

What Can Broiler Vocalizations Tell Us About Their Welfare?

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Background

Vocalizations can tell us a lot about animal health and welfare status. Once we determine what normal, healthy vocalizations sound like in broiler chickens, it becomes easier to recognize vocalizations that represent stress and illness.

Broilers often use different types of sounds to communicate with each other and express their needs. Some include:

- Calls to warn about ground and areal predators
- Sneezing/Coughing to expel unwanted congestion
- Establishing dominance or pecking order

Objective

Through this study, we compared and analyzed broiler audio recordings to evaluate and compare different stress and illness vocalizations in two rooms of broiler chickens

Materials & Methods

The study was conducted by placing a Zoom H6 audio recorder in two separate rooms containing eight 5x10 foot pens of male chickens, all 36 days of age. Room 1 contained 181 birds while Room 2 contained 160 birds, and audio was recorded for 30 minutes in each before being uploaded to a computer in a .wav format for analysis via Adobe Audition. It was also known that many of the 341 total birds had IBV (infectious bronchitis), with Room 1 having more known cases than Room 2 at the time. The two recordings were then evaluated using spectral frequency display and waveform to find and count each vocalization event. Adobe Audition is quite beneficial when it comes to analyzing animal vocalizations; the spectral frequency display enables spectrograms to be created that clearly depict unique variations in an audio file by measuring all the frequencies of a sound in Hz. (see figures 1 and 2)

