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**Suggested Personal & Professional Development (PPD)*

BEHAVIOUR AND WELLBEING

# Sleep deprivation in horses

**Sleep is a vital aspect of overall health; but, unfortunately, equine sleep disorders are poorly understood. There are few peer-reviewed publications on the subject and many veterinary professionals and owners are left to manage situations based upon their personal experience, rather than evidence-based medicine.**

Sleep deprivation is a noticeable ailment which suggests there are underlying factors in the horse's health or environment that need to be addressed. Equine sleep patterns are adaptable – because, in the wild, horses may have periods of time when they must be more alert for predators. Therefore, a horse can go for up to three days with inadequate sleep before sleep deprivation sets in, and in exceptional circumstances, up to three months before collapse caused by sleep deprivation is apparent (Houpt et al, 2001).

## Sleep cycles

As is the case with humans, horses go through a series of sleep cycles during their sleep time. These cycles have several different stages, all of which are characterised very differently. The time spent in each of these stages will vary from individual to individual, based on their circumstances (Belling, 1990) including:

- type of housing
- age
- social dynamics
- feeding routine
- daily monotony
- unfamiliar surroundings
- wild temperament
- time
- outside weather.

Horses usually begin to fall asleep in a standing position. The head begins to hang at a medium level, the eyes are semi-open and the bottom lip is loose. When the horse slips into a slow wave sleep (SWS), the head will hang lower, and if the horse is content in its environment, it will lie down in either sternal or lateral recumbency.

This is not essential though, because through the mechanism of the 'stay apparatus', a horse can sleep in the SWS phase of the cycle with relatively little effort. The SWS is a shallow sleep where the muscles are inactive, and there is little to no eye movement. The eyelids, however, may stay partially open.

Following SWS, the horse will lie down into lateral recumbency and slip into rapid eye movement (REM) sleep, which is sometimes also known as 'paradoxical' sleep. During REM sleep, the muscles are totally relaxed and the eyelids are completely closed – although the eyes may move about under the lids. The total sleep cycle in the horse is short in nature – sometimes as little as 15 minutes – with SWS followed by REM sleep, followed again by SWS (Belling, 1990).

Horses are known as 'polyphasic' sleepers, and have multiple short periods – some throughout the day, and most at night. Horses will mainly sleep from 8pm to 5am, with the majority of the SWS and REM sleep occurring between 12am to 4am (Keiper and Keenan, 1980). They will also sleep during daylight hours if possible – being a prey animal, this is not in their survival nature. Horses need a minimum of approximately three to five hours sleep per 24-hour period. This time must include both SWS and REM sleep.

Foals, on the other hand, require much more sleep than an adult horse. Foals spend 15 to 33 per cent of their time resting in lateral recumbency when they are newborn, which gradually decreases to two per cent after weaning (Boy and Duncan, 1979). Therefore, foals are less able to compensate for lack of sleep and may display signs of sleep deprivation sooner than adult horses.

## Sleep deprivation vs narcolepsy

Both sleep deprivation and narcolepsy can cause episodic collapse in an apparently healthy horse. This is when there is a loss of postural tone that may lead to recumbency. This can be alarming to the observer. The actual collapse or partial collapse looks identical with both sleep deprivation and narcolepsy, so they are commonly confused. Sleep deprivation, however, is caused primarily by insufficient sleep and increased drowsiness; whereas narcolepsy is a triggered neurological disorder caused by certain activities or emotions.

## Signs

Signs vary between different horses, depending on the extremity of the sleep deprivation. Some – or all – of the following may be observed:

- complete collapse
- collapse of the front end into a bowing position

"As is the case with humans, horses go through a series of sleep cycles during their sleep time"

***Figure 1.*** *Indications vary between different horses, depending on the extremity of the sleep deprivation. Collapse of the front end into a bowing position is one such sign.*

(**Figure 1**), praying position or onto the knees
- lack of evidence of lying down in the stable
- increased drowsiness during the day
- poor performance
- fetlock or carpal abrasions from falling.

## Types of sleep deprivation

There are four recognised types of sleep deprivation.

### Pain-associated

Pain-associated sleep deprivation is probably the most common type of sleep deprivation in horses. It is seen in horses that have been diagnosed with painful conditions, such as advanced joint disease, gastric ulcers, late pregnancy, polysaccharide storage myopathy, and other musculoskeletal disorders. As a consequence of the pain, the horse is unable to lie down comfortably in lateral recumbency in order to gain sufficient REM sleep.

### Monotony-induced

Monotony-induced sleep deprivation is most often seen in horses that are tied up with 'cross-ties' for long periods of time. It is also occasionally seen in horses where, for a prolonged period of time, they must stand quietly. Examples are police horses, show horses standing to be plaited and riding school ponies saddled and waiting for their lessons.

