chain saw ( <i>at 120 dbA danger is immediate</i> )	120
Gunshot, engine backfire, TNT blast, jet engine ( <i>at 140 dBA any exposure is dangerous and may cause pain</i> )	140

([http://www.cdc.gov/nasd/docs/d001001-  
 d001100/d001014/d001014.html](http://www.cdc.gov/nasd/docs/d001001-d001100/d001014/d001014.html))



Look Out for These Noisy Things: Machinery and Squealing Sows: Images: <http://www.cdc.gov>

That Waxy Buildup

What is that stuff anyway...**ear wax**? It isn't really wax. It is a sticky liquid secreted by **cerumen glands** found only in the skin of the ear canals. The primary purpose of earwax is to protect canals and eardrums from foreign objects. Like a No Pest Strip, it traps anything that flies, crawls, or is blown into the ear canals.

For Whom the Bels Toll

Noise is measured in **bels** and decibels (dB) and is logarithmic. That is, 40 dB is not just twice as loud as 20. Loudness increases about three times for every bel (or 10 decibels). So 30 dB is three times as loud as 20, 40 is three times as loud as 30. This makes 40 dB nine times as loud as 20 dB. To the average human ear, an increase of 10 dB is triple the noise.

Did You Know...



Ear trumpets were man's early attempts at coping with hearing loss. In pre-historic times, hearing trumpets were hollowed-out horns of cows, rams or other animals. Later they were made of metal. Beethoven used an ear trumpet made of metal. ([www.hearingcenteronline.com](http://www.hearingcenteronline.com))

## Resources

### FREE Phone Zone

The **California Telephone Access Program (CTAP)** offers free telecom equipment and services to people with difficulty using the phone to eligible consumers. For information call TTY: (800) 806-4474 (English) (800) 806-1191 (voice) or TTY: (800) 896-7670 (Spanish) (800) 949-5650 (voice)

### Active Listening Strategies & Cell Phones and Hearing Aids & Communicating with People with Hearing Loss

[http://www.ucsfhealth.org/adult/medical\\_services/audio/hearingloss/moreinfo/patient\\_education.html](http://www.ucsfhealth.org/adult/medical_services/audio/hearingloss/moreinfo/patient_education.html)

### Hearing Aid Funding Sources

<http://www.atnet.org/resources/hearingaid.htm>

### Sign Language Animated Dictionaries On-Line

<http://wings.avkids.com/Book/Signing/index.html>

[http://www.signwithme.com/main\\_signs.asp](http://www.signwithme.com/main_signs.asp)

### Safety for Aging Farmers

<http://www.cdc.gov/nasd/docs/d001601-d001700/d001618/d001618.html>

### Hearing Loss: The Silent Epidemic

<http://www.cdc.gov/nasd/docs/d000901-d001000/d000962/d000962.html>

### Noise on the Farm:

<http://ohioline.osu.edu/aex-fact/0590.html>

### CDC: Protect Your Hearing/Decibels table

<http://www.cdc.gov/nasd/docs/d001001-d001100/d001014/d001014.html>

## What? ...Huh? Sounds and Signs of Hearing Loss?

When injury or a medical condition affects the outer or middle ear the resulting hearing loss is referred to as **conductive**. This is the easiest to treat. When the inner ear or the auditory nerve is affected, hearing loss is referred to as **sensorineural**, often treated with hearing aids or cochlear implants. **Mixed** involves both a conductive and a sensorineural loss.

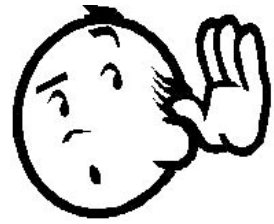
**Mild** hearing loss is typically a loss of around 26 to 45 decibels. If one is close enough when talking, this probably won't cause any trouble in understanding. However, if one is farther away or there is background noise, a mild hearing loss may interfere. Plus, weak voices are difficult for people with mild hearing losses to understand. **Moderate** involves loss at 46-65 db and more difficulty hearing speech. **Severe** is loss at 66-85 db, with a lot of difficulty hearing speech. At this level the term "deaf" is used. **Profound** is loss of over 85 db and hearing aids may or may not help; cochlear implants are an option.

