

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Abdominal Cavity. The largest body cavity in the horse extending from just behind the thoracic cavity to the pelvic region.

Ablate. To remove or destroy especially by cutting, abrading, or evaporating.

Accessory Lobe. A third lobe in the right lung makes it large than the left lung.

Adenosine Triphosphate. An energy-carrying molecule found in the cells of all living things. ATP transports chemical energy within cells for metabolism.

Aerobic Metabolism. Aerobic metabolism uses oxygen to create energy from carbohydrates, fats and even protein.

Alar Cartilage. A nasal cartilage which supports the rim of the nostril allowing it to flair open during exercise.

Allergy. A hypersensitivity disorder of the immune system when the system reacts to normally harmless substances.

Alveoli. Sac-like structures that group together like interlinked caves to exchange oxygen and carbon dioxide to and from the blood.

Ammonia. A compound of nitrogen and hydrogen with the formula NH_3 . A colorless gas characterized by its pungent odor.

Anaerobic Metabolism. Anaerobic metabolism is responsible for creating energy for your movements without the use of oxygen.

Antibiotic. Medicine that fight bacterial infections by either killing the bacteria or stopping its reproduction.

Arteritis. The inflammation of the walls of arteries, usually as a result of infection or auto-immune response.

Arytenoids. A pair of small three-sided pyramid shaped cartilages at the back of the larynx that open and close over the opening to the trachea.

Arytenoids Dorsalis Muscle. The muscle that causes abduction of the arytenoid cartilage (laryngeal hemiplegia) as the muscle ceases to function.

Ascarids. Paracaries equorum, also known as large round worms, this is the most common parasite to infect mostly young horses.

Aspirate Food or Other Particulates. The entry of foreign material into the airways. Referred to as “going down the wrong pipe.”

Aspergillus. A genus consisting of several hundred mold species found in various climates worldwide.

Auscultation. To listen to internal sounds of the body.

Bacteria. A large domain or kingdom of prokaryotic microorganisms commonly referred to as “germs.”

Banimine: A brand of flunixin meglumine a non-steroidal anti-inflammatory drug, analgesic, and antipyretic used in horses, cattle, and pigs.

Bastard Strangles. Describes the dissemination of the strangles infection to unusual sites other than the lymph nodes draining the throat.

Bernoulli Effect. An increase in the speed of a fluid (or gas) occurs simultaneously with a decrease in pressure.

Beta Oxidation. The process by which fatty acid molecules are broken down in the mitochondria to generate energy.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

- Blood Gas Barrier.** The extremely thin wall of the alveoli sac that allows oxygen and carbon dioxide to diffuse in and out of the bloodstream.
- Botulism.** A rare but serious paralytic illness caused by a nerve toxin bacterium *Clostridium botulinum*.
- Bronchi.** The large airways within the lungs.
- Bronchioles.** Within the lungs, the main bronchi branch off into smaller and smaller passageways, of which the smallest are called bronchioles.
- Bronchitis.** An inflammation of the mucous membranes of the large and medium-sized airways in the lung.
- Bronchoalveolar Lavage Test.** A medical procedure in which a bronchoscope is passed into the lungs to collect a liquid biopsy to diagnose and treat lung disease.
- Bronchodilator.** A substance that dilates the bronchi and bronchioles, decreasing resistance in the respiratory airways and increasing airflow to the lungs.
- Capillary.** The smallest of the body's blood vessels with endothelial linings of only one cell layer thick.
- Carina.** The cartilaginous ridge within the trachea that runs anteroposteriorly between the two primary bronchi at the site of tracheal bifurcation.
- Cartilage.** A tough, fibrous, but flexible connective tissue found in many areas in the body. It can give shape and support.
- Carotid Artery.** This is the artery felt when the pulse is taken at the throatlatch. It carries oxygenated blood from the heart to the head.
- Caudal Lobe.** Portion of the lung closer to the hind quarters.
- Cellular Respiration.** The biochemical pathway by which the chemical bonds of food molecules is released and partially captured in the form of Adenosine Triphosphate (ATP).
- Chimney Effect.** The movement of air into and out of buildings, chimneys, flue stacks, etc, is driven by the buoyancy that occurs from a difference in indoor-to-outdoor air density resulting from temperature and moisture differences. Also called the stack effect.
- Chondroids.** Hard stones of dried out pus in the guttural pouch in a small portion of horses following a strangles infection. These horses will act as chronic shedders of the strangles bacteria.
- Cilia:** The fine hair-like projections from certain cells such as those in the respiratory tract that sweep in unison and help to sweep away fluids and particles. Some single-celled organisms use the rhythmical motion of cilia for locomotion.
- Cleft Palate.** An uncommon malformation of the soft and sometimes hard palate affecting .1-.2% of foals.
- Clenbuterol.** A sympathomimetic amine used by sufferers of breathing disorders as a decongestant and bronchodilator to make breathing easier.
- Commensalism.** A relationship between two organisms where one organism benefits without affecting the other.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Complete Blood Count. A (CBC) measures the concentration of white blood cells, red blood cells, and platelets in the blood and aids in the diagnosis of medical conditions.