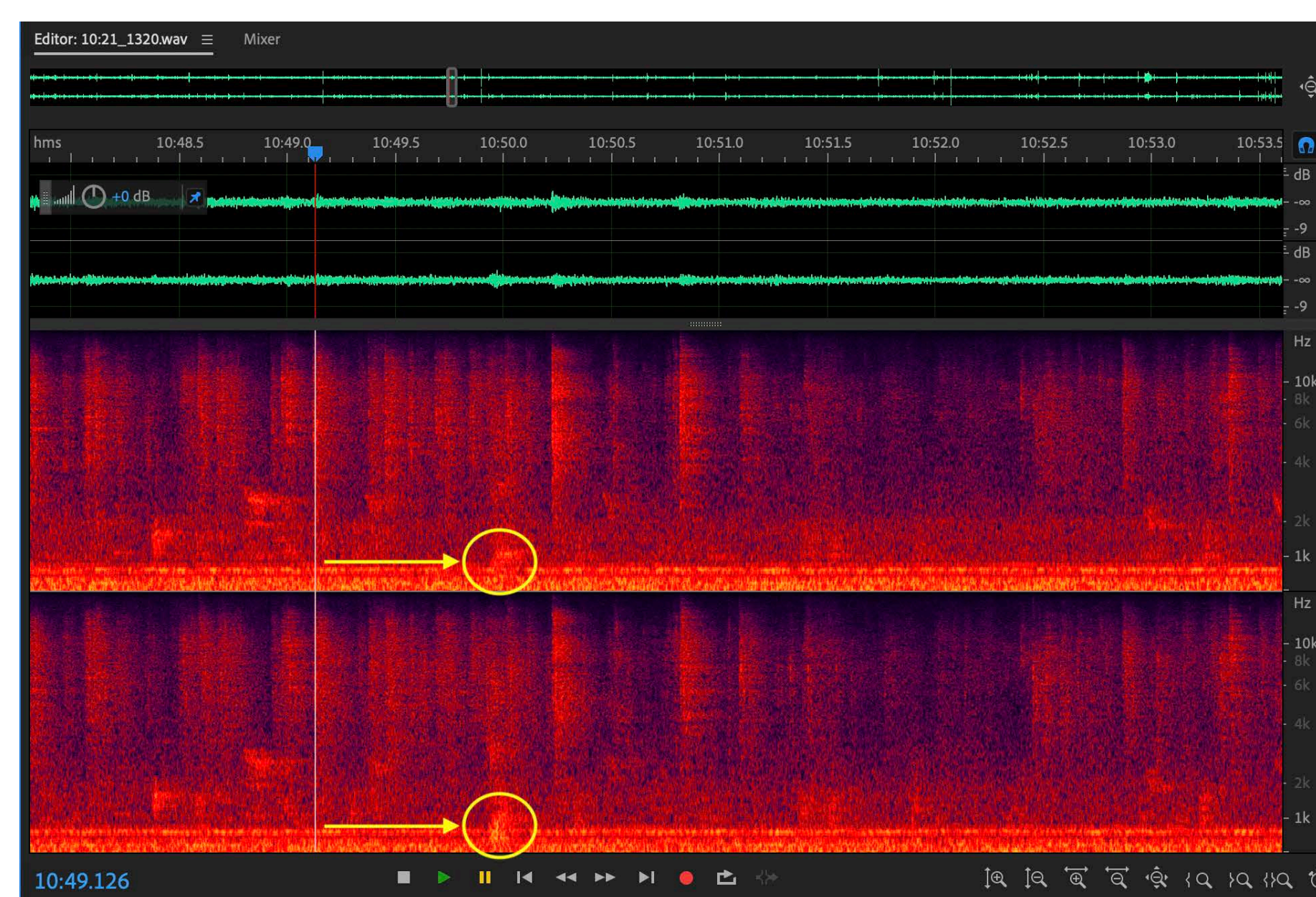


Fig 1: Spectrogram from Adobe Audition; Depicts an "alarm call" from room 2 by using the waveform and spectral frequency display. (vocal event circled in blue)

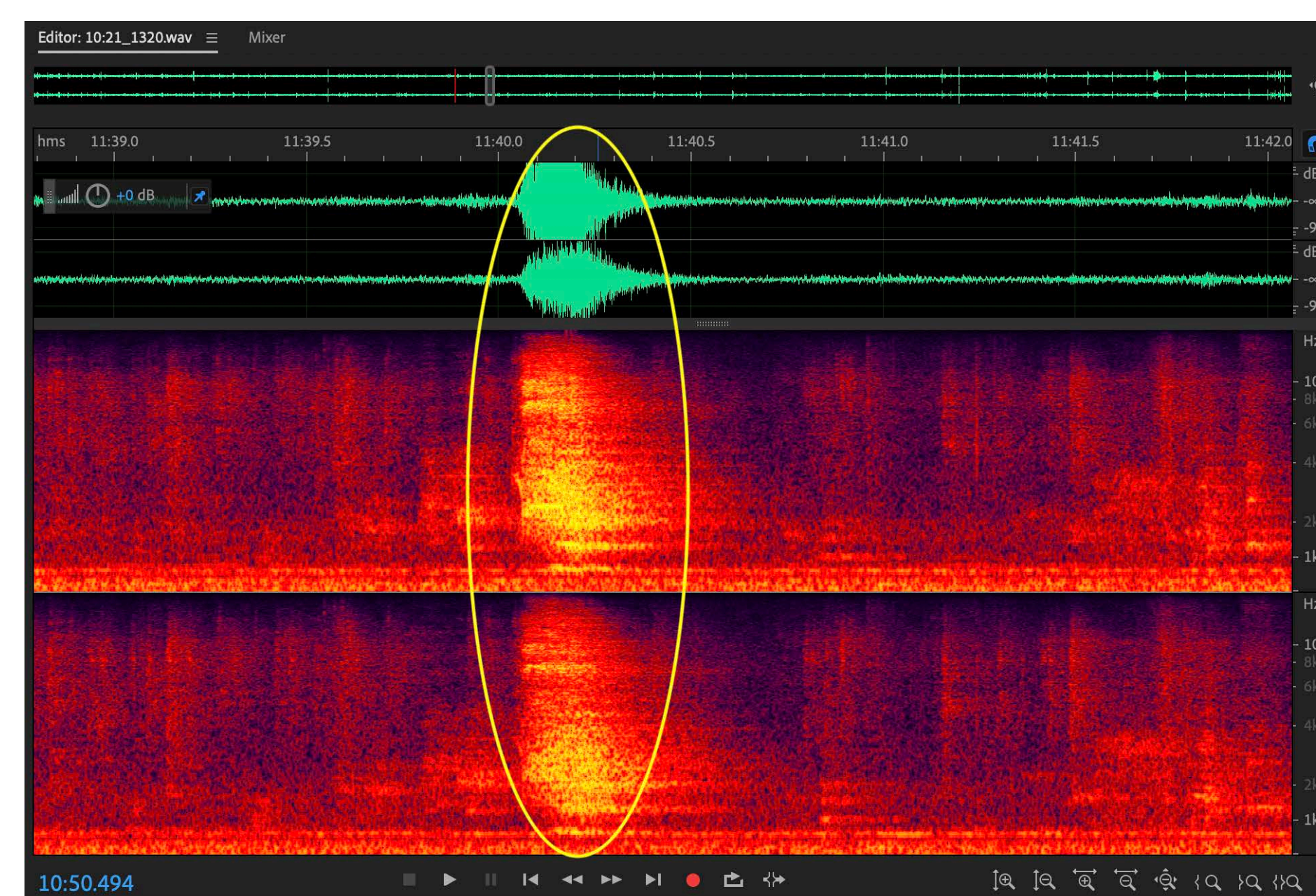


Fig 2: Spectrogram from Adobe Audition; Depicts a "cough" from room 2 by using the waveform and spectral frequency display. (vocal event circled in blue)