**Hearing problems are serious.** It is important that you see a doctor, who may refer you to an **otolaryngologist** (oh-toe-lair-in-GAH-luh-jist), who specializes in the ear, nose, and throat. The otolaryngologist will determine why you have hearing loss and offer treatment options. S/he may refer you to an audiologist, who can measure your hearing. (National Institute on Deafness and Other Communication Disorders, National Institutes of Health)

### Aid Your Hearing before You Need Hearing Aids

Identify noise sources to prevent noise-induced hearing loss (NIHL) and reduce exposure to high levels at the source (Assistive Technology Partners, Denver, CO):

1. **Remove** the noise source
2. **Reduce** noise volume to safe levels by:
  - Replacing worn, loose, unbalanced machine parts to reduce vibration
  - Lubricating parts to reduce friction-induced noise
  - Enclosing sources in sealed compartments
  - Installing mufflers
  - Mounting sources on rubber blocks or springs reducing vibrations
3. **Isolate** the operator from the noise source:
  - Use tractor cabs
4. **Wear hearing protection** to reduce noise from reaching the eardrum
  - Ear plugs are best for comfort and portability and do not mask direction of noise



### Low Hearing Technologies & Tips

-If sound alarms are used on the farm, install **visual alarms** too, i.e., blinking lights.

-Farmers who wear hearing aids may have difficulty hearing in metal buildings.

-Add insulating materials to **absorb sound** to inside surfaces. Mineral and glass fibers and open cell foams have good sound absorbing qualities.

-Farms have traffic. Don't forget to **stop, look and listen** before crossing vehicle paths on the farm.

- Add Alarm clocks with a **flash or strobe light** that vibrate pillows or beds

- Phone call **signalers** alert you to incoming calls by turning a lamp on and off.

-**Closed caption** decoders (CC) print TV or video dialogue on the TV (not all programs or tapes have CC).

-Smoke and **fire detectors** are available that flash a strobe light when activated.

-Telephone **amplifiers** are portable with batteries that attach to phone earpieces to increase listening volume.

-**Amplified handsets** can replace the old phone handset.

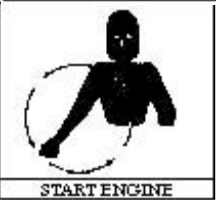
Ref: [www.oznet.ksu.edu/agrability](http://www.oznet.ksu.edu/agrability)

*CalAgrAbility recommends that farmers and workers with hearing loss talk to their M.D.s before operating machinery and doing hazardous tasks.*

## Hand Signals



STOP



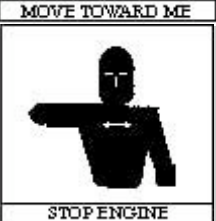
START ENGINE



RAISE EQUIPMENT



MOVE TOWARD ME




STOP ENGINE

Figure 4: Partial Set of Ag Hand Signals  
<http://ohioline.osu.edu/aex-fact/0591.html>

**Plug It UP!**

Ear protection should have a (NRR) noise reduction rating of 25 dB or higher. Most protection is inexpensive, reusable, washable, and convenient to carry. Find a comfortable form of hearing protection and use it.

- **Ear Plugs** plastic or rubber earplugs are inexpensive (**Figure 2**)
- **Expandable foam plugs** expand and conform to each person's ear canal
- **Canal caps/sound bands** are formable or pre-molded with bands for use over the head, neck or under the chin. The wearer removes plugs and lets them hang, ready when needed again. (**Figure 3**)
- **Ear muffs**  cover the entire outer ear and are slightly more effective than plugs. "Low profile" muffs with large ear cups can hold extra materials for use with extreme noise. Some include electronics to help users communicate. (**Figure 2**)
- **Cotton** should *never* be used. It does not block out high frequencies.

<http://www.cdc.gov/niosh/topics/noise/about/chooseprotection.html>

**Send up a Hand Signal**

Farming with hearing impairments requires safe work strategies and use of technologies. Work strategies should include a set of **hand signals** for clear well-defined communication with coworkers. Figure 4 shows a few ag hand signals to use around noisy equipment. Get the entire set from American Society of Agricultural Engineers site or your local Coop Extension Office. Spanish is available at <http://www.cdc.gov/nasd/docs/d000901-d001000/d000932/d000932.html>.

Figure 3: Sound Bands



Sounds Bands

**About CalAgrAbility ...**

The California AgrAbility Project's primary goal is to help farmers, agricultural workers, ranchers and their families to continue working in agriculture regardless of physical limitations, impairments and disabilities. Staff will help conduct on-site assessments and identify appropriate assistive technologies to make the job safer and easier. This is supported by the CSREES USDA under special project number 2003-41490-01584.

**1-800-477-6129**

***It is surprising that only 20-30 percent of farmers use ear protection and even then they state that they rarely use it.***



Ear Muffs



Plugs

**Figure 2: Hearing Protection** (Northeast Center for Agricultural and Occupational Health)

**We're on the Web!**

<http://calagrability.ucdavis.edu/>

California AgrAbility Project

