



Equine

SIGHT

senses

For your horse, sight is the most important sense of all, allowing him to detect predators from a long way away so that he can keep himself safe. Vet Kelly Harty from Fellowes Farm Equine Clinic explains

Our expert



Kelly Harty MVB CertAVP(EP) MRCVS joined Fellowes Farm Equine Clinic, a member of XLEquine, in 2015. She has a particular interest in equine lameness and poor performance.

When you're hacking out, it becomes clear that your horse's sight is very different to your own. You might be riding past

what is obviously a fallen tree, but while you're both seeing the same thing, to him it may appear different and cause him to behave in a way you wouldn't expect. For example, a small beam of sunlight might be lighting up part of the tree, making it look unusual, or a squirrel scurrying out of sight might catch his eye.

If he lived in the wild, your horse's sight would be essential for his survival – his vision is highly sensitive to movement so that he can easily detect the presence of predators in any light. The importance of sight to your horse is reflected in the size of his eye, which is the largest of any land mammal – he produces retinal images that are 50% larger than your own. To add to this, the visual cortex of his brain handles one-third of all sensory input.

DID YOU KNOW?

When your horse has his head down grazing, his binocular vision allows him to see the ground while at the same time his monocular vision allows him to keep an eye out for predators approaching on the horizon.

The equine eye

The **cornea** is the clear dome on the front surface of the eye that allows light in. It protects the front of the eye and helps to focus light on the retina.

The **eyelids** are thin folds of skin that cover the eye and blink to protect it. Blinking also helps spread tears over the surface of the eye, keeping it moist and clearing away small particles.

The **orbit** is a bony socket in the skull that protects your horse's eye.

The **tapetum** is a reflective area that helps to gather available light at night.

The **pupil** is the black area in the middle of the eye. It is controlled by sphincter muscles. In a dark environment, it enlarges to allow light in and if the environment is bright, the pupil becomes smaller.

The **lens** is soft, transparent tissue that sits behind the iris. It focuses light onto the retina and changes shape to enable this.

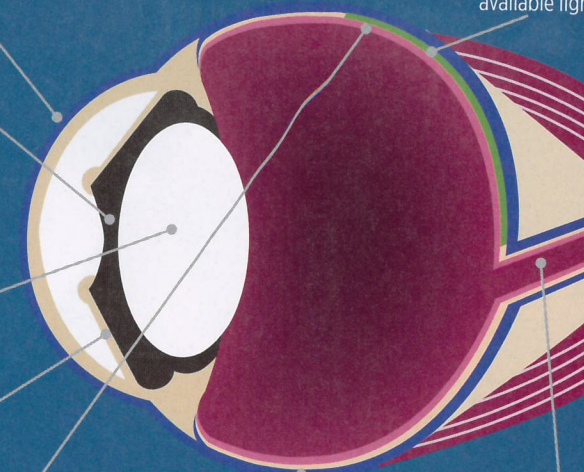
The **iris** is the circular, coloured area of the eye. It controls the amount of light entering the eye by making the pupil larger or smaller.

The **sclera** is the white of the eye and it is the eye's tough outer layer.

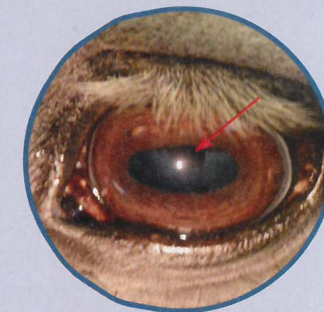
The **retina** is the light-sensitive layer at the back of the eye. It contains photosensitive rod and cone cells that convert light into electrical impulses that travel along the optic nerve to the brain. The most sensitive area of the retina is the visual streak, which contains thousands of tightly-packed photoreceptors that make images sharp. If your horse wants to take a better look at something, he will adjust the position of his head so that the object falls within this area.

The **optic nerve** sits at the back of the eye and transfers electrical impulses from the retina to the brain.

The **conjunctiva** is the thin membrane that covers the sclera and lines the inside of the eyelids.



The **corpora nigra** is a dark, irregular structure that sits at the top of the pupil. It's believed to shade the pupil from glare.



The **third eyelid** is a whitish-pink colour and is found under the other eyelids in the inside corner of the eye, nearest the nose. It provides additional protection for the eye and extends up when needed, wiping the eye clean. It also provides extra lubrication.



“Your horse's vision is highly sensitive to movement so that he can easily detect the presence of predators in any light”

DID YOU KNOW?

If your horse sees something he's not sure of with monocular vision, he'll alter his position so he can get a better look at it in binocular vision.



One eye or two?

Your horse sees in both monocular vision (with each eye viewing different things) and binocular vision (where both eyes are focused on the same object). However, most of his sight is monocular and there is only an arc of around 55–65° in front of him where he is able to see with binocular vision.

Both eyes can be used to look at a distant object until it comes within approximately one metre, when your horse will be forced to turn his head and look with only one eye. You will know when your horse is using binocular vision because he will usually stand alert, with both of his ears focused on an object in front of him.

Because he relies mostly on monocular vision, he has poor depth perception – he can misjudge the depth of a small puddle or the distance to a fence. Horses compensate for this by comparing the size of an object to a memory of something they've seen in the past – for example, if a fence appears smaller, then it must be further away.

With thanks to XLEquine for their help with this feature, xlequine.co.uk

DID YOU KNOW?

Horses can see distinct images better than dogs can, but not as well as humans can.

In focus

Your horse is unable to focus his eyes in the way you and most other animals can, and his vision is not as sharp as yours. Have you ever noticed your horse raising and lowering his head to look at an object? He does this to adjust the focal length, moving until the object comes into focus on his retina. He will usually need to lower his head to judge closer distances and raise it to judge objects further away.



Your horse will raise and lower his head to look at objects, until they come into focus on his retina

Field of vision

Your horse's eyes are set on the side of his head, rather than the front like your own, and this gives him extraordinary peripheral vision, which is useful for animals who must constantly watch out for predators. The placement of his eye and its horizontal, ovoid pupil allow him a total visual field of approximately 350° without moving his head. Narrow blind spots exist immediately in front of his nose and directly behind his hindquarters.

**DID YOU KNOW?**

When your horse is working on the bit, he is unable to see what's ahead of him.

Night and day

There are two types of photoreceptor cell in the retina in your horse's eye, called rods and cones. Cone cells allow him to see colour and rod cells, which are very sensitive to light, enable him to see at night.

Your horse's vision is dichromatic (two-colour), so he has two different types of cone cell, whereas your vision is trichromatic (three-colour) and you have three types of cone cell. This means that your horse is able to see in colour, but not as well as you can. It is difficult to know for sure what colours horses see, but it is thought to be similar to the vision of a colourblind person, where they see in blue and yellow hues, but are unable to distinguish between red and green.

Your horse has a large number of rods, which makes his night vision very