

Terminology of Lung Sounds in Large Animal Veterinary Medicine

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Despite the rapid advance in medical technology, veterinarians still carry and use the stethoscope as the primary and the most reliable tool for physical diagnostic examination of chest or abdominal disorders. Auscultation remains for the clinician either in practice or in an academic institution, an important and inexpensive diagnostic method. Although the art of auscultation has been utilized in the medical field as early as the 19th century by *Leannee*, 1819, the descriptive terminology of lung sounds has become confusing. In a recent review by *P. Roudebush* (1), the author has made a realistic and truthful statement "Sometimes it seems as though every clinician has his own verbal classification for lung sounds. This confusing auscultatory nomenclature has complicated communication among veterinarians, and even complicated a veterinarian's day-to-day monitoring of disease in the same patient." This statement suggests that veterinary medicine is seeking a more accurate and widely accepted terminology.

The purpose of presenting this particular topic at the Hanover Equine Respiratory Disease meeting is to argue for acceptance of the terminology and nomenclature previously suggested (4). Thereafter, state of the art books in veterinary medicine could present the lung sounds with much better clarity to veterinary students and more importantly, to standardize the use of this terminology in scientific publications.

Based on the recent publications of *Roudebush* (1) and *Kotlikoff* and *Gillespie* (4), the actual lung sounds classification and terminology is proposed (Table 1).

Normal Lung Sounds

Normal breath sounds are used to describe the sounds from the lung which vary in quality depending on where the stethoscope is placed over the thorax (Table 2). They are loudest over the trachea and base of the lung and quietest over the middle and diaphragmatic lobes of the lung. Normal breath sounds are loudest on inspiration because inspiration is an active process in contrast to expiration which is passive in normal animals. Normal breath sounds are often difficult, if not impossible to hear, in obese animals or in noisy surroundings which are so common under field conditions. However, bronchial sounds can always be easily heard over the antero-ventral lung lobes.

The term "alveolar" or vesicular sounds were thought to be produced at the level of the terminal airways (bronchioles less than 2 mm and air moving in and out of the alveoli). It

A Normal Lung Sounds:	1) Normal Breath Sounds 2) Normal Bronchial Sounds
B Abnormal Lung Sounds:	1) Increased Bronchial Sounds 2) Crackles 3) Wheezes — a) High pitched b) Low pitched
C Abnormal Chest Sounds:	1) Pleuritic Friction Rubs 2) Absence of Sounds

Table 1: Proposed Classification of Sounds

A Normal Lung Sounds:	
1) Normal Breath Sounds	
a) Larynx and Trachea	— Tubular sounds — Clearly audible — Evident on both inspiration and expiration — Expiratory sounds may be slightly louder and higher pitched
b) Lung Field	— Low volume, low pitched sound — May be barely audible or inaudible — Soft, non-musical rustling sound — Inspiratory sounds may be of longer duration, more audible and higher pitched than expiratory sounds
2) Normal Bronchial Sounds	— Harsh blowing or tubular sounds mostly in antero-ventral areas of the lung field — More evident on inspiration i.e. louder on inspiration, softer on expiration

Table 2: Description of Chest Sounds

has been demonstrated that this area was a quiet zone or a silent zone of the lung and that the velocity of gas flow is likely too low to generate audible lung sounds (3). In addition, thickness of large animal chest walls is another factor to consider in reducing even normal bronchial sounds. Therefore, bronchial sounds could be more accurately used to describe normal breath sounds. Such bronchial sounds could be increased in normal physiological changes such as exercise, high environmental temperature, etc.

Abnormal Lung Sounds

Abnormal lung sounds or adventitial sounds are present in the tracheobronchial tree with pathological alterations (Table 3).

