



Barn Air Quality and Transmissible Disease Protection

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February 6th 2016



Why do we care about the barn environment?

- Protection from elements, housing
- Storage, arena, aesthetics

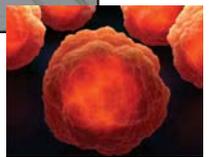
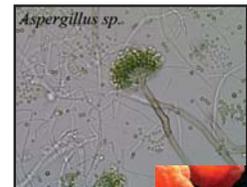
We must also consider air quality and biosecurity

- Organic dust, gases, exhaust
- Ventilation
- Transmissible disease



Air quality: organic dust

- Particulate matter in organic dust is biologically active: inflammation, foreign body to lower airways
- Sources
 - Hay & bedding (straw)
 - Manure
 - Arena dust
- Contents
 - Bacteria, endotoxin
 - Molds, fungi, mites



When are particulates a problem

- Concentration: may exceed by > 20 times what is considered safe
- Size: Inhalable (< 10 μm) and/or respirable (< 5 μm)
 - Reach the lung and penetrate lower airways
- Distribution in stall
 - Greatest low to ground
 - Increase when clean stall



Gases: Ammonia

- Caustic gas (>10 ppm)
- May damage tissues of respiratory tract and lung
 - chronic inflammation
 - Increased mucous production
 - Increased airway constriction and sensitivity
- Closely regulated in livestock industry
 - OSHA restricts exposure to 35 ppm
 - May exceed 200 ppm in horse stall



Management conditions can influence particulate concentrations and exposure

- Bedding
 - Straw 3 X's greater than shavings
- Diet
 - Even good quality hay has organic dust
- Cleaning
 - Marked increase in respirable particulates
 - Is horse in stall?

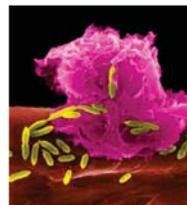
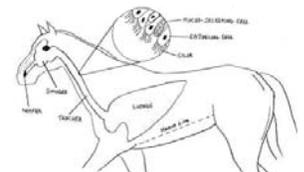


Respiratory System Defenses

Nostrils, cough, sneeze



Mucus and transport

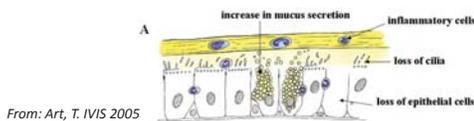


Cells and mediators of the Horse's immune system

Respiratory disease can hinder normal defenses of the airways and lung

Viral respiratory diseases and chronic disease (Heaves) may increase the risk of acquiring secondary infections:

- 50% -100% decrease in clearance
- Increased mucus production
- Damage to cells needed for defense of respiratory tract
- Increase in cells causing inflammation



Good air quality very important for maintaining respiratory health

- Poor air quality may increase a horse's risk of infectious respiratory diseases (viral, bacterial)
- Direct relationship between particulate exposure and chronic inflammatory lower airway disease
 - Heaves (recurrent airway obstruction; RAO)
 - Inflammatory airway disease (IAD)



Exercise may also impact defense

- Horses may breathe in up to 10 X's more air in exercise!
 - Increase rate and depth of respiration
 - 150 L/min to 1500 L/min



Increased load and penetration of particles

What are Heaves & IAD

- Similar to occupational asthma in humans
- Allergen mediated
 - Moldy hay (*Aspergillus fumigatus*)
 - Endotoxin
 - Exposure to organic dust
- Improving air quality critical in managing these conditions



Have you ever wondered what this is doing to you?



- Impaired respiratory health recognized in swine, poultry and dairy workers
 - asthma, chronic bronchitis, COPD

What about the equine industry?

- Increases in respiratory symptoms (cough, wheezing), and in the prevalence of asthma have been reported for workers in horse barns

Storage

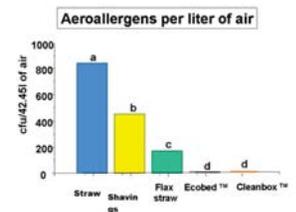
Avoid storage (especially Hay) above stalls



Bedding

Influenced by:

Preference and effectiveness
Cost and Availability
Storage and Disposal
Health concerns



How can you improve air quality

- Management
 - Turnout
 - Bedding
 - Diet
 - Storage & cleaning
- Ventilation
 - Barn & stall design
 - Increased organic dust exposure impedes barn ventilation



Diet

- Hay
 - Good quality hay
 - Pelleted or cubed hay
 - Avoid round bales
 - Wetting hay
- Silage (haylage)
- Pelleted feed



I've changed my forage and bedding – what now?

- What makes a problem barn:
- Poor ventilation
- Poor ventilation
- Poor ventilation



Optimize ventilation in barn *and* stalls

- Open, unobstructed barn interior
- Year round openings: temperature, moisture control
 - Ridges, eaves, sidewall & aisle openings
- Ventilation of aisles means nothing if stalls aren't ventilated
 - Open grillwork front and side partitions
 - Interior open to roof peak (or ceiling >12 feet)
 - No overhead storage
 - Windows, doors in stall



Ventilation objectives

- Exchange and distribution of fresh air
- Concerns
 - Moisture, odor, gas, dust, drafts
- Objectives
 - Fresh air (odor, ammonia)
 - Control moisture (humidity <70%)
 - 5-10°F temp difference with outside
 - Decrease true drafts in winter
 - Heat dissipation in summer
- Barn environment that is best for horses may not be what is most comfortable to us