Conchea. Small cony curvatures on the sides of the sinus that allow for greater surface area to warm and humidify the haled air.

Corticosteroid. A class of chemicals that include steroid hormones naturally produced in the adrenal cortex of vertebrates.

Cranial Lobe. Portion of the lung closet to the horse's head.

Cranial Nerves. Nerves that emerge directly from the brain, in contrast to spinal nerves, which emerge from segments of the spinal cord.

Creatrine Phosphate. (CP) is a phosphorylated creatine molecule that serves as a rapidly mobizable reserve of high-energy phosphates in skeletal muscle and brain.

Cryotherapy. The local or general use of low temperatures in medical therapy.

Dynamic Airway Collapse. Difficulty in breathing that is made worse by exercise.

Edema. Swelling caused by an accumulation of fluid in the body's tissues.

Endemic. Present in a community at all times but in relatively low frequency. Something that is endemic is typically restricted or peculiar to a locality or region.

Endoscopy. Using an endoscope to look inside the body.

Endotoxin. Toxins kept within a bacterial cell and to be released only after destruction of the bacterial cell wall. Endotoxin is used synonymously with the term lipopolysaccharide a major constituent of the outer cell membrane of gram-negative bacteria.

Enzootic. Endemic in animals. An enzootic disease is constantly present in an animal population, but usually only affects a small number of animals at any one time.

Eosinophil Granulocytes. White blood cells responsible for combating multicellular parasites and certain infections in vertebrates.

Epiglottis. A flap of elastic cartilage tissue covered with a mucus membrane that covers the entrance to the trachea when the horse swallows.

Esophagus. The organ in vertebrates which consists of a muscular tube through which food passes from the pharynx to the stomach.

Ethmoid Hematoma. A progressive and locally destructive disease that is a mass in the paranasal sinuses that resembles but is not a tumor.

Ethmoid Labyrinth. An intricate structure of thin-walled interconnecting cavities that are part of the nasal passages.

Exercise Induced Hypercapnia. High levels of carbon dioxide (CO₂) in the blood when exercising.

Exercise Induced Hypoxemia. Low levels of oxygen (O₂) in the blood when exercising.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Exercise Induced Pulmonary Hemorrhage. A condition where blood enters the air passages within the horse's lung when the horse is under extreme exercise. Also known as "bleeding."

Fat Metabolism. A metabolic process that breaks down ingested fats into fatty acids for energy production.

Fast Twitch Muscles. Fibers that contract quickly and powerfully but fatigue rapidly, sustaining only short, anaerobic bursts of activity before muscle contraction becomes painful.

Fixed Airway Conditions. A constant limitation on airflow.

Flehman Response. Behavior whereby an animal curls back its upper lip exposing its front teeth, inhales with nostrils closed and holds position to expose certain odor molecules to the vomeronasal organ.

Furosemide. A loop diuretic used in the treatment of exercise-induced pulmonary hemorrhage.

Diaphragm. The musculotendinous structure that separates the thoracic and abdominal cavities and aids in respiration.

Dictyocaulus Arnfieldi. Only affecting equids, this worm is also known as lung worm as it resides in the bronchi and bronchioles of the lungs causing bronchitis.

Diffusion. A process by which molecules intermingle as a result of their kinetic energy of random motion.