### Environmental insecurity

Sleep deprivation caused by environmental insecurity will require some investigative work in order to determine the root cause. Issues may include stable relocation, stable size changes, loss of field-mates, rugging issues and inclement weather. These lead to the horse being too psychologically uncomfortable to lie down.

### Dominance displacement

If a horse is constantly excessively dominant in a herd, it is most likely to be suffering from dominance displacement sleep deprivation. All its energy goes into dominance and they do not relax. This is most common in geldings. It leads to anxiety and insecurities, and is often resolved with the introduction of a dominant mare.

## Diagnosis

The underlying problems in cases of sleep deprivation are often easily diagnosed through a process of elimination.

The horse should initially have a thorough clinical examination to rule out any cardiac or neurological forms of collapse. Once these are eliminated, sources of pain should be investigated. This may include a lameness work-up, radiographs, blood work for acute phase proteins (APP) such as serum amyloid A (SAA) and fibrinogen (Jacobsen, 2007) and gastroscopy.

If, after a thorough clinical investigation, the horse is shown to be in prime health, the owner should then consider some of the following questions to address any changes in the horse's lifestyle:

- has the horse been transported recently – such as to a new yard or to a show?
- have the horse's normal living conditions changed recently – such as a new stable or field?
- are there any new horses in the same field that are challenging the hierarchy?
- has anyone witnessed the horse lie down or roll recently?
- what is the normal routine of the horse? Is it required to stand still for long periods of time?
- has the weather changed recently and is the rug being worn appropriate for the temperature?

## Treatment

If the sleep deprivation is caused by an underlying medical issue – such as one of the ones previously mentioned – that issue should be dealt with in the first instance. In the case of musculoskeletal disease, treatment modalities may include non-steroidal anti-inflammatories, corticosteroid joint injections and nutraceuticals. Gastric ulcers may require treatment with omeprazole; and other internal causes of inflammation must be addressed directly and specifically.

Discomfort resulting from late pregnancy usually resolves instantaneously with giving birth. Until then, providing the mare with a comfortable deep straw bed will encourage her to lay down and rest.

Sleep deprivation resulting from environmental or dominance factors, and monotony-induced sleep deprivation, can all only be treated by pinpointing and addressing the root cause. Considerable hours of observation may be needed to understand what must be tackled. For example, observe where the horse appears most relaxed – is it the stable or the field? A field-kept horse may not be suited to this routine and may require a period of stabling each day/night to relax properly; or a stabled

"There are four recognised types of sleep deprivation"

horse may actually suffer from claustrophobia and be more relaxed living out?

A horse suffering from arthritis may need to live out in order to stay on the move and may seize up in the stable. Also, if the horse is unable to relax in the field because it has taken on the responsibility of dominance, it may be better suited to living in a bigger herd where it feels protected enough to sleep.

Ensure there is adequate shelter in the field, both from wind and rain, and from the sun, and that ground conditions are suited to lying down. If the field is poorly drained, this may need to be addressed, and maybe hard standing and a field shelter installed. Also check for any other potential stress factors, such as neighbouring horses or livestock.

## Conclusion

Once the cause has been removed, the prognosis for these horses is very good. ■

# PPD Questions

1. How much sleep do horses require in a 24-hour period?
   A. one to two hours
   B. three to five hours
   C. five to seven hours
   D. seven to nine hours
   E. 10-12 hours.

2. What is not a type of sleep deprivation?
   A. pain-associated
   B. boredom-associated
   C. monotony-associated
   D. dominance displacement
   E. environmental insecurity.

3. Sleep deprivation and narcolepsy are caused by a similar pathogenesis. True or false?
   A. true
   B. false.

4. The following is an acute phase protein and, therefore, a biochemical indicator of inflammation...
   A. ALT
   B. HGB
   C. MCHC
   D. SAA
   E. CKK.

5. Horses can be in slow wave sleep in standing, sternal recumbency and lateral recumbency; however, REM sleep can only happen in lateral recumbency. True or false?
   A. true
   B. false.

Answers
1.B 2.B 3.B 4.D 5.A

*References*

*Belling TH (1990). Sleep patterns in the horse. Equine Practice 12: 2-26.*

*Boy V and Duncan P (1979). Time-budgets of Camargue horses I. Developmental changes in the time-budgets of foals. Behaviour, 71(3): 187-201.*

*Houpt K et al (2001). The effect of exercise deprivation on the behaviour and physiology of straight stall confined pregnant mares. Animal Welfare-Potters Bar 10(3): 257-268. Jacobsen S (2007). Review of equine acute-phase proteins. In Annual Convention of the American Association of Equine Practitioners 53: 230-235.*

*Keiper RR and Keenan MA (1980). Nocturnal activity patterns of feral ponies. Journal of Mammalogy, 61(1): 116-118.*