Statistical Methods

Raw means and frequencies of the broiler calls were reported. Averages, minimums, maximums, and ranges of the volume of each vocalization event was calculated and compared. (see figure 3)

Results

Vocalization Event Criteria:

- Cough: Vocalizations that sounded congested and were of a frequency lower than 1000Hz in the Adobe Audition spectrogram
- Normal Call: Calls between -14 and -6
- Alarm Call: Calls that were of a high volume, above -6db

The Room 1 audio contained 37 normal calls, 5 alarm calls, and 18 cough vocalizations. The Room 2 audio contained 26 normal calls, 6 alarm calls, and 10 cough vocalizations. The average volume of normal calls was -9.8dB in Room 1 and -8.6 in Room 2. So Room 1, the room holding 21 more broilers than the other, seemed to have louder normal calls on average (see figure 3). Room 2 also had a higher range in volume of normal calls. The results indicate that the frequency of normal calls and cough vocalizations were numerically higher in Room 1, while the frequency of alarm calls was about the same in both rooms. (see figure 4). These discrepancies could be due to the larger number of birds and the lower number of IBV cases in Room 1, but the gathered data itself is not enough to know for sure.

Results/Figures

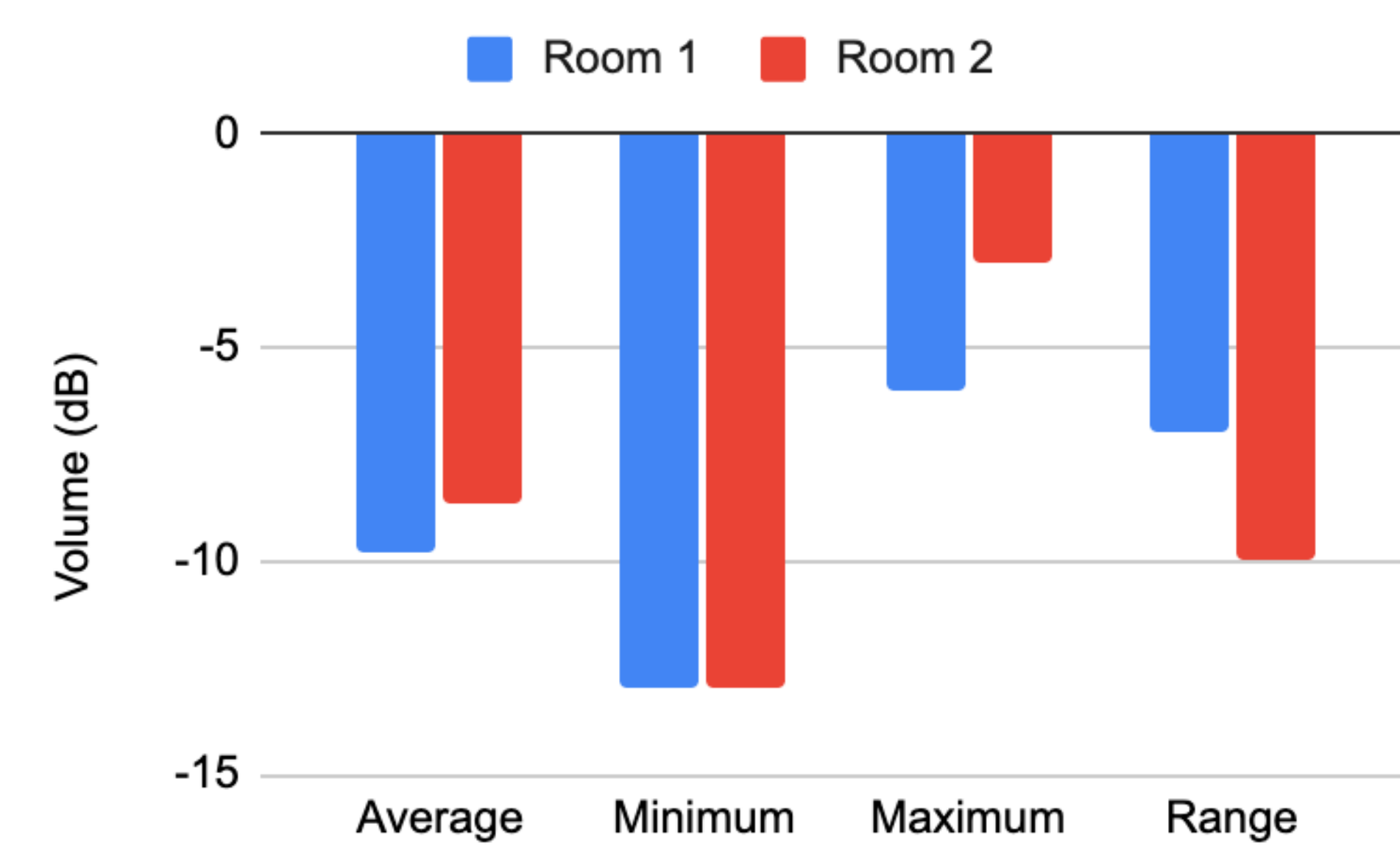


Fig 3: Normal call volume statistics by room

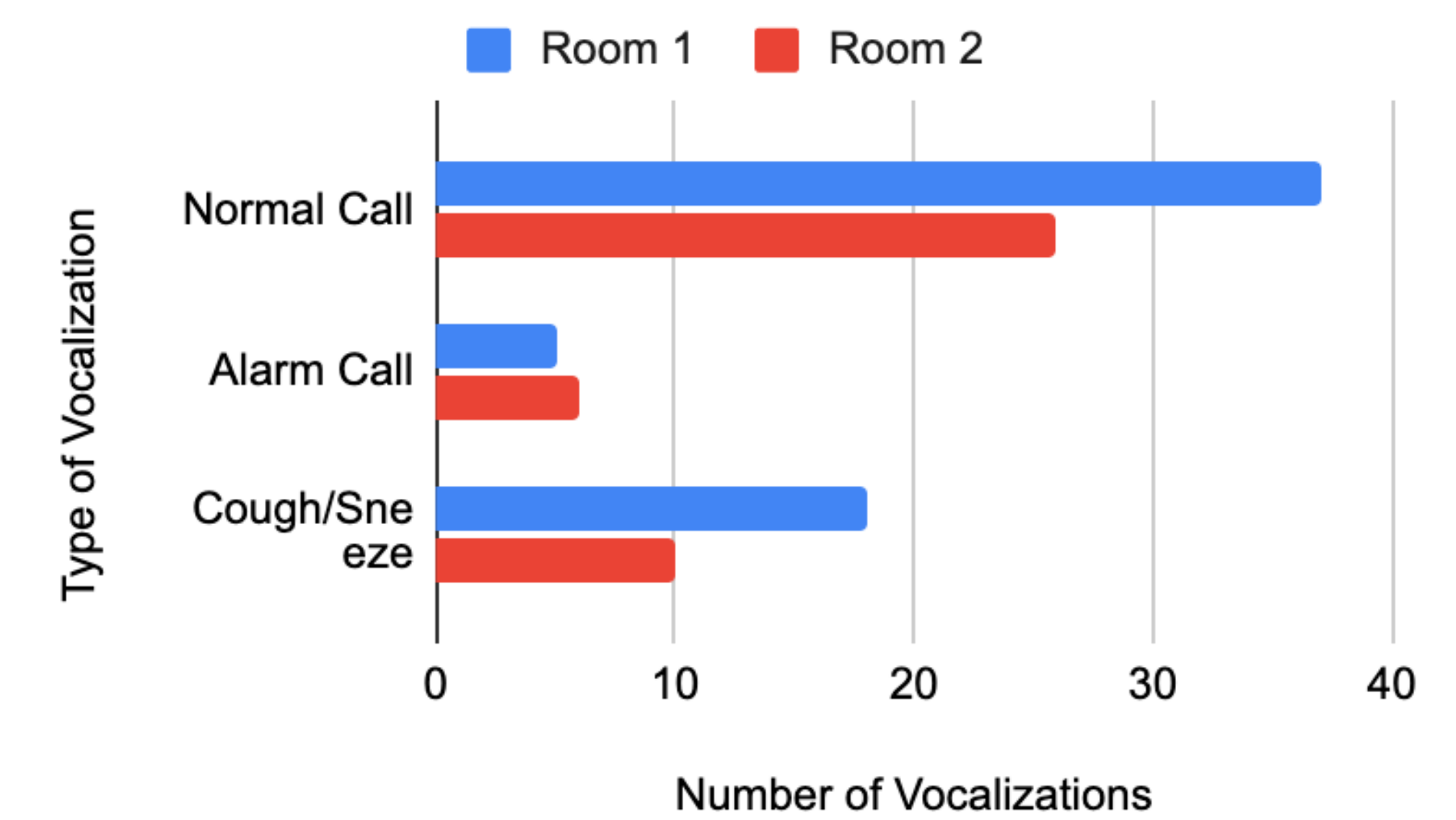


Fig 4: This graph depicts general vocalization event counts per room.

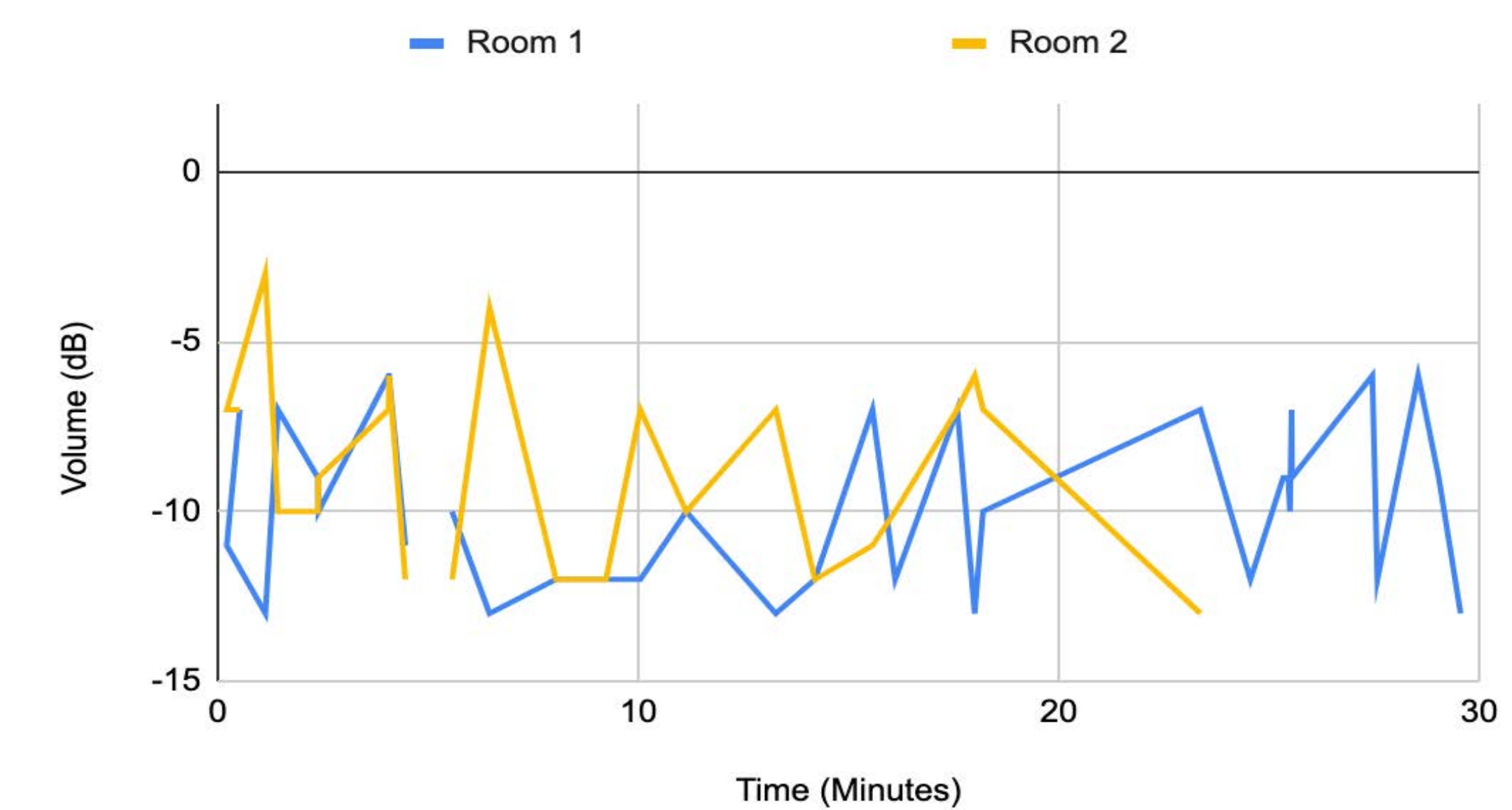


Fig 5: Normal call volume variations over time, by room.