DNA. Deoxyribonucleic acid is a molecule that encodes the genetic instructions used in the development and function of all known living organisms.

Dorsal Displacement of the Soft Palate. DDSP is the obstruction of the upper airway during high-intensity exercise when the soft palate temporarily displaces above the epiglottis.

Dyspnea: is a sign of serious disease of the airway, lungs, or heart. The onset of dyspnea should not be ignored but is reason to seek medical attention.

Glucose. A simple sugar, it is a major source of energy for most cells of the body.

Glycogen. A polysaccharide that is the principal storage form of glucose in animals and human cells.

Goblet cells. Glandular simple columnar epithelial cells whose function is to secrete mucin, which dissolves in water to form mucus.

Gram-Negative. A type of bacteria that cause infections. Identified by how they retain a specific stain color.

Gram-Positive. A type of bacteria that cause infections. Identified by how they retain a specific stain color.

Guttural Pouch. A pair of air filled chambers in the neck just behind the skull unique to horses and a few other animals.

Hard Palate. The horizontal bony plate of the skull located in the roof of the oral cavity.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Heart Rate. An adult horse at rest will have a heart rate of 30-50 beats per minute.

Heaves. Common name for Recurrent Airway Obstruction (RAO).

Hemoglobin. The iron-rich protein in red blood cells. It is what makes blood red.

Herpesvirus. A common DNS virus that occurs in horse populations worldwide. Most common strains are Type1 (EHV-1) and 4 (EHV-4).

Immune. Resistant to a particular infection or toxin owing to the presence of specific antibodies or sensitized white blood cells.

Immune System. A system of biological structures and processes within an organism that protects against disease.

Inflammatory Airways. A group of inflammatory conditions that effect the lower respiratory tract to decrease the horse's ability to breathe.

Inflammatory Airway Disease. IAD describes allergic disease that arises out of environmental conditions and decreases the horse's ability to breathe.

Influenza. Known as "the flu", a common RNA virus that affects the respiratory tract in horses worldwide.

Jacobson's Organ. The vomeronasal organ (VNO), an auxiliary olfactory sense organ found in many animals.

Larynx. A muscular and cartilaginous structure commonly called the "voice box" in the neck of amphibians, reptiles, and mammals.

Laryngeal hemiplegia. A disease which impairs airflow during extreme exercise due to a paralysis of the left arytenoid cartilage and vocal fold.
Also known as "roaring" because of the noise produced as air passes over the paralyzed vocal fold.

Leukocytes. Cells that help the body fight infections and other diseases. Also called white blood cells (WBCs).

Lidocaine. A Common local anesthetic and antiarrhythmic drug.

Lipopolysaccharide. Large molecules consisting of a lipid and a polysaccharide joined by a covalent bond found in the outer membrane of gram-negative bacteria.

Lung. The essential respiratory organ in air-breathing animals.

Lymphocyte. A kind of white blood cell in the vertebrate immune system defending against bacteria and disease.

Macrophage. A type of white blood that ingests (takes in) foreign material. Macrophages are key players in the immune response to foreign invaders such as infectious microorganisms. Blood monocytes migrate into the tissues of the body and there differentiate (evolve) into macrophages.

Mainstem Bronchi. Either of two main branches of the trachea, leading directly to the lungs.

Mast Cells. A mastocyte or Labrocyte is a resident cell containing granules rich in histamine and heparin in response to injury or inflammation in the body

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Maxillary Sinuses. The largest of the paranasal sinuses it is located below the eyes drains into the middle meatus.

Meatus. A natural body opening or canal.

Metabolism. The set of life-sustaining chemical transformation within the cells of living organisms.

Mediastinum. Divides the thoracic cage into two halves.

Mitochondria. The cell's power producer generating most of the adenosine triphosphate (ATP) used as a source of chemical energy.

Mineral Oil Pneumonitis. A chronic inflammation of the lung caused by the aspiration of mineral oil.

Monocytes. A type of leukocyte or white blood cell which play a role in immune system function. Depending on a patient's level of health, monocytes make up between one and three percent of the total white blood cells in the body.

Mucociliary Escalator. Refers to the cilia of the epithelial cells in the airways that beat rhythmically to move mucus and particulates up and out of the respiratory tract.

Mucosa. Moist tissue that lines certain parts of the inside of the body.

