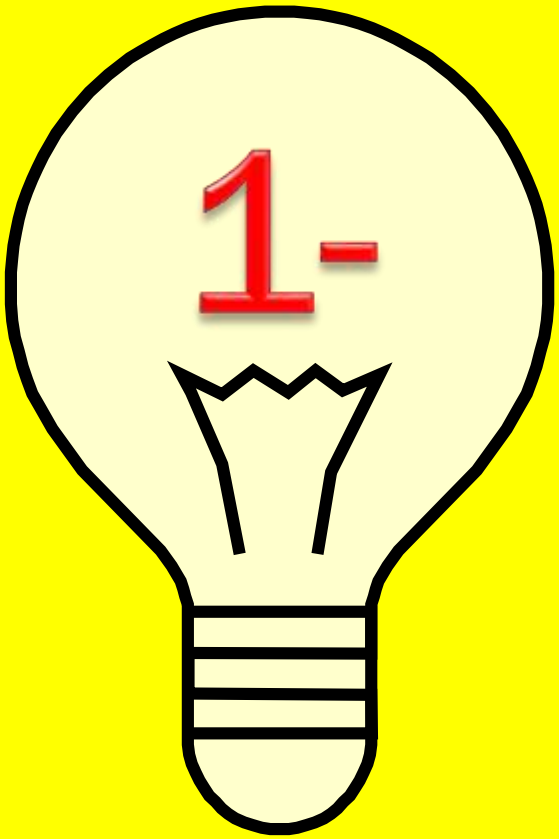
CLINICAL EXAMINATION OF THE RESPIRATORY TRACT IN ANIMALS

The upper respiratory tract includes the nasal cavities, nasopharynx, the larynx, and the trachea to the thoracic inlet. The lower respiratory tract includes the intrathoracic trachea, bronchi, lungs, pleura and pleural space, diaphragm, and thoracic wall. This chapter will describe the clinical examination of the respiratory tract according to anatomical location and species differences.

Physical examination of the respiratory tract in animals

IN THE BEGINNING , YOU MUST KEEP IN CONSIDERATIONT HE FOLLOWINGS:-



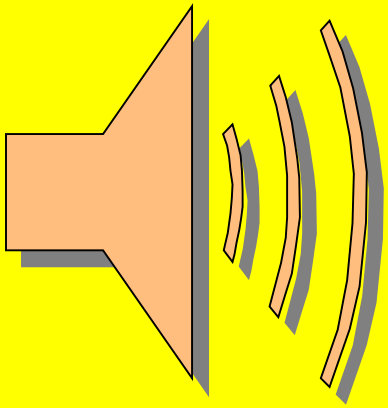
The audiovisual examination of breathing is usually performed first, followed by examination of the lower respiratory tract and the upper respiratory tract, and finally by any special diagnostic examination or test:

for (WHY): MINIMIZING ANY CHANGES IN THE RATE AND DEPTH OF BREATHING WHICH MAY OCCUR BECAUSE OF HANDLING THE ANIMAL,.

THE EXAMINATION IS BEST DONE IN A QUIET LOCATION, FROM A DISTANCE WITHOUT DISTURBING THE ANIMAL

IN THE EXAMINATION OF THE ANIMAL OUT OF ITS ENVIRONMENT (SUCH AS IN OUTPATIENT CLINIC), THE ANIMAL IS USUALLY ANXIOUS AND ALTERATION OF THE RATE AND PATTERN OF BREAT MAY BE OCCURRED.

THE AUDIOVISUAL EXAMINATION OF THE BREATHING INCLUDES



1. THE RATE OF BREATH.
2. THE RHYTHEM OF BREATH.
3. THE TYPE OF BREATH.
4. THE DEPTH OF BREATH.
5. SYMMETRY OF BREATH.
6. ANY ABNORMAL RESPIRATORY NOISES ASSOCIATED WITH BREATH.

*THE RATE OF BREATH:

NUMBER OF BREATH/ MINUTE

THE BEST METHOD: OBSERVE THE BREATH FROM BEHIND & TO ONE SIDE OF THE ANIMAL, BY WATCHING THE MOVEMENTS OF THE COSTAL ARCH & THE ABDOMINAL WALL AT THE FLANK.

IN NORMAL RSTING HORSES, BREATHING MOVEMENTS MAY BE SO SUBTLE THAT DETERMINE OF THE RATE CAN BE PROVE VERY DIFFICULT, IN SUCH CASE, WE CAN DETERMINE RATE BY PLACING A HAND NEAR THE NOSTRILS

PANTING OCCURS IN NORMAL PETS AS THERMOREGULATOR Y MECHANISM

*THE RHYTHM BREATH:

NORMAL RHYTHM OF BREATH IS INSPIRATION, EXPIRATION, AND PAUSE.

