

## CREATING A MINIMUM-DUST ENVIRONMENT

Good ventilation is essential for the health of your horse, but is undermined if the breathing zone of a horse is surrounded by bedding and forage containing dust and fungal spores.

### Bedding

Wood shavings (dust extracted), paper, cardboard or hemp consistently contain minimal dust and fungal spore content. Good quality straw that has been well stored may have a low dust content, however it is hard to guarantee that this is consistent for every bale.

Deep litter systems may encourage the growth of fungi and can be associated with other agents that inflame the respiratory system, for example ammonia and endotoxins.

### Drainage

Ensuring proper drainage prevents urine and other liquids from collecting in the stable. Urine contains ammonia, a noxious gas, which can be irritating to the respiratory tract.

### Feeding

Fungal spores develop in hay because our climate results in it usually being cured in damp, humid conditions. Again, it is pointless having a perfect environment if a horse has its muzzle, and therefore nostrils, buried in hay containing fungal spores. Soaking hay does prevent the majority of fungal spores becoming airborne, as long as it does not dry out. Prolonged soaking may leech nutrients and vitamins from hay. A compromise would be complete immersion for no less than 20 min and no more than 2 hours.

Alternatives such as haylage can be considered. The baling and wrapping process involved in making haylage creates an environment that prevents the formation of fungal spores.

### Bucket Feeds

Straights and concentrates in bucket feeds can produce dust, which can be inhaled when the horse has its nose buried in the bucket. Therefore it is beneficial to damp down hard feed with a small amount of water.

### Groom outside

Grooming can generate a lot of dust and should be done outside where the dust cannot accumulate and be breathed in by the horse.

### Hay and Bedding stores

These can also be a source of dust and fungal spores. Try to avoid storing in a common air space with a horse's stable, for example an overhead hayloft.

### Muck out

Ideally a horse should not be present in its stable during mucking out and bedding down, as this can often generate lots of airborne particles. If possible allow dust to settle after putting down a new bed before returning your horse to its stable.

Muck heaps should be remote from a horse's stable as they are a source of dust and generate fungal spores.

### Exercise Surfaces

When riding ensure that dusty surfaces are avoided. Some surfaces may become very dusty during the dry summer months.



ADVICE ON

# HORSE RESPIRATORY HEALTH



**The British Horse Society**  
Registered Charity No. 210504

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conjunction with*



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## THE RESPIRATORY SYSTEM OF THE HORSE

The horses' respiratory system is very efficient and has developed to make the horse a superb athlete.

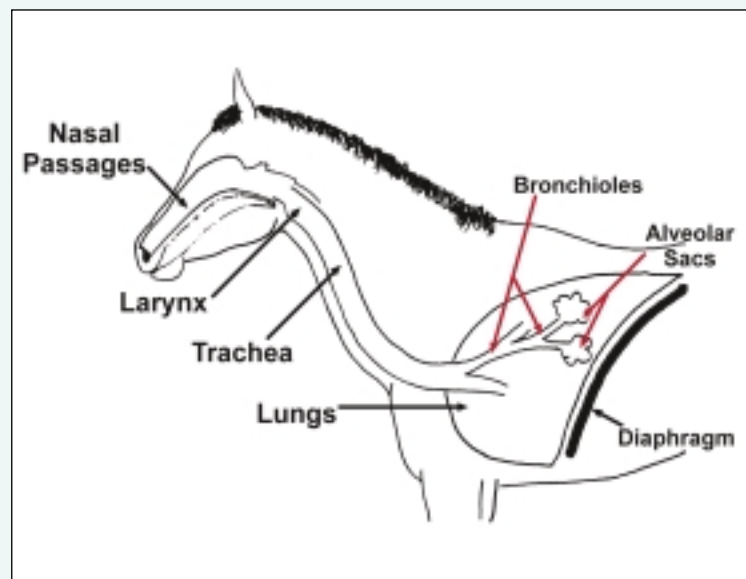
The respiratory system is designed for the horses' natural environment, which is open pasture where there is limitless fresh air.

By removing the horse from its natural environment we risk upsetting the natural balance of its health.

## THE STRUCTURE OF THE RESPIRATORY SYSTEM

Horses use the muscles of the chest, diaphragm and abdomen to move air in and out of their lungs. During breathing, air is drawn in through the nostrils, passes along the nasal passages through the larynx and into the trachea (or windpipe).

The trachea then branches into two bronchi, one passing into the left lung and the other into the right lung. Within each lung these bronchi repeatedly branch forming smaller and smaller airways known as bronchioles. Eventually the bronchioles end as alveolar sacs where oxygen is drawn into the blood and waste gases are expelled from the body.



## DEFENCE MECHANISMS OF THE LUNGS

The respiratory system has a defence mechanism for preventing infection and also removing any airborne particles or dust that a horse inhales. The majority of harmful material is filtered out by the nasal passages. Smaller particles including dust, bacteria and viruses may pass further into the lungs, even as far as the alveolar sacs, and be deposited there. The lining of the airways provides protection against the potential harmful effects of these small particles in a number of ways:

- It secretes mucus and other substances that form a liquid barrier.
- Much of the airway lining has millions of microscopic finger like projections that sweep dust and other substances upwards away from the lower airways and into the back of the throat.
- The horse naturally grazes from the ground, this head down posture assists with clearing the airways.
- The respiratory system also has a very active immune system that is able to react to, fight and remove material ranging from bacteria to tiny particles of dust.

## Breathing Zone

It is the quality of the air in the zone directly around a horses' nostrils that is critical to its respiratory health - this is termed the **breathing zone**, as this is the air that a horse will draw into its lungs.

