



Poultry Extension Collaborative newsletter

A collaboration between Purdue University, University of Maryland,
University of Georgia and Virginia Tech

Chicken Vocalizations

Chickens make different sounds for a plethora of reasons. Determining the reasons behind vocalizations and understanding how chickens use them is a great way to gain insight about their behavior.

Some of the most common chicken vocalizations are:

- A rooster's crow
- A hen's "food call"
- Alarm calls
- A hen's post laying "cackle"
- A chick's distress call
- A hen's gavel call

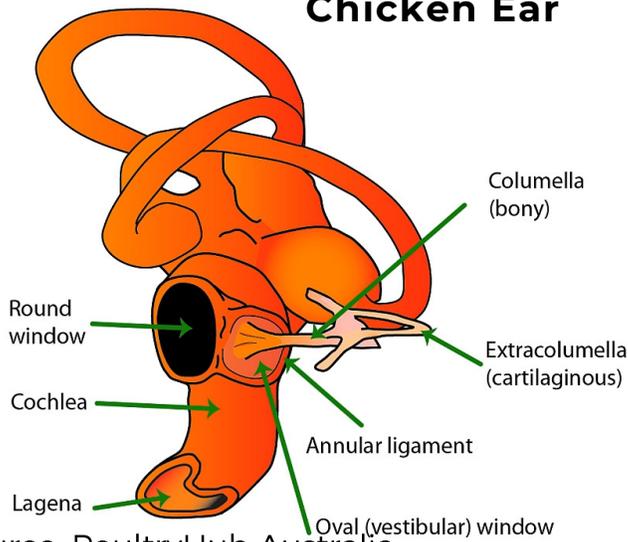
Chickens use sound in more ways than you might imagine. Broilers, roosters, laying hens, and even the chickens in a backyard flock constantly use vocalizations to communicate with each other.



Source: Pixabay

How does a chicken create and receive sound?

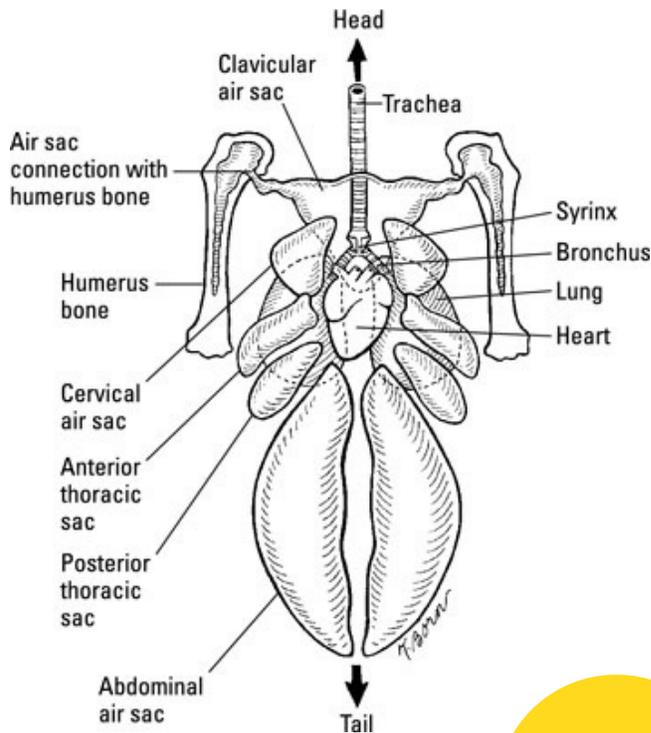
Chicken Ear



Source: PoultryHub Australia

Understanding a chicken's hearing ability can be an important step in identifying their vocalization patterns and uses. Chickens have an ear that is divided into three sections referred to as the inner, middle, and outer ear. Once the ear receives an acoustic sound wave from the outer portion of the ear, it is converted into vibrations of the eardrum. Those vibrations are transmitted through the middle ear into the inner ear where they are ultimately transformed into nerve impulses by the cochlea. The anatomy of the chicken ear has a significant effect on what they are able to hear. Researchers found that red junglefowl chicks can hear sounds best when they are at a frequency of 1410 Hertz (Saunders & Salvi, 1993).

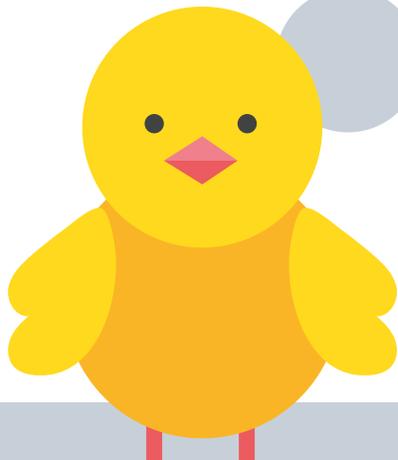
Chicken Respiratory System



Source: Kathryn Born

How Chickens Create Sound

Birds are unique in the way they produce sound. Chickens have air sacs and a synx that they use to push air out of the body and cause thin (tympaniform) membranes to vibrate and create noise. The chicken is able to control how a vocalization sounds by using the muscles of the synx.