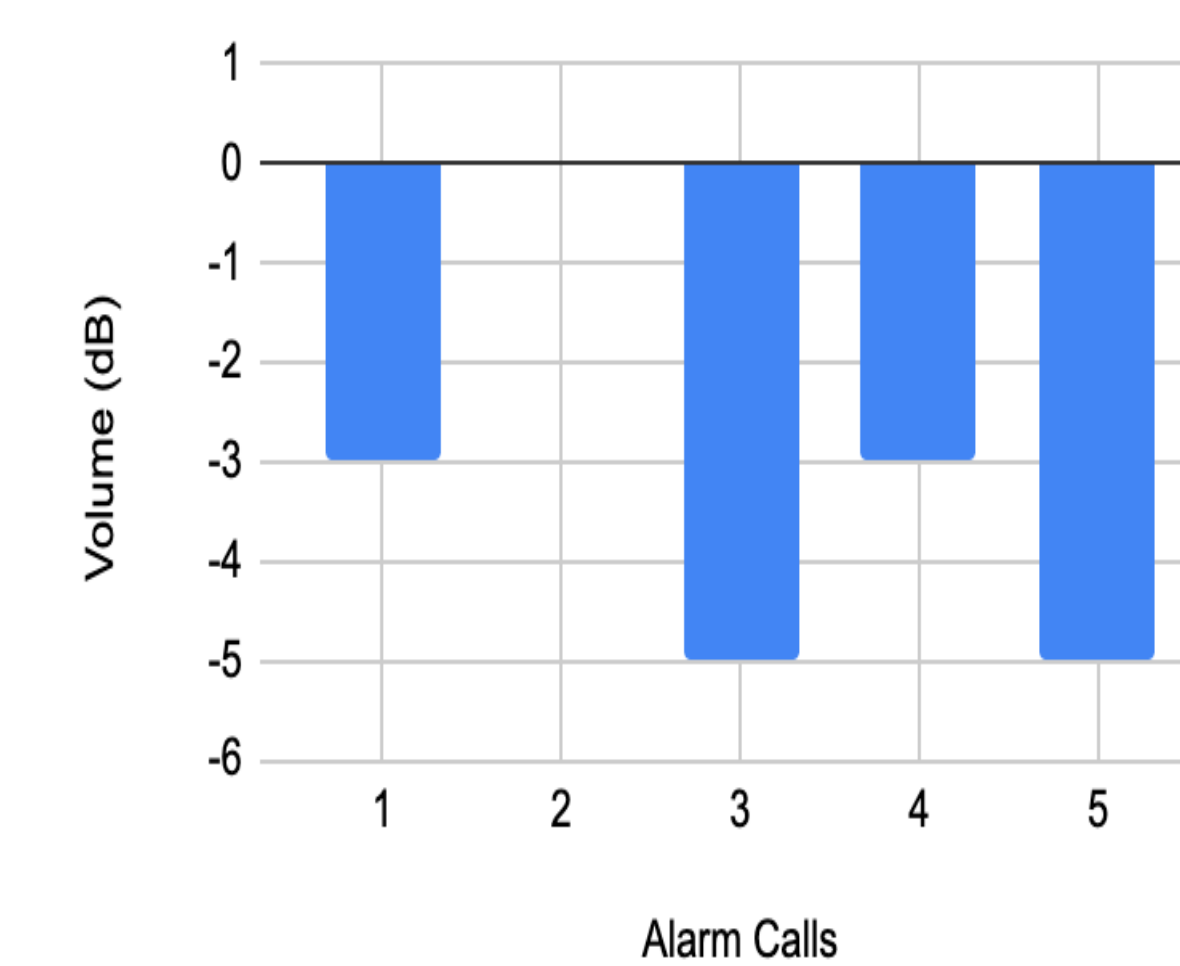


Fig 6: Room 1 alarm call volume. Note: The volume of alarm call #2 is Zero (0), the maximum volume within the range of this audio analysis