Prevention of transmissible disease

- Biosecurity: management practices that reduce the chances that infectious disease will be carried onto or spread from or within a farm
- The equine industry faces high biosecurity risks
 - High traffic
 - Animal co-mingling
 - Animal travel
 - Animal introduction



Goals for biosecurity

- Prevention of infectious disease is the most important goal
- Have a plan: for traveling and for when your horse is at home
- There is not one universal biosecurity program that can be applied to every situation

AAEP Biosecurity Instructions
www.aaep.org/pdfs/control_guidelines/biosecurity_instructions%201.pdf

How are pathogens transferred

- Fomite: Anything touching an infected horse or carrying secretions/manure from that horse
- Common mechanisms of pathogen transfer
 - People, other horses
 - Aerosolized, manure
 - Equipment, vehicles
 - Insects, birds, vermin
 - Feed, waste



Be informed!!

- Precautions
 - showing your horse
 - visiting barns, horse shows, or auctions
 - for visitors to your farm
 - for new horses on your property
- Monitoring your horse for signs of illness
- What to do if a horse is sick or in an outbreak



Common pathogens

- Outbreaks occur regularly on horse farms, racetracks, and other locations where horses congregate
- Viral
 - Equine Herpes Virus
 - Influenza
- Bacterial
 - Strangles (*Streptococcus equi*)
 - Other (*Salmonella*, *Rhodococcus*)
- Many routes of transmission
 - Aerosolized transmission is common



General guidelines for your stable

- Number of horses
 - The more horses, the greater the risk for disease transmission
- Type of facility
 - How often are new horses introduced
 - How often do people and horses come and go
- Use of resident horses
 - Do they travel



Introduction of new horses on the property

- One of the most common ways infectious disease is introduced to a property
- Certificate of health status
 - Vaccination, illness, Coggins
- Looks may be deceiving
 - Separate 2-3 weeks
 - Fever is the first sign of infection



Horse turn-out and grouping

- Small, specific groups
 - 5-10 maximum
 - Traveling horses
 - Resident horses
- Don't change groups



Management of people and equipment to prevent the spread of infectious disease

- People are one of the most common sources for transfer of pathogens
 - Dedicated cloths for the barn/stall
 - Gloves, hand sanitizers
 - Hand washing is critical
- Equipment
 - Discourage sharing
 - Clean and disinfect equipment between uses
 - Pathogens transmitted indirectly through shared equipment, water sources and feed bins



Traveling with your horse

- The more a horse travels, the more likely it will encounter or bring back a pathogen
 - This is especially true when traveling to events that do not have health requirements
- Use your own equipment
- Avoid contact with other horses
- Monitor your horse's health while away *and* when returning



Cleaning and disinfecting

- Disinfectants do not work on a dirty surface
 - Wash surfaces before disinfecting
 - Soap and water, Tide with bleach
 - *Disinfecting & sterilization is last*
 - Chlorine bleach
- Dirt floors and untreated wood are porous and hard to clean
- Remember to clean all areas of the barn



Keeping things clean on your property

- Remove manure and soiled bedding from stalls twice per day if possible
 - Reduce insect vectors
 - Reduce pathogen and parasite load
 - If possible haul off property
 - Composting is alternative



Washington State University Guide to Composting
Horse manure
<http://whatcom.wsu.edu/ag/compost/horsecompost.htm>

The same principles apply to cleaning trailers and trucks

- *Always* clean and decontaminate between usage *even if* “looks” clean



Be prepared to prevent a disease outbreak

- Have a plan with your veterinarian
- Know what pathogens are important and how they are spread
- Early detection of *ALL* health problems important
- Use appropriate precautions when traveling
- Preventative medicine
- Optimize your animal's health



Vaccination Schedules

- Core Vaccines
 - Endemic diseases, diseases with public health significance, required by law, virulent/highly infectious diseases or very severe diseases
 - ***Tetanus, EEE/WEE, WNV, Rabies***
- Risk based vaccines
 - *Rhinopneumonitis (EHV-1,4), EVA, Influenza, strangles, PHF* (other: anthrax, botulism, rotavirus)

American Association of Equine Practitioners Vaccination guidelines
http://www.aaep.org/vaccination_guidelines.htm

Vaccination and monitoring are key in the prevention of many infectious diseases

- Discuss vaccination with your veterinarian
 - Vaccine protocol for your geographic area and property
 - Likelihood of exposure, severity of disease
 - Efficacy, safety and cost of vaccine
 - Tailor to needs of horse (travel, age, breeding)
- Key points to remember
 - Vaccination **does not** guarantee protection
 - Keep a written record

Recognize the signs of illness

- Fever, depression, inappetance, cough, nasal discharge, diarrhea, neurologic
- If identify a horse with signs of illness
 - Call veterinarian
 - Know what to do while you wait for your veterinarian
 - Determine which horses exposed and keep separate from other horses



What to do in an outbreak

- Maintain animal health and contain spread of disease
- Communication is ESSENTIAL
 - Designated and quarantined areas
 - Record on and off site traffic
 - Appropriate hygiene of people handling horses



It is not always possible to provide quarantine or to easily move a horse off site



When is quarantine necessary

- Complete separation of a horse (or property) from contact with other horses
 - New horses: 30 days
 - Re-entering horses: 14 days
 - Sick horses: varies
 - Separate areas for sick, suspect and “in contact” horses



Questions?