When it comes to hearing, chickens are unique

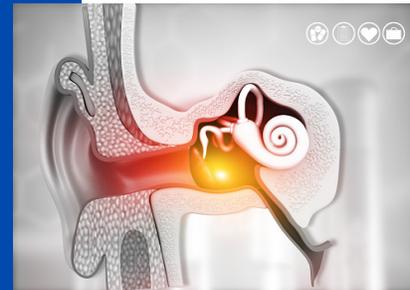
Comparing chickens and humans

Chickens are special because, unlike humans, they are able to regrow damaged hair cells within their ear even as they age! Damaged hair cells is the main cause of hearing loss in humans but birds do not have this problem at all. Because of this unique ability, research with poultry species could help us develop future treatments for human hearing loss.

When it comes to hearing frequency range, humans are superior. Chickens can only hear sounds within 200 to 4100 vibrations per second (Hz), while humans can hear sound that is within 20 to 20,000 Hz.



Chickens and other birds can hear and register sounds more quickly than humans can. To determine the distance and location of a sound, chickens assess the time it takes for a sound to reach their ears. Their ability to easily perceive sounds helps them avoid predators and danger.



Source: Pixabay

Did you know?

Chicken embryos start to hear around their 12th day of embryonic development during incubation!



Functional Implications of Chicken Vocalizations

Chickens use different vocalizations to express their needs and communicate. Broilers are chickens that are specifically used for meat production and are highly motivated to eat. Layer chickens are genetically selected for egg production and some can lay over 250 eggs per year. Social communication is important for chickens, especially in commercial settings where many are in close proximity to each other. Due to the differences in breeds and environment for laying hens, broilers, and small flocks, there are likely differences between the types of vocalizations these animals use most often. Reproductive vocalizations are important, too. The type of calls chickens make can vary based on sex and age.

Communication is Key to Survival

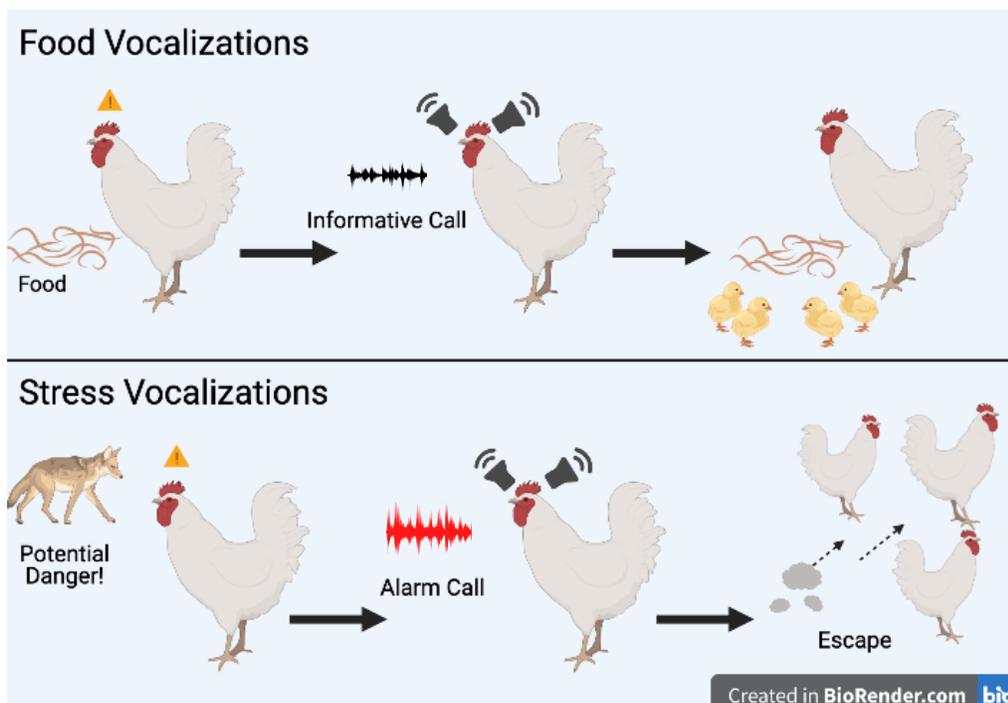
- After hatching, chicks are typically very explorative and open to learning from their mother. This is known as the imprinting phase. Mother hens are known to make "**food calls**", which are auditory clues to help chicks learn which foods are safe to eat.
- "**Calling sounds**" and "**distress calls**" are often seen in very young broiler chicks when isolated or stressed.
- Chickens are social animals and they operate in ways that protect the entire flock. **Alarm calls** are used to keep everyone safe and aware of danger. See how they work below!