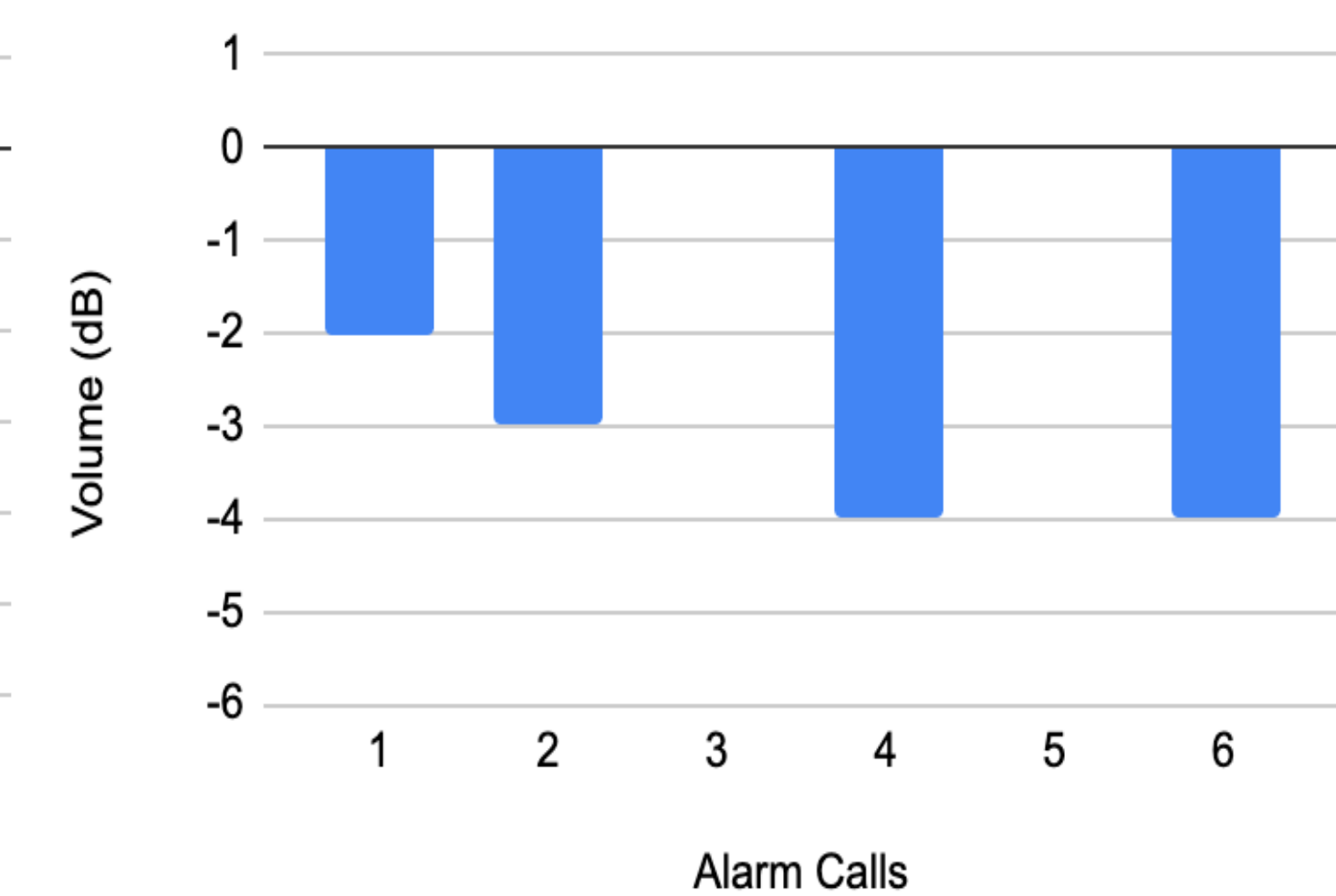


Fig 7: Room 2 alarm call volume. Note: The volume of alarm call #3 is Zero (0), the maximum volume within the range of this audio analysis

Conclusions

While we are not certain about the significance of the differences noticed between the two rooms, the results suggest that this method of vocalization analysis can be used to noninvasively monitor poultry health and welfare.

Additional Research can be conducted using similar methods to further evaluate which range of frequencies (Hz) in broiler vocalizations indicate health, and which ranges indicate stress or illness