**Recurrent Airway Obstruction**

- Also known as “Heaves”
- Alternative Terminology
  - COPD = chronic obstructive pulmonary disease
  - Emphysema
  - “Broken wind”
- Defined: Common, chronic, progressive lower respiratory disease syndrome of horses and ponies
- Cause: chronic exposure to inhaled dust particles containing allergens, e.g., moldy hay;
  
  *Thermoactinomyces*

- Presenting signs
  - Long, insidious, ill-defined onset of coughing, exercise intolerance, intermittent nasal discharge
  - Worsens over time unless treatment and management changes
  - Expiratory wheezes
  - Abdominal muscle hypertrophy (“heave line”)
  - Flared nostrils
  - Weight loss

- Acute presentation
  - Respiratory distress within 20-30 minutes of exposure to allergen
  - Requires immediate treatment
  - Severe dyspnea, tachypnea, flaring nostrils, anxious, paroxysms of coughing

- Geographic incidence
  - Common in the northern hemisphere

- Age predisposition
  - Adults 6-10 years
  - Incidence increases with age
  - Uncommon in young horses

- Cost considerations
  - Major source of loss and wastage to equine industry
  - If horses must be stabled, alterations in stable design and management may be $$$

- Predisposing factors
  - Genetic predisposition
Equine Respiratory Disease

- Poor stable management
  - Inadequate clearance of wet bedding
  - Poor ventilation
  - Poor quality bedding and hay

- Pathophysiology
  - Inhaled spores deposit on mucosa
  - Neutrophils invade airways
  - Release of chemicals (e.g., histamine, leukotrienes)
    - Bronchospasm
    - Increased mucus production
    - Increased vascular permeability
  - Edema and plugging of the airways with mucus
  - Airway obstruction
  - Increased respiratory effort/hypoxia

- Diagnosis
  - Presenting signs (cough, dyspnea, etc.)
  - History & exposure
  - Auscultation: bronchial sounds, *wheezeing*, crackling
  - Cytopathology: BAL or TTW
    - > 90% neutrophils
  - Endoscopy: accumulation of tracheal mucopus seen in distal trachea

- Treatment
  - Environmental control
    - Eliminate hay; used cubed diet, vacuum-packed hay
    - Remove horse from stable to outdoor environment OR change bedding to a non-straw material (e.g., paper, wood shavings, rubber mats, peat moss, etc.)
  - Bronchodilator
    - Beta-2 adrenergic agonist
    - Oral, injectable, or inhalational
    - Start at low doses
    - Higher doses can activate Beta-1 receptors → trembling, excitement, sweating, ileus, colic, tachycardia
Equine Respiratory Disease

- Oxygen administration can be supportive
- Corticosteroids
  - Often dramatically improves signs
  - Inhaled preparations successful
  - Side effects
  - Use lowest effective dose

Prognosis
- Pathology is reversible
- Condition may recur if allergens increase
- About 10% of RAO patients also suffer from SPARAO (summer pasture-associated RAO)
  - Control difficult in these animals

Equine Viral Arteritis (EVA)
- Also known as:
  - EVA
  - Infectious cellulitis
  - Pink eye
  - Equine typhoid

- A reportable, highly contagious disease associated with sporadic outbreaks of respiratory disease and abortion in horses
- Although transmitted primarily by the respiratory route, the greatest economic impact is on the horse-breeding industry
- Cause: Equine arteritis virus
- Spread: respiratory or venereal route
- Signs:
  - Most infections subclinical
  - Clinical signs vary:
    - Pyrexia
    - Depression
    - Conjunctivitis, rhinitis, nasal/ocular discharge, respiratory distress, neonatal pneumonia
    - Abortigenic; can cause abortion storms
Equine Respiratory Disease

- Geographical incidence
  - Distributed worldwide
- Age predisposition
  - All ages susceptible
- Sex predisposition
  - Intact stallions are capable of becoming life-long carriers showing no signs
  - Carrier state is only found in sexually mature colts, stallions
  - Mares in contact with stallions are at risk
- Cost considerations
  - Financial considerations of an outbreak of EVA-related abortion or infection in stallions can be significant
- Pathophysiology
  - Virus enters lungs or reproductive tract
  - Virus replicates in the reticuloendothelial system (monocytes and macrophages)
  - Dissemination \(\rightarrow\) panvasculitis
  - Edema: limbs, mammary gland, prepuce, scrotum, ventral body wall, around eyes
  - Abortion: may occur in up to 50% of infected mares
  - Pneumonia: most susceptible are very young foals
- Diagnosis
  - Serology
  - Virology
  - Histopathology
    - Characteristic lesions in small vessels
- Treatment
  - Not typically needed unless severe
  - If severe, control of pyrexia and edema
  - NSAIDS for stallions because pyrexia and edema can result in sperm damage and temporary infertility
- Control
  - Isolation of all incoming horses for 3-4 weeks
  - All breeding stallions should be vaccinated every 6 months against EVA to prevent establishment of the carrier state.
Equine Respiratory Disease

- Vaccination of mares 3 weeks or more prior to breeding to known carriers

**Prognosis**

- Most infected adults recover completely after symptomatic phase
  - But pregnant mares may have aborted
- Foals that develop pneumonia may die
- 10-70% of infected stallions may become persistently infected