IN DISEASES OF RESPIRATORY TRACT, THE PAUSE MAY BE SHORTENED AND EITHER THE INSPIRATORY OR EXPIRATORY PHASE OR BOTH MAY BE PROLONGED.

*THE RHYTHM BREATH:

THE TYPE OF BREATH IS DETERMINE IS ASSESSED BY OBSERVING HOW THE MOVEMENTS ARE SHARED BETWEEN THE THORACIC AND ABDOMINAL WALL.

THE HORSE HAS BIPHASIC INSPIRATION AND EXPIRATION WITH END-EXPIRATORY ABDOMINAL LIFT.

CHARACTERISTIC OF DYSPNEIC PATIENTS:

1. ANXIOUS FACIAL EXPRESSION.
2. MAY PREFER TO REMAIN STANDING OR LIE IN STERNAL RECUMBENCY.
3. ABDUCTION OF ELBOW FROM THORAX.
4. HEAD AND NECK USUSALLY EXTENDED, HELD HORIZONTAL TO THE GROUND.
5. EXCESSIVE MOVEMENTS OF THORACIC OR ABDOMINAL WALL
6. RESPIRATORY NOISES .
7. MOUTH BREAT, PROTRUDING TONGUE.

REVERSE SNEEZING: IS A BRIEF, RAPID INSPIRATORY EFFORT SEEN IN DOGS, IS REFLEX FOR CLEAR NASO-PHARYNX OF IRRITANT.

-REPEATATIVE IDICATING DISEASES IN SINUSES OR NASOPHARYNX.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RESPIRATORY SOUNDS:

THESE ARE THE SOUNDS AUDIBLE AT REST WITHOUT A STETHOSCOPE, AND USUSALLY INDICATE RESPIRATORY TRACT DISEASES, SUCH AS STRETOR, ROARING, STRIDOR, SNORTING, SNEEZING, COUGH...

- SNEEZING:
- STRETOR (SNORING): LOW-PITCHED SOUND DURING BREATHING DUE TO VIPRATION OF THE SOFT PALAT, NASOPHRYNX.
- STRIDOR: HIGH-PITCHED INSPIRATORY SOUND DUE TO UPPER AIRWAYS OBSTRUCTION.

Examination of the nose :

-THE ANATOMICAL VARIATIONS.

-The examination includes ex. Of nares and nasal cavity, ex. Of breath from the nostrils, nasal dischargers, nasal m.m., and patency of nasal cavity.

-The nares and the rostral part of the m.m. of the nasal cavity examined by inspection and a good source of light.

Method for evaluation of breath from nostrils (How????)

Nasal sinuses:

