Breathing, stride and could they be linked?

Mild respiratory problems have often been overlooked in show jumpers, but recent research has shown that breathlessness could limit performance more than originally thought. Dr David Marlin PhD explains

FOR every stride a horse takes in canter and gallop it takes one breath. Unlike in walk and trot, where inhalation and exhalation occur independently of the steps, in the two fastest gaits breathing and stride are locked together in perfect synchrony.

It stands to reason, therefore, that if a horse has trouble moving air in and out of its lungs it will have an effect on stride pattern. So if your horse is struggling to catch his breath, is his performance being compromised and if so what can we do about it?

The reason for the link between stride pattern and breathing is to ensure that the horse does not use any more energy than is necessary. When a horse breathes in, the diaphragm contracts, which is aided by the chest stretching longer as he starts to take a stride, while breathing out is assisted by the forelegs landing on the ground and compressing the front of the ribcage helping to force air out (see diagram).

Being able to control the horse's stride is perhaps most crucial in show jumping, where courses are designed on the basis of specific stride intervals between jumps and the ability to meet a fence on the correct stride is paramount. If the horse does not maintain the correct length of stride when approaching a fence, he will either take off too far away or too close, both of which can result in a reduction in power from the muscles and cause the horse to lose height.

A show jumping round — by seconds

75
the approximate duration of a show jumping course

1
the time the horse spends in the air over every fence

15
the number of jumping efforts

20
the total amount of time during a round when the horse is unable to breathe

> For a third of the jumping round, the horse is unable to breathe
>
> **Dr David Marlin**

Airways awareness

TOP-class show jumpers often travel long distances for long periods and may be stabled in dusty competition stables, so they may already be more susceptible to persistent, undiagnosed low-grade respiratory disease. It doesn't matter whether we are talking about upper or lower airway problems as they can both affect the coupling of breathing and stride.

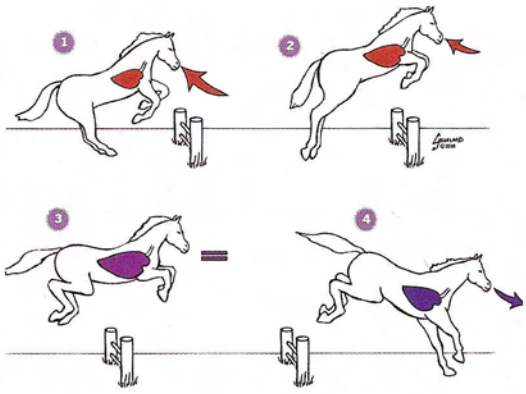
In the past, few riders bothered to get their vet to examine the airways of their show jumper in the belief that breathing does not play a big part in their performance because the rounds are so short. However, even during a 75-second jumping round, about 70% of the horse's energy comes from aerobic metabolism requiring oxygen, which in turn necessitates a good, healthy respiratory system.

In addition to the physical aspect of

Pictures by Trevor Meeks

performance —

Flying high: when a horse jumps it holds its breath while in the air



THE BREATHING EQUATION

1. When the horse pushes off from the ground the chest expands and the diaphragm contracts
2. As the horse leaves the ground it will have inhaled for the final time before landing
3. While in mid-air the horse holds its breath. The higher the jump the longer it will be before the horse is able to exhale
4. As the horse's forelegs hit the ground on landing the front of the ribcage is compressed, which helps force the air out

breathing, the psychological impact of struggling to draw breath has also perhaps been underestimated. Think about your own breathing: 99% of the time we are unaware that we are doing it, but imagine you have a bad cold or someone holds a hand over your mouth; all of a sudden we are very aware of our respiratory movements. It is the same for a horse.

When a horse is working, the amount of air moved in and out, referred to as ventilation, is directly related to how hard he is being pushed. Anything that interferes with air movement will be immediately sensed by the horse. This can affect the horse's concentration and if he is distracted by a sensation of even mild breathlessness (dyspnoea) then he won't be listening to the rider. He may try to put in more effort or he may slow down, or even, in some cases, may stop altogether.

No time to draw breath

WE know that when a horse jumps it holds its breath while it is in the air. However, when negotiating combinations with one or two strides in between, the horse will not take another full breath until it has completed the combination.

So, if this is put in the context of a 75-second round with approximately 15 jumping efforts, assuming the horse is in the air for one second with each jumping effort, then for a fifth of the jumping round the horse is unable to breathe. The ability to move air in and out between jumps is therefore vital.

Unlike humans, the horse can only breathe through its nostrils and not through its mouth. Therefore any obstruction of the nasal passages in the horse can have an effect on the ability to move air in and out.

Horses working harder have to breathe harder and the heavier the horse breathes, the more its nasal passages are sucked in. This means that the space for air to move around becomes narrower, which places greater stress on the respiratory system. We might even consider this a design fault in the horse.

Finally, it should be noted that show jumping places sufficient stress on the membranes between small airways and the small blood vessels in the lungs to make broken blood vessels in the lungs (EIPH or "bleeding") common. While very few jumpers will have blood at the nostrils following training or competition, recent work from a group of vets in Belgium showed that 38% of amateur and 42% of international-level horses had broken blood vessels in the lungs during competition. H&H

Ways to optimise respiratory efficacy

- MAKE sure that you give your horse adequate time to warm up. During exercise the horse relies on the contraction of its spleen to push more red blood cells into circulation to carry more oxygen. Not warming up your horse can mean the spleen won't release as many red blood cells, thus limiting the amount of oxygen and causing earlier fatigue. If the warm-up is too intense, this can result in the horse using up large amounts of glycogen and production of a high level of lactic acid may result in fatigue during the round.
- CONSIDER getting your horse scoped by your vet once or twice every season, particularly in advance of any major competition or long journey.
- ENSURE that if your horse starts making any abnormal respiratory noise you get it investigated for upper airway obstructions such as roaring (laryngeal paralysis), which may be compromising performance.
- IF your horse has a breathing problem, consider using equine nasal strips if your vet agrees. These are scientifically proven to reduce the resistance to air movement through the nasal passages, which will mean the horse has to put less effort into breathing and can concentrate on jumping. Nasal strips have also been proven to reduce bleeding during exercise.

performance —

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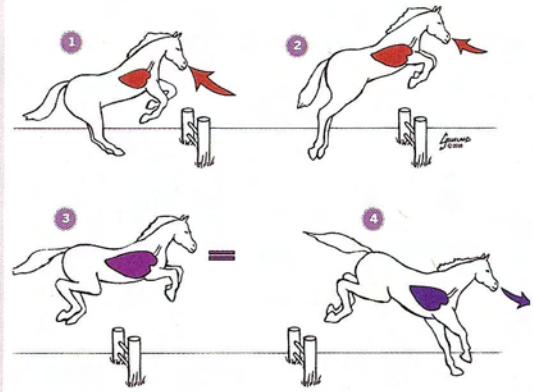

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