**Strangles**

- **Cause:** *Streptococcus equi*
  - Beta-hemolytic streptococcus

- **Signs:**
  - Pyrexia, depression, inappetance
  - Profuse mucopurulent nasal discharge
  - Lymphadenitis/abscessation of the lymph nodes of the head, especially submandibular and retropharyngeal
    - May discharge pus, which is highly infectious
  - Dyspnea -- retropharyngeal abscess causing airway obstruction
  - Possible guttural pouch infection
    - Neuropraxia of CN IX, X, XI

- **“Bastard”/Metastatic strangles**
  - Aspiration of pus to the lungs can cause pneumonia
  - Spread to the liver, spleen, kidneys, and mesentery is common, leading to peritonitis and signs of colic
  - Abscessation in the brain causes neurologic signs

- **Geographic incidence**
  - Worldwide

- **Age predisposition**
  - Young and elderly at risk of severe disease

- **Cost considerations**
  - Management, nursing, and treatment of a group of horses
  - Commercial activities must be stopped to avoid spread (e.g., riding, training, boarding, livery, etc.)
Equine Respiratory Disease

- Special Risks
  - Highly contagious by close contact
  - Easily spread by fomites and flies; rapid isolation of an infected animal is necessary
  - Aerosol spread is not significant in most cases

- Pathophysiology
  - Inhalation of bacteria
  - Colonize mucosa and tonsils
  - From there into the lymph nodes
  - Bacteria resist phagocytosis → abscess formation
  - Release of toxins and enzymes → severe inflammation
  - If bacteremia, “bastard” strangles possible
  - In the pharynx, severe tissue damage

- Timecourse
  - Incubation: 2-14 days
  - Elimination of infection: about 4 weeks after the end of clinical signs
  - About 10% of affected animals go on to carry the bacteria in their guttural pouches for months to years

- Diagnosis
  - Isolation of the organism
    - Sterile aspirate of a mature intact abscess is preferable
  - ELISA testing/PCR testing
  - Guttural pouch empyema by endoscopy
  - Long swabs that reach the pharynx

- Treatment
  - Antibiotics if signs but no abscesses
  - If abscesses started, antibiotics slow the abscessation process and are contraindicated
    - Drain abscess with a small hole
  - Assisted feeding, possibly by NG tube
  - NSAIDS
  - If dyspneic, made need an emergency tracheostomy and intensive supportive care

- Prognosis
  - If vaccinated, it reduces morbidity, but not incidence
Equine Respiratory Disease

- Morbidity: up to 100% in susceptible populations
- Mortality: less than 2%, but “bastard” strangles increases mortality rate to up to 62%

- **Equine Influenza**
  - Epizootic disease of the equine upper and lower respiratory tract
  - Cause: Equine influenza virus A
  - Signs:
    - Dry harsh cough
    - Adult horses: tracheobronchitis
    - Foals: pneumonia
    - Viremia with myocarditis and hepatic damage
    - Nasal discharge
    - Pyrexia
  - Geographic incidence
    - Worldwide
    - Some countries are free from disease and have strict entry regulations
    - In the USA, a reportable disease in *some* states (not Illinois)
  - Age predisposition
    - Affects all ages
    - More severe in the young, the old, the weak, sick, or debilitated
  - Pathophysiology
    - Aerosol spread, binds to respiratory tract, causes damage directly
    - If gets into the blood, viremia can lead to myocarditis, hepatic damage, or edema
  - Timecourse
    - Incubation: 1-3 days
    - Virus shed in nasal discharge for 7-10 days
    - Seroconversion by 8 days following infection
    - Cough lasts 1-3 weeks, then recovery
  - Cost considerations
    - Explosive outbreaks occur in racing stables, breeding establishments, show barns
    - A marked impact on the equine industry
  - Diagnosis
    - Virology – from nasopharyngeal swab
Equine Respiratory Disease

- Antigen detection – ELISA
- Serology – antibody detection

Treatment
- Broad spectrum antibiotic cover of affected foals
- Stall rest: 1 week for each day of fever
- Diphenhydramine to suppress cough
- Amantadine (an anti-viral) suggested

Prophylaxis
- Vaccination
- But antigenic drift is a problem...

Prognosis
- Good: adults with uncomplicated tracheobronchitis
- Poor: foal with secondary bronchopneumonia

Equine Herpes Virus

Cause
- EHV-1 & EHV-4
  - EHV-1 – causes abortion, URT disease, and neurologic disease
  - EHV-4 – causes respiratory tract disease and occasional abortions

Transmission
- EHV-1 and EHV-4 transmitted by aerosol and contact

EHV-1
- Virus replicates in respiratory epithelium = respiratory signs
- Viremia, spreads to reproductive tract, abortion in 7th-8th month
  - Foals born live may die within a few days
- Myeloencephalopathy: ataxia, posterior paresis

EHV-4
- Primarily equine rhinopneumonitis
- Mucopurulent nasal discharge, conjunctivitis, secondary pneumonia
- May infect lymphocytes, resulting in lymphadenopathy

Diagnosis
- Virus isolation
  - Nasopharyngeal swabs
Equine Respiratory Disease

- Aborted fetuses
  - Serology
  - PCR
- Treatment of Rhinopneumonitis
  - Antibiotics
  - Stall rest
  - NSAIDS
  - Isolation
  - Disinfect
- Abortion Storms
  - Exposed to EHV during gestation
  - ¼ of all diagnosed abortions due to EHV
- Treatment of Neurologic Signs
  - Sling up
  - Thick bedding
  - Monitor for decubital ulcers & urine scald
  - Keep tail clean
  - Supportive care
- Prevention
  - Isolate
  - Reduce stress
  - Vaccinate