1. Frontal sinuses.
2. Maxillary sinuses.
3. Sphenopalatine.
4. Ethmoidal sinus.

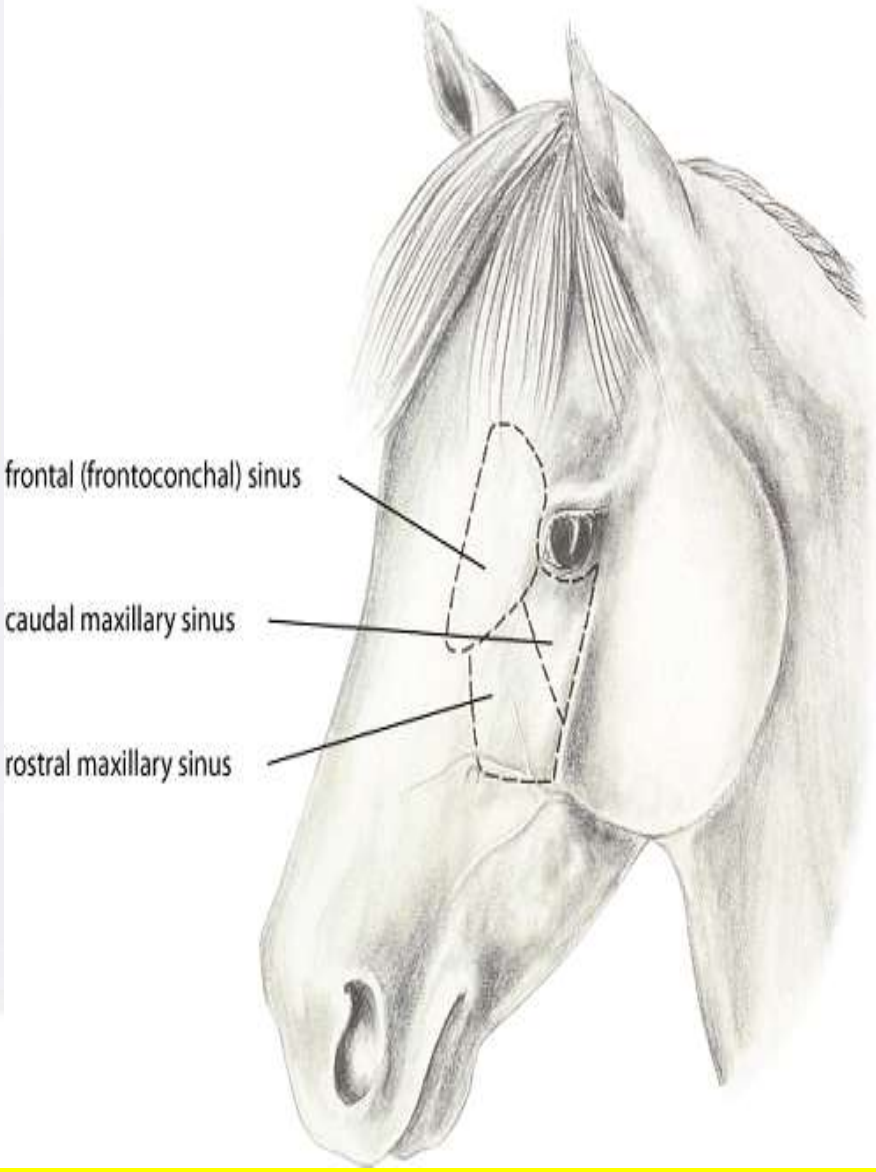
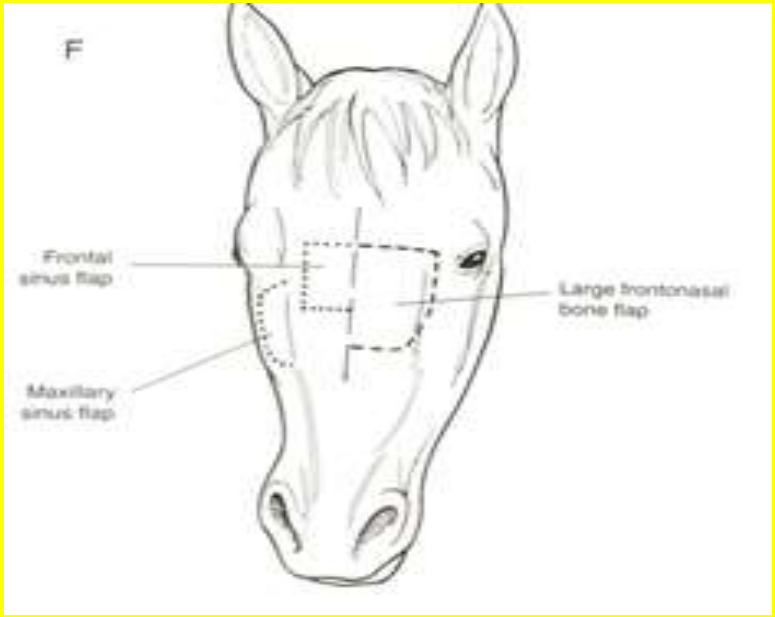


Fig. 16.2 This horse has a right purulent nasal discharge and also right maxillary swelling and epiphora due to empyema of the right maxillary sinus.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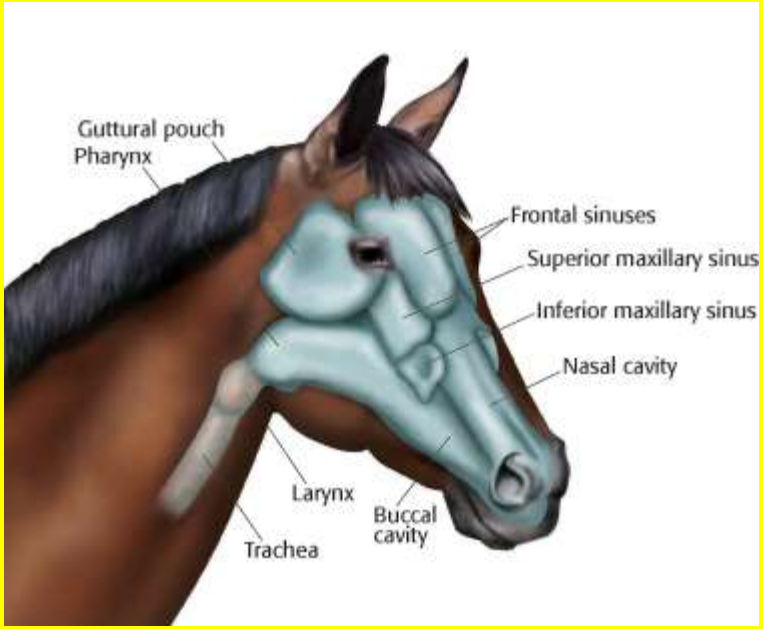
Frontal sinus flap
Large frontonasal bone flap
Maxillary sinus flap