Take a listen to a real food call and alarm call!

This hen is giving a food call to her chicks. [Click here to listen!](#)



The chicken is warning others of a potential predator. [Click here to listen!](#)



Functional Implications of Chicken Vocalizations

Family Matters

- Roosters often “**crow**” to show that they are dominant over other chickens or to indicate safety for the flock. They can also give alarm calls when there are potential predators nearby.
- Hens emit pre-lay vocalizations before entering a nest to lay eggs. In feral hens specifically, the **pre-lay call** has also been seen to attract males that are attempting to breed.
- Hens are also known to give a **post-laying “cackle”** after laying eggs. This is a unique collection of short vocalizations followed by an elongated one. It is believed that the purpose of this post-laying vocalization is to inform males that the hen is less likely to be receptive of fertilization at that time.
- Hens often give a **gakel call** to indicate frustration with their environment. This is a common response to changes in food availability. It is often associated with frustration behaviors such as stereotyped pacing or displacement preening.



Take a listen to a real gakel call!

Fun Fact!

Chicks raised without a hen have shown increased eating behaviors when they hear tapping sounds. This is likely because the sound is similar to the pecking noise of an actual hen.



The hen is giving a gakel call. Click here to listen



Characteristics of Sound

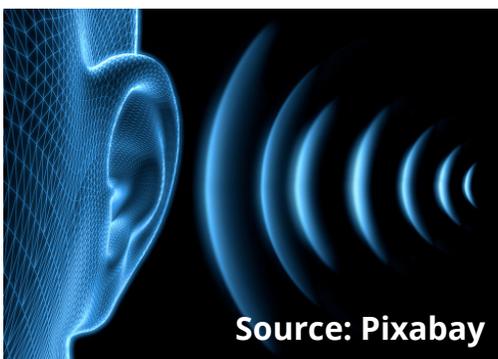
Have you ever stood beside a loud speaker and physically felt the vibrations? All of the sounds we hear each day are the result of something vibrating in the area that it occupies. For something to make a sound, it has to be moving back and forth in some way. For example, when you place your hand on your throat while speaking, you can feel the vibrations of your vocal cords creating the sound of your voice.



Once the vibrations creating the sound are made by the sender, they are transmitted through the air to the auditory systems of the receivers. When sound moves through air molecules, it tends to push those molecules back and forth, creating the rarefactions (reducing air density) and compressions (increasing air density) that we refer to as **sound waves**. You can think of these waves as a series of molecular collisions or chain reactions happening in the air all around you.



The rapid changes in air pressure that happen as sound waves move through the air are detected by your ears and then converted to neural impulses. This process happens thanks to the components of the auditory system.



Source: Pixabay

Measuring Sound

Measuring and understanding sound characteristics can provide insight into animals' health and welfare status.

Spectral entropy is an acoustic parameter that helps describe the complexity of a system. Sounds with very low spectral entropy are tonal (distinct) sounds, while high spectral entropy indicates white noise. Comparing spectral entropy of different vocalizations may be an indicator of changes in welfare status.

Obviously, you can only hear a sound if it is within range of your ears and if the vibrations are moving at the proper speeds. The vibration speed of a sound is referred to as its **frequency**, measured in vibration cycles per second (Hertz). Sounds with slow vibrations and lower frequencies tend to sound deeper, or as if they have a low **pitch**. The opposite is true for high pitch sounds. In other words, frequency is a standardized, quantitative way to measure the subjective way pitch is interpreted.

What can chicken vocalizations tell us about their behavior and welfare?

Much research has been done regarding the use of different strategies to assess the welfare of chickens. These attempts at evaluating behavior or stress measures are often useful but not quite comprehensive enough to be solely relied on. Since vocalizations are good indicators of health and affective state, there has been a recent interest in chicken vocalizations and researchers aim to learn as much about them as possible.

- Food calls, crowing, and calling sounds are normal vocalizations heard in flocks. They are often associated with species-specific behavior that is commonly observed in chickens.
- Monitoring the amount of distress calling heard in a backyard flock or commercial house can be a good way to bring fear behavior (running away from stressors, alerting of potential predators, etc) to ones attention.
- Changes in behavior are often indicative of changes in health or welfare. Regular monitoring of flock vocalizations could help one notice any significant vocalization changes and then investigate other potential changes in flock behavior.

When vocalizations are combined with other behavior, farmers and researchers can get a clearer idea of individual and flock welfare status. Whether chickens are seen as pets or livestock, we want to take every step possible to ensure they are healthy and comfortable in their environment.



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