Increased Bronchial Sounds

There is not a sharp line of demarcation between normal bronchial sounds and increased bronchial sounds. Many clinicians use the latter term when the sounds from the lung are harsh and approximate the sounds heard over the trachea. They are heard on both inspiration and expiration but become louder on expiration with pathological changes in the lung such as consolidation. Any disease in which the bronchial lumen remains open and the surrounding lung tissue has been replaced by cells and tissues (consolidation)

which transmit sound better than air leads to increased bronchial tones.

Crackles

Crackles are short in duration, non-musical and discontinuous sounds subjectively described as clicking, popping or bubbling sounds. The use of crackles instead of rales will discontinue the variety of qualifying adjectives linked to rales either moist, wet, dry, sticky, etc ... Descriptive modifiers, such as "coarse" or "fine" have been commonly used to describe crackles but no one so far has been able to determine, in many different disease states, the range of intensity and frequency content in fine vs coarse crackles (5).

Wheezes

Wheezes are continuous, musical sounds of variable pitch and duration. The whistling sound is generated by air passing through a narrowed airway and production of regular vibration of airway walls. The abnormal lung sound wheezes will be replacing the older term rhonchus. Wheezes may be classified as high pitched or low pitched. The pitch or musical quality of the sounds is determined by the frequency of the fundamental note produced by the oscillating airway. Although, it is thought that wheezes occur predominantly on expiration, the matter remains controversial since inspiratory wheezes can also be heard (1,2,4).

Abnormal Chest Sounds

Pleuritic friction rubs have been described as "sandpaper" like sounds (Table 4). They are caused by severe inflammation in the thoracic cavity and the rubbing together of visceral and parietal pleura. It is worth noting that these

C Abnormal Chest Sounds:

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| 1) Pleuritic Friction Rubs | — Constant location and occur with each respiration |
| | — Combination of continuous and/or discontinuous sound |
| | — Sound is described as a loud and coarse rasping or scraping |
| 2) Absence of Sounds | — Significant reduction or complete abolition of breath sounds |

Table 4: Description of Chest Sounds

sounds are not commonly heard, even in the horse, where pleurisy is a common condition.

The absence of breath sounds is not a common finding on clinical examination. It does occur when something is obstructing the transmission of normal lung sounds. This may be due to fluid (pleural effusion), air (pneumothorax), diaphragmatic hernia, and space occupying thoracic lesions.

With the progress of time and medical sophistication, lung sound terminology has been expanded, modified and revised in an attempt to provide a precise category or term for a specific disease situation. These terms have evolved to include multiple subtypes and variations, many of which cannot be precisely described or defined acoustically, decreasing our ability to communicate and visualize auscultative findings. Consequently, researchers have de-emphasized the stethoscope as an important tool and clinicians are experiencing difficulties in applying meaningful interpretations with this system.

The knowledge that more than one set of conditions will result in a detectable lung sound suggests that precise categorization is of little benefit in determining a specific etiology or disease process. Consequently, a more general, simplified, approach would create the least confusion, allow for optimal communication and provide the most meaningful addition to the overall data base required to make an informed diagnosis.

In conclusion, by facilitating communication between practitioners and researchers, adaption of this terminology will continue to advance understanding of the relationship between lung sounds and disease processes in veterinary medicine.

References

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B Abnormal Lung Sounds:

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| 1) Increased Bronchial Sounds | — Similar or indistinguishable from normal increased bronchial sounds |
| | — Harsh blowing or tubular sounds |
| | — Evident on both inspiration and expiration |
| | — Are often louder on expiration |
| 2) Crackles | — Non-musical |
| | — Discontinuous |
| | — Low intensity |
| | — Sound is described as: |
| | — bubbling |
| | — popping |
| | — clicking |
| | — Can occur during inspiration or expiration |
| 3) Wheezes | — Musical |
| | — Continuous |
| | — Variable pitch: — High |
| | — Low |
| | — Sound described as: |
| | — whistling |
| | — squeaking |
| | — Usually occur on expiration |
| | — Inspiratory wheezing is associated with stenosis of the upper airway, trachea or large bronchi |

Table 3: Description of Chest Sounds