Guttural pouch
Pharynx
Frontal sinuses
Superior maxillary sinus
Inferior maxillary sinus
Nasal cavity
Larynx
Buccal cavity
Trachea

Examination of larynx:

--In pets:

By careful palpation.

Normally: is symmetrical and gentle manipulation causes no obvious discomfort.

In horses:

The most affection is the hemiplasia of larynx due to RLN.

Abnormal breath noises, exercise intolerance, abnormal phonation.

The dorsorosral aspects of larynx should be bilaterally palpated to determine the prominence of the muscular process of arytenoids for the symmetrical structure.

Cattle:

Examined by external palpation for evidence of pain, enlargement, hotness, induction of cough by mild pressure on it.

Auscultation: for normal breath sound during inspiration and expiration.

Examination of Trachea:

Examined by:

- Inspection of the overlaying skin:
- External palpation.
- Mild digital pressure and massage of trachea will induce cough in bracheitis.
- Cricotracheal space and legement in horse.

Examination of the lower respiratory tract:

-1-By careful palpation of the thorax – palapation of the entire length of each rib - for detecting fracture ribs, wounds, subcutaneous emphysema, and pain.

By inspection : for the evidence of pain in thorax.

2- By percussion of the chest:

The percussion of normal lungs usually produce resonant sounds and in pets may be tympanic sounds.

The percussion only of limited value in animals, as the abnormalities that can be detected by percussion must be superficially located and of large size

Anatomic landmarks of lung for auscultation and percussion (lung field):

In general, this area is surrounded by three bounders (limits) and three points must be kept in considerations are:

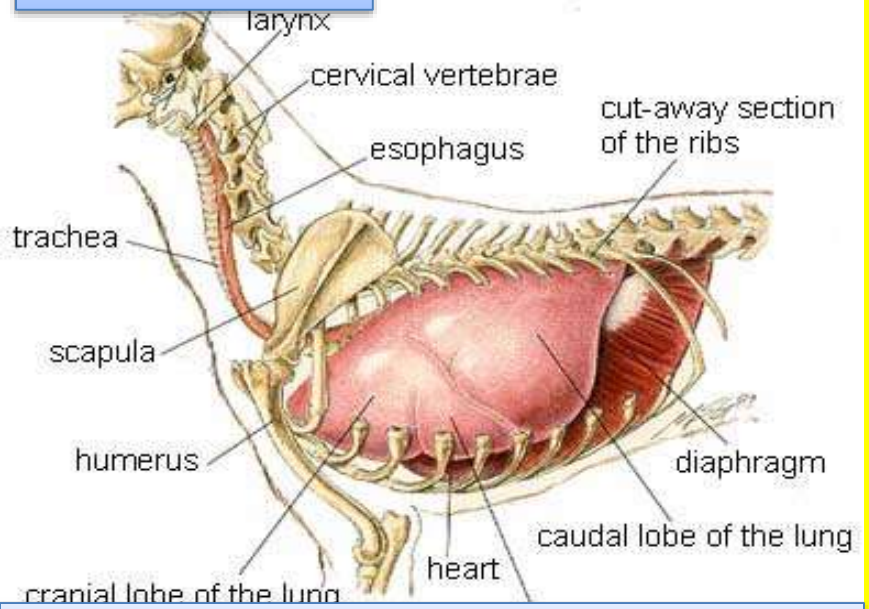
1. **The caudal angle (posterior) of scapula.**
2. **The olecranon process of the ulna.**
3. **The second last intercostal space at a point on a horizontal line from the scapula to the external angle of the ilium.**

The three borders or limits are:

