



Breath Characteristics and Adventitious Lung Sounds in Healthy and Asthmatic Horses

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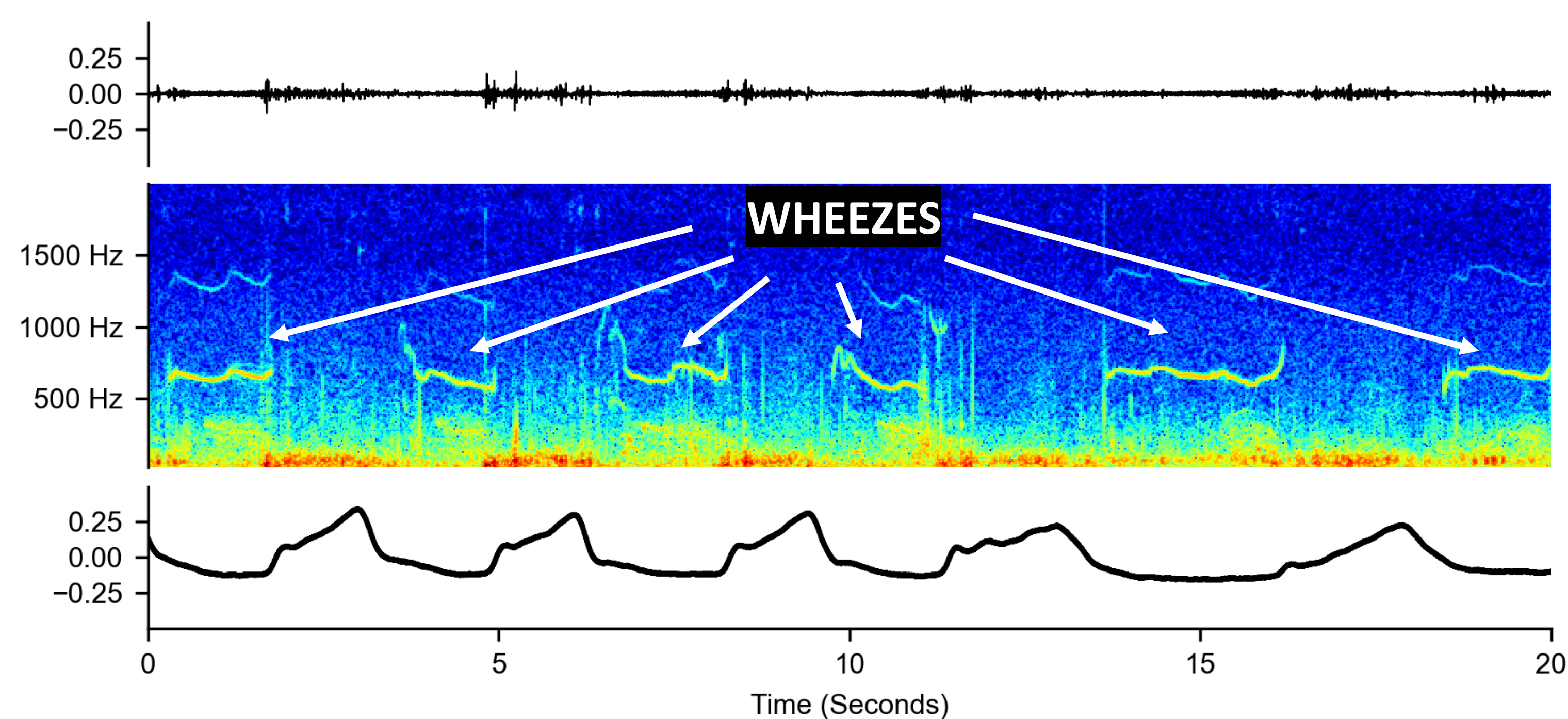
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Introduction