Even if a horse is in a well-ventilated stable, if it has its nose buried deep in mouldy and dusty hay, or is rooting in its bed, it will be inhaling thousands of airborne particles from the immediate surrounding breathing zone.



## Stabling

A stable is an unnatural environment for the horse, potentially exposing its respiratory system to a multitude of airborne challenges including:

- Dust
- Fungi
- Toxins
- Ammonia



Research has shown that some stables exceed the dust levels that are deemed safe for people working in factories.

When stabled, a horse's defence mechanism is constantly challenged and has to work overtime to remove harmful substances from the lungs.

One component of the defence mechanism is the immune system, which may be particularly active and result in inflammation of the respiratory tract.

When stabled, even healthy horses have been shown to have inflamed respiratory tracts. For most horses, the respiratory tract is at its healthiest when the horse is at pasture 24 hours a day.

## RECURRENT AIRWAY OBSTRUCTION (RAO)

Even though apparently healthy horses may not show obvious clinical signs such as coughing or nasal discharge, these horses may not be able to perform at their full potential and may have respiratory problems in later life.

Recurrent airway obstruction (RAO) or 'heaves' is a respiratory disease associated with horses generally over 7 years of age. Signs of RAO include coughing, nasal discharge and, in more severe cases, increased respiratory effort with involvement of the abdominal muscles, hence the name 'heaves'.

The disease is linked to stabling (and is therefore often seen in winter). Horses with RAO are believed to have developed an allergy to one or more of the airborne particles (often termed allergens) associated with housing. Most evidence points to fungal spores, present in both hay and straw, as being the principle agents that cause RAO.

## Respiratory Disease Associated with Stabling

### Some Confusing Terminology

Respiratory disease associated with stabling has been recorded since the time of the ancient Greeks - as documented by Aristotle.

Since then the condition has gone under many names including:

- Hay or Dust Allergy
- Chronic Obstructive Pulmonary Disease (COPD)
- Small Airway Disease (SAD)
- Broken Wind

Nowadays veterinary surgeons throughout the world refer to this disease as either:

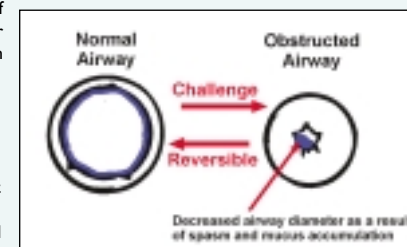
- **Recurrent Airway Obstruction** (abbreviated to RAO) Or '**Heaves**'

## What happens to the lungs of horses with RAO

When a susceptible horse breathes in an allergen the immune system of the lungs 'overreacts' and the bronchioles go into 'spasm' reducing their diameter. The airways also become inflamed and, as a result, clog with increased quantities of mucus.

All of these changes lead to obstruction of the airways, making it more difficult for the horse to breathe air in and out of its lungs. To compensate, horses have to increase the effort associated with breathing (heaves). The respiratory inflammation and excess mucus that occur in RAO result in the clinical signs of coughing and nasal discharge. A horse with RAO has a less efficient respiratory system and often cannot perform athletically to their full potential.

Once this process has been set in motion, an affected horse's lungs react not only to allergens but also to other irritants, such as dust and ammonia from urine.



Horses with RAO have become hypersensitive and hyperreactive to allergens associated with stabling. Medication is sometimes used to control the disease, however, in the long term control of the environment is essential.

## IMPROVING AIR QUALITY

### Maximise Turnout

The natural environment for a horse is out of doors - 'away from all sources of dust present in a stable. For many reasons this is often not practical and there has to be a compromise between stabling and turnout.

### Reducing the Challenge

All horses would benefit from being exposed to a reduced dust environment and this is especially true for horses with RAO. Ideally when stabled, a horse should be provided with:

1. A well-ventilated stable
2. Low dust bedding
3. Low dust feeds
4. Ground level feeding

## VENTILATION

Stables should be well ventilated. This means that there should be a good circulation of air with no stagnant regions. Fresh air should be able to enter the stable and stale air able to leave it.

Fresh air should enter a stable via the open top door, as well as through windows or vents at the back, sides or front. The body heat produced by the horse warms the air, which then rises and leaves at the highest point of the stable. This process of circulation draws fresh air from the sides and stale air leaves via the roof.

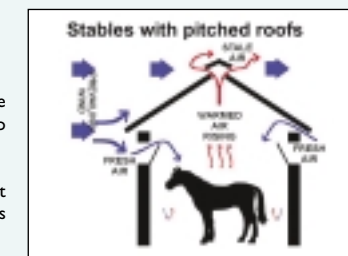
The prevailing wind also plays a part forcing fresh air into the stable and drawing stale air out. However, it is important to avoid draughts.

Many modern stable designs provide warm and comfortable accommodation but do not provide sufficient ventilation, as they do not contain enough inlets or outlets in addition to the open top door. Ventilation must be maintained even in cold weather it is better to put an extra rug on your horse than close vents, windows or doors.

### Stables with pitched roofs

Windows or vents in the walls allows fresh air to enter the stable.

An alternative arrangement is to have vents in the eaves allowing fresh air in.



### Stables with mono-pitched roof



### Stables with mono-pitched roofs and lean-to stables

Windows or vents in front and back walls allow fresh air to enter the stable (through the lower opening) and stale air to leave (through the upper opening)

## Barns

American type barns, although apparently spacious and airy, may not allow proper circulation of air, which result in regions of stagnant air within the barn. Barns require multiple outlets and inlets to counteract these limitations' some barns even incorporate mechanical ventilation.