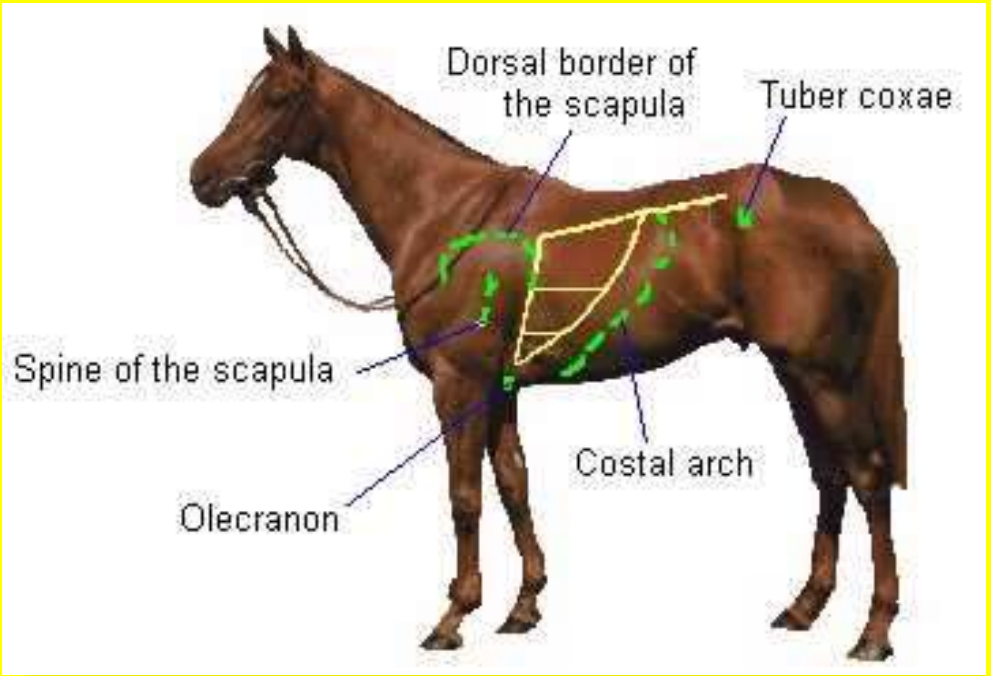
A. **The dorsal limit or border: that is of the lateral margin of the paravertebral muscles.**
B. **The cranial border (lungs extend cranially in front of it , species differences).**
C. **The basal or the ventral border:**

Basal limit is straight

Pets



Basal limit is curved



Basal limit is curved

Note that : Species differences

animal	No. ribs	At level of	Middle of thorax	
Horse	18	16	11/12	¼ cranial lobes of lung is covered by shoulder
Cow	13	11	9	The whole of cranial lobes of lungs is covered by shoulder
Sheep	13	11	7	
Pets	13	11	9	

In ruminants and pets, auscultation of lungs must be as forward and high up as possible in the axilla to evaluate the cranial lobes of lungs (commonly affected).

The recommendations during lung auscultation in animals:

The entire aspects of both lung fields and trachea and larynx should be auscultated in a systematic manner

1- Begin with auscultation of larynx, trachea, and the thorax ; which is divided into ventral, middle and dorsal thirds and begin auscultation over the area of tracheal bifurcation and over the base of the heart.

2- The diaphragm of the stethoscope is held firmly over the external aspects of larynx, and then over the cervical trachea to listen four sounds of expiration and inspiration.

3- It is also critical to auscultate in the axillary region as far as cranially and dorsally as possible to ensure that the cranio-ventral aspects of lungs are examined.

4- While auscultation to breath sounds the movements of the thorax and abdominal walls are observed simultaneously.

5- The stethoscope is moved caudally along the thoracic wall until the lung sounds are no longer audible.

6- The stethoscope is moved systematically in horizontal and vertical directions like the pattern of a checkerboard till all lung areas are examined.

7- At each site of auscultation, at least two breath cycles are listened and the area of abnormalities are auscultated again to ensure the same abnormalities can be heard.

8- When the breath sounds are just barely audible, particularly in adult will-conditioned large animals, it may be necessary to make the animal hyperventilate to accentuate both normal and abnormal breath sounds, by occulding nostrils with one hand (in small animals) or holding a plastic or leather rebreathing bag (bagging) over the rostral face for 1-2 minutes (in large animals).

The breath sounds:

The normal breath sounds that are normally audible over the larynx, trachea, and lungs (over the thoracic wall) by auscultation are generated by turbulent air flow in the large airways (> 2 mm, such as nasal cavity, larynx, trachea, bronchi…), and transmitted along the tracho-bronchial tract as air-born sound and peripherally through the lung tissue and to thoracic wall. These sounds when travel within the lungs outward toward the thoracic wall are filtrated or damped and that accounted for the differences in the sounds heard over various portions of the respiratory tract.

The small airways (< 2 mm) are transmitted the sound waves poorly and do not contribute to the generation or transmission of breath sounds.