Mucus. A slippery secretion produced by and covering mucus membranes.

Mucus Membrane. The membrane lining all body passages that communicate with the air.

Nasal Cavity. The large air filled space above and behind the nostrils.

Nasal Edema. The inflammation/swelling of the lining of nasal mucosa from infection.

Nasal Passages. Another term for the nasal cavity—the large air filled space above and behind the nostrils that lead up to the larynx.

Nasal Septum. The boney plate that separates the left and right airways in the nose, dividing the two nostrils.

Nares. The pair of openings of the nostrils.

Nebulizer. A drug delivery device used to administer medication in the form of a mist inhaled in the lungs.

Neurologic Disease. Disorders of the brain, spinal cord, and nerves throughout the body.

Neutrophils. The most common type of white blood cell, comprising about 50-70% of all white blood cells. They are phagocytic, meaning that they can ingest other cells, though they do not survive the act. They are the first immune cells to combat infection, through a process known as *chemotaxis*.

Non-Neoplastic. An abnormal growth of tissue resulting from uncontrolled, progressive multiplication of cells and serving no physiological function.

Nostril: The external opening of the nasal passages.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

- Obligate Nasal breather.** A physiological necessity to breathe through the nose, along with an inability to breathe through the oral cavity.
- Obstructive Lung Disease.** Respiratory disease characterized by the airways obstructing the ability to exhale.
- Olfactory Receptor Neurons.** The workhorses of the nose, they function as sensory cells, detecting inhaled odors.
- Oral Cavity.** The space of the mouth in which food is taken in.
- Overland Endoscopy Equipment.** A portable endoscopy unit that attaches to the saddle to allow a base computer to look at the function of the larynx during extreme exercise.
- Palpation.** A method of feeling with the fingers or hands during a physical examination.
- Paranasal Sinuses.** A group of paired air-filled spaces that surround the nasal cavity, including the Frontal sinus, maxillary sinus, ventral conchal sinus, dorsal conchal sinus, and sphenopalatine sinus.
- Paraneumonic Effusion.** A type of pleural effusion that arises as a result of pneumonia, lung abscess, or bronchiectasis.
- Parenchyma.** The bulk of a substance that comprises the functional parts of an organ.
- Pharynx.** Structure that contains the nasopharynx, oropharynx, and the laryngopharynx.
- Pelvic Cavity.** The cavity of the body that is bounded by the bones of the pelvis, containing reproductive organs, bladder and colon.
- Phenylbutazone.** A non-steroidal anti-inflammatory drug (NSAID) for the short-term treatment of pain and fever in animals.
- Pheromones.** Odorless pheromones secreted or excreted that triggers a social response in members of the same species.
- Plastination.** A process used in anatomy to preserve bodies or body parts in a way that retains most of the properties of the original sample.
- Pleura.** A serous membrane which folds back onto itself to form a two-layered membrane structure where the outer layer is attached to the chest wall and the inner layer covers the lungs and adjoining structures.
- Pleura Space.** The space between the layers of the pleura.
- Pleuradynia.** A general term for pain in the chest or abdomen when breathing caused by infection of the pleura.
- Pleurapneumonia** Infection in the lungs and pleural space usually develops as a secondary infection from pneumonia.
- Pneumonia.** An inflammatory condition of the lung—primarily affecting the microscopic air sacs known as alveoli.
- Polymerase Chain Reaction Test.** Biochemical technology used to diagnose a variety of viruses and certain fungi.
- Protazoa.** A diverse group of unicellular eukaryotic organisms.
- Pulmonary Artery.** The artery that carries deoxygenated blood from the heart to the lungs.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Pus. Typically a white-yellow, yellow, or yellow-brown thick mucus formed at the site of inflammation during an infection.

Recurrent Airway Obstruction. An allergic respiratory disease in horses. RAO is known as “heaves” or “wind-broke” because you can see the sides of the horse heave as he breathes.

Recurrent Laryngeal Nerve. A branch of the vagus nerve (tenth cranial nerve) that supplies motor function and sensation to the larynx.

Respiratory-Locomotor coupling. The relationship between the horse's stride at a fast trot, canter, and gallop to breathing.

Respiratory Rate: At rest the horse will take 8-12 breaths per minute.

Restrictive Lung Disease. A chronic disorder that causes a decrease in the ability to expand the lung to breathe air into the lung.

Retropharyngeal Lymph nodes. Located deep behind the throatlatch and within the guttural pouch, these are the lymph nodes that are infected with strangles.

Rhinopneumonitis. The general name for herpesvirus 4 (EHV-4) occupies the horse in such a way that allows a lifetime post infection viral persistency.

Rhinitis Virus. (ERAV) affects both the upper and lower airways and is caused by nasal secretions and aerosol inhalation.

RNA. Ribonucleic acid is a ubiquitous family of large biological molecules that perform multiple vital roles in the coding, decoding, regulation, and expression of genes.

Saline. A general phrase referring to a sterile solution of sodium chloride or salt, in water.

Septic Bronchitis. Where highly irritating decomposing fluids, caused by bacteria, are present in the bronchi.

Shedding. The process by which a viral or bacterial infection is released to find a new host.

Shipping Fever. Pleuropneumonia contracted after trailer the horse for long distances. It is caused by the inhalation of bacteria and pathogens.

Slow Twitch Muscles. Fibers that carry more oxygen and sustain aerobic activity using fats or carbohydrates as fuel. Slow twitch fibers contract for long periods of time but with less force.

Soft Palate. A moveable fold of muscular fibers suspended from the hard palate (roof of the mouth).

Sinuses. A cavity within a bone or other tissue. Most commonly found in the bones of the face.

Snap Test. A quick and accurate at-the-farm blood test to detect a number of infectious diseases. Notable noise when test is complete.

Staining. A technique used in microbiology to artificially colorize a substance to facilitate examination.

Strangles. A highly contagious upper respiratory tract infection in equines caused by the *Streptococcus equi* var *equi* bacterium.

Streptococcus Equi–Subs equi. The strangles bacterium transmitted by direct contact with infected horses or shed mucus.

Advanced Equine Studies
The Horse's Respiratory System
Glossary of terms

Streptococcus Equi–Subs zoo epidemicus. Subspecies of Streptococcus equi associated with pneumonia.

Stethoscope. An acoustic medical device for auscultation, or listening to the internal sounds of the body.

Tachycardic. An elevated heart rate.

Tachypnea. An elevated respiration rate.

Temperature Rate. Normal body temperature for a horse is 99 – 101F (37.5 – 38.5C).

Thermoregulation. The ability to maintain body temperature within certain parameters independent from environmental temperature.

Thoracic Cavity. The chest cavity protected by the thoracic wall also known as the ribcage.

Titer Test. The measurement of the amount or concentration of a substance in a solution—usually antibodies in a blood sample.

Trachea. A tube that connects the pharynx and larynx to the lungs also called the “windpipe.”

Tracheal Puddle. Accumulation of mucus on the floor of the ventral aspect of the trachea.

Tracheal Rings. Semicircular rings of hyaline cartilage which occupies the anterior two-thirds of the circumference of the trachea.

Treadmill Endoscopy. Endoscopy that looks at the function of the larynx during exercise on a treadmill.

Twitchy airways. Not a sensation but an underlying tendency for the airways to react by narrowing when they encounter certain stimuli.

Upper Airways. The passage by which air enters and leaves the lungs.

Upper Respiratory Tract. The upper airways or parts of the respiratory system lying outside the thorax.

Urea. A nitrogen-containing substance normally cleared from the blood by the kidney into the urine.

Vaccine. A biological preparation that improves immunity to a particular disease.

Vagus Nerve. One of the two extremely long cranial nerves that extend from the brain in the abdomen.

Varicosity. The quality or state of being abnormally or markedly swollen or dilated.

Viral Arteritis. A contagious RNA virus disease of equids caused by equine arteritis virus (EAV).

Visceral Piston Mechanism. The inertial displacement of the diaphragm during exercise that drives respiration.

Vo₂. Also known as maximal oxygen consumption measures the volume of oxygen consumed at maximum exercise.

Vocal Folds. Also known as vocal chords are twin infoldings of mucus membrane stretched horizontally across the larynx.

Vomer nasal Organ. An auxiliary olfactory sense organ that is found in many animals. Also called Jacobson's organ.