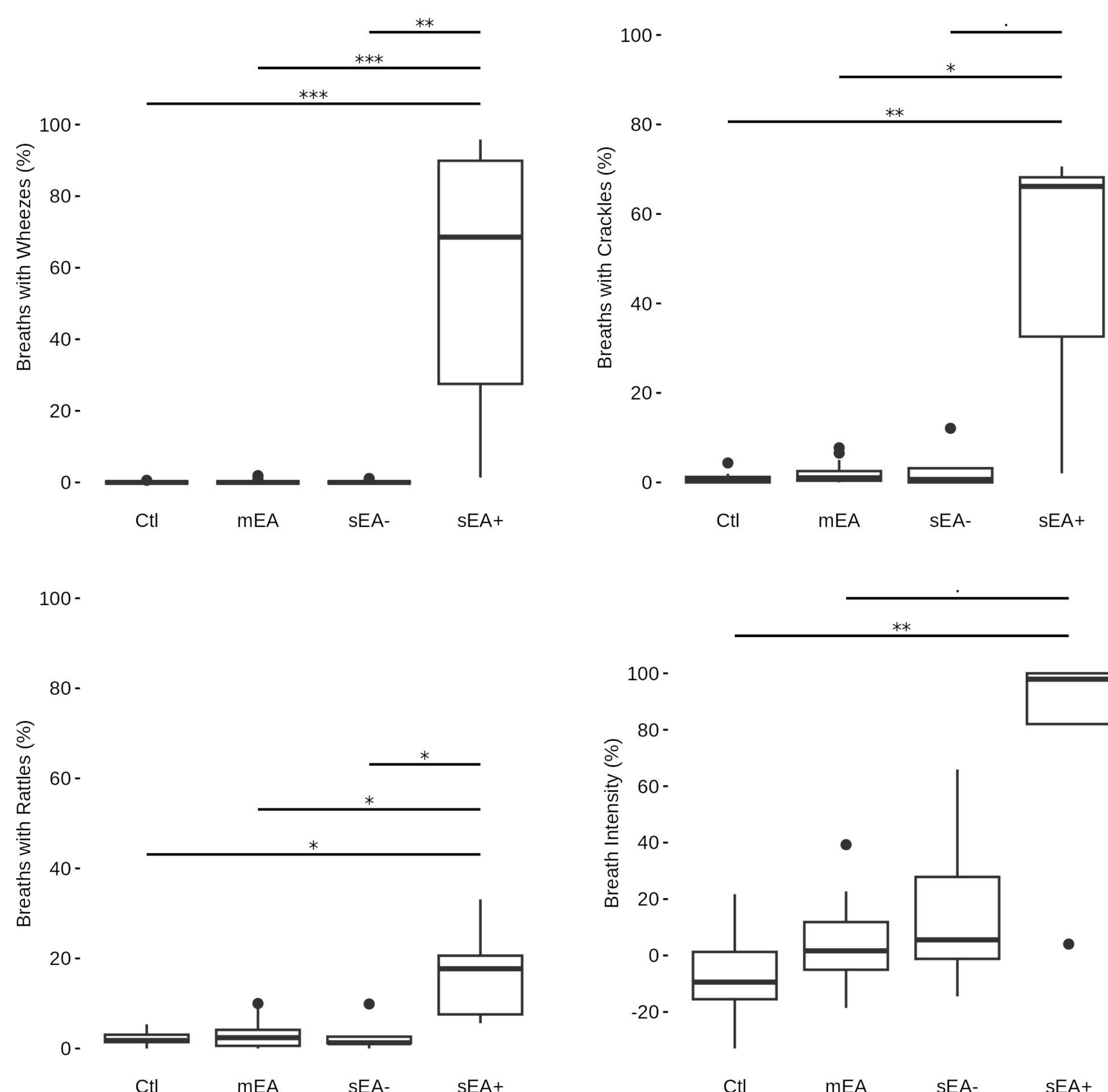
Thoracic auscultation is a mainstay in the diagnostic work-up of equine asthma (EA), but suffers from limitations, including low sensitivity for transient or localized lung sounds, high subjectivity, and lack of systematic analysis of breath sounds in asthmatic horses.

Objectives

Use digital auscultation to compare breath parameters and occurrence of adventitious sounds in healthy and asthmatic horses.



Visual representation of wheezes as waveform (top), spectrogram (middle) and plethysmography curve (bottom)



Proportions of adventitious breath sounds per study group. · = $P < .1$,
* = $P < .05$, ** = $P < .01$, *** = $P < .001$



Digital auscultation device

Materials & Methods

- Study population
 - 12 healthy control horses (ctl)
 - 12 horses with mild to moderate EA (mEA)
 - 10 horses with severe EA (sEA)
 - 5 in remission [sEA-]
 - 5 in exacerbation [sEA+]
- Horse population characteristics
 - Clinical evaluation
 - Tracheal mucus score
 - Bronchoalveolar lavage fluid (BALF) cytology
 - Lung function
- Digital auscultation
 - In 11 locations simultaneously for one hour
- Analysis
 - 100 breaths per recording randomly selected, blindly categorized, and statistically analyzed

Results

The novel digital auscultation method provided high-quality recordings and allowed characterization and quantification of breath duration and variability, breath intensity as well as adventitious sounds. Adventitious sounds were significantly more frequent in sEA+, but not in sEA- or mEA, compared to ctl. Breath intensity was also significantly higher in sEA+ than in sEA-, mEA, and ctl.

Conclusions & clinical importance

By overcoming some of the limitations of traditional auscultation methods, this digital approach can provide more accurate and objective assessments of respiratory conditions in horses, potentially supporting diagnosis, monitoring, and management of EA. However, larger studies are required to determine its ability to discriminate mildly to moderately asthmatic from healthy horses. Additionally, exploring its potential in other respiratory disorders warrants further research. The dataset is also used to train an automated machine-learning algorithm.

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