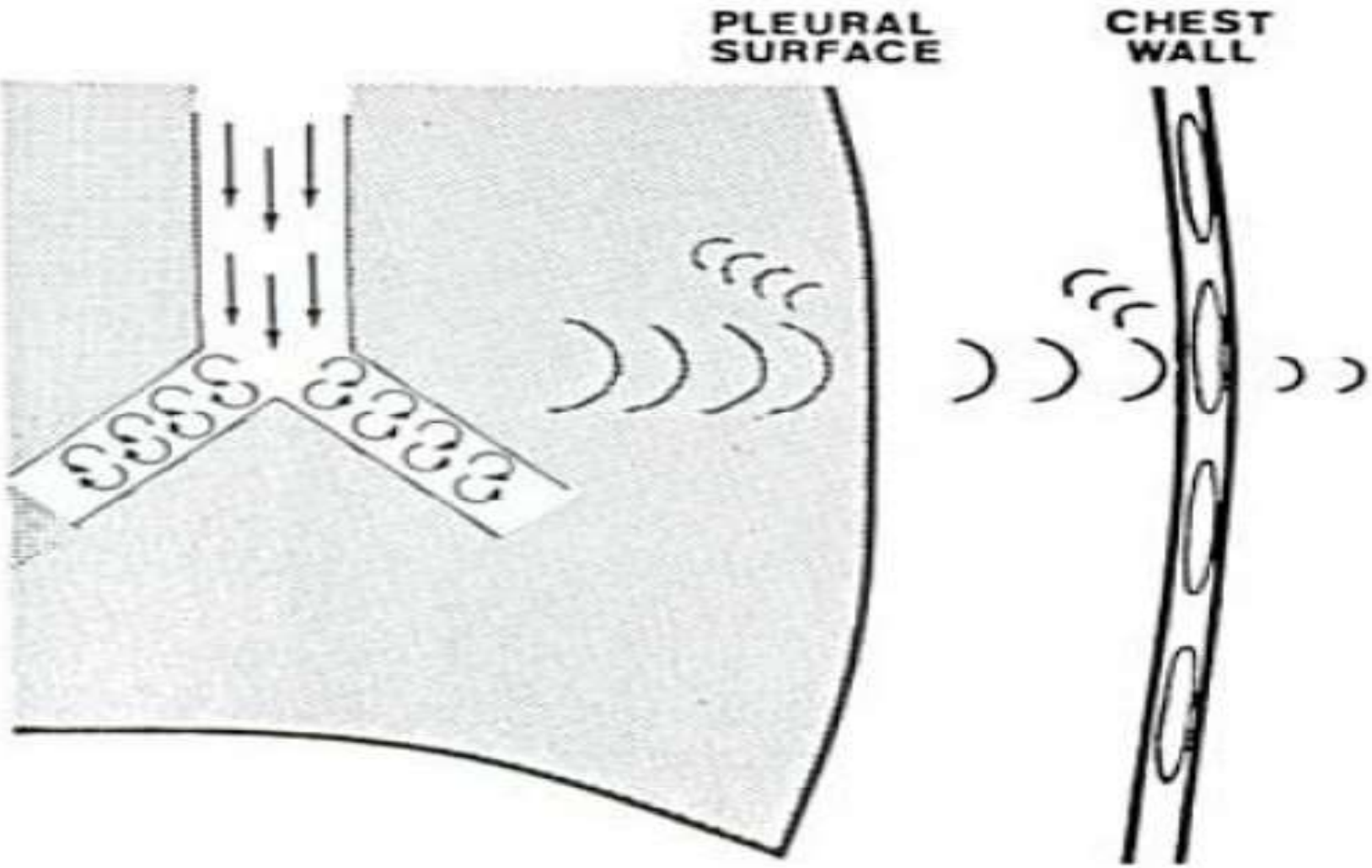


Fig. 16.9 Schematic representation of sound production in the large airways, and reflection at the pleural surface at the lung and at the thoracic wall.

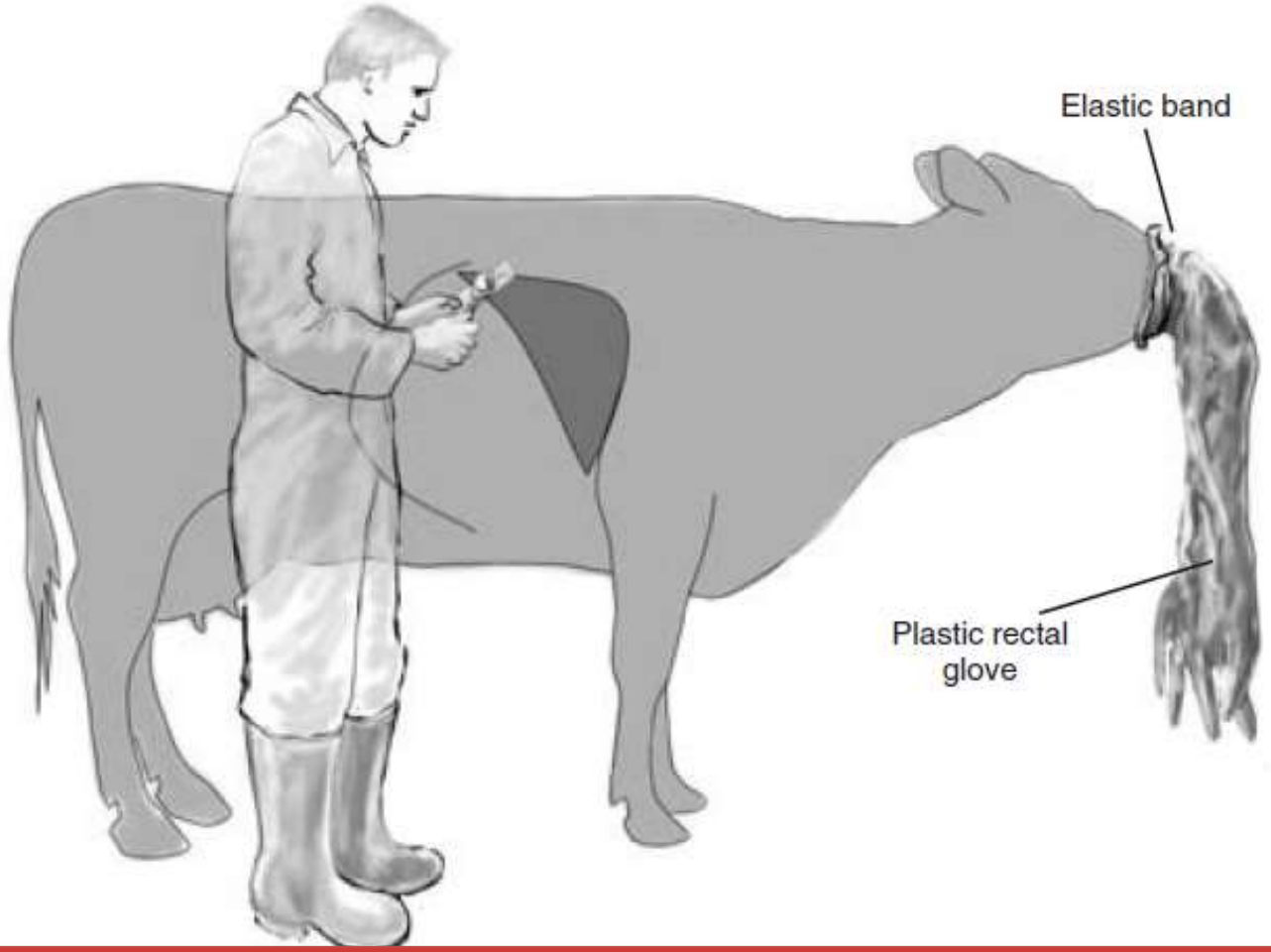
NORMAL BREATH SOUNDS: ***bronchial sounds*** (NOW)

Tracheal sound (previously)	Bronchial sound (previously)	Vesicular sound (previously)
Breath sound heard over cervical trachea	Breath sounds heard over the bifurcation of trachea	Breath sound audible over the periphery of lungs

The normal breath sounds audible over the larynx, cervical trachea which are soft blowing sounds (CH), neither harsh nor associated with adventitious sounds, and heard predominantly during early inspiration and early expiration.
Over the thorax wall: only fraction of breath sound could be heard during early inspiration particularly in large animals.

Rebreathe bagging in the horse

Fig. 16.12 The audibility of breath sounds detected by auscultation may be increased by using a rebreathing bag. This induces hyperventilation and considerably improves the sensitivity of thoracic auscultation.



Rebreathing bag (Bagging in cattle) in the field

ABNORMAL RESPIRATORY OR BREATH SOUNDS:

- Variations in audibility of breath sounds.
  - Increased
  - Decreased
- Adventitious respiratory sounds
  - Crackles
  - Wheezes

I- VARIATION OF AUDIBILITY OF BREATH SOUNDS/bronchial sounds

Increased amplitude or audibility (harsh)	Increased amplitude or audibility barely detect or absent (muffled lung sound)
1. Hyperventilation during exercise, anxiety, high environmental temperature. 2. During systemic conditions such as acidosis, fever, septicemia, and anemia.... 3. Respiratory tract diseases: lung consolidation, congestion in early pneumonia, atelectasis. 4. Cardiac diseases: cardiac	1. In large animals especially horse during rest (quiet breathing animals) with thick chest wall, obese. 2. Loss of breath sounds due to loss of breath reflection at tissue/air or tissue/fluid interfaces such in pulmonary emphysema, pneumothorax, pleural effusion

II- ABNORMAL BREATH SOUNDS (ADVENTITIOUS)

1- Crackles: (moist rales) Discontinuous/interrupted non-musical, short duration (1-30 ms) sounds	
A- Coarse (bubbling) Short duration (10 – 30 ms)	B- Fine (popping) Very short duration (1 – 10 ms)
Similar to bubbling of air through fluid	Similar to rolling a lock of one's hair between fingers close to ear
Loudest over the distal cervical trachea, may audible during inspiration or expiration	Obvious in the peripheral and independent lung areas
Indications: air passing via secretions in airways (exudation)	Open of a series of airways which have become abnormally closed during expiration
Exudation of pneumonia or transudation from cardiac origin or pulmonary edema,	acute atypical interstitial pneumonia& pulmonary edema

II- Wheezes Continuous musical , whistling, squeaking of long duration sound (> 250ms) (Rhonchi/dry rales)	III- Pleuritic fraction rub
The sound may be heard throughout the breath cycle (inspiratory or expiratory)	sand-paper like sound
Air flows via narrowed airways, causing walls to vibrate	
1. Expiratory wheezes most common with expiratory dyspnea indicating partial obstruction of the intra-thoracic airways as in COPD, chronic atypical interstitial pneumonia in cattle. 2. Inspiratory wheezes (stridors) with inspiratory dyspnea indicates partial obstruction of the extra-thoracic airways as in bilateral laryngeal paralysis, cervical tracheal collapse, consolidation of lungs 3. Narrowing lumen of airways by tenacious materials	Occurs in: First stage of pleurisy

Sounds	*Acoustic characteristics*	*Significance and examples*
Normal breath sounds	Soft blowing sounds; longer and louder on inspiration than on expiration; audible over the trachea and lungs	Normal respiratory tract
Increased audibility of breath sounds	Mild to moderate increase in loudness of breath sounds; audible on inspiration and expiration over the trachea and lungs	Any factor which increases respiratory rate or depth of respirations, including fever, excitement, exercise, high environmental temperatures, lung disease. Harsh loud breath sounds are audible over the lungs with any disease resulting in collapse or filling of alveoli and leaving bronchial lumina open; e.g. pulmonary consolidation and atelectasis.
Decreased audibility of breath sounds	Decreased audibility of breath sounds on inspiration and/or expiration over the lungs. Generalized or localized	Obese animal, pleural effusion, space-occupying mass of lung or pleural cavity, pneumothorax, diaphragmatic hernia, occlusive (lung) airway disease as in bronchial lumina filled with exudate
Crackles	Short duration, interrupted, non-musical breath sounds. Coarse crackles are loud and most commonly heard over large airways in animals with pulmonary disease and may be heard during inspiration and expiration. Fine crackles are of short duration, less intense and higher pitched	Coarse crackles are probably caused by air bubbling through, and causing vibrations within, secretions in large airways. Fine crackles caused by sudden explosive popping open of a series of airways closed during expiration. May be detected in early or late inspiration.
Wheezes	Continuous musical-type squeaking and whistling sounds audible over the lungs	Narrowing of large airways; expiratory polyphonic wheezing common in equine COPD; bronchopneumonia, any species
Pleuritic friction rubs	'Sandpapery' sound; grating; sound close to the surface; on inspiration and expiration; tend to be jerky and not influenced by coughing	Pleuritis; diminish or disappear with pleural effusion
Stridor	A high-pitched sound on inspiration, audible with or without stethoscope over the larynx and trachea	Obstruction of extrathoracic airways, especially the larynx (due to edema) prime example is calf diphtheria or tracheal collapse in horses and dogs
Stertor	Snoring sound (low pitched, coarse and raspy) audible without a stethoscope on inspiration and expiration over the pharyngeal and laryngeal areas	Partial obstruction of the upper respiratory tract, commonly due to abnormalities of soft palate and nasopharynx
Expiratory grunting	Loud grunting on expiration; audible on auscultation of the thorax, over the trachea and often without the aid of a stethoscope	Due to pain resulting from severe diffuse pulmonary emphysema; extensive consolidation; acute pleurisy and peritonitis

Especial methods for examination of the respiratory tract

- ultrasonography
- endoscopy
- X-ray examination
- Tracheal and bronchial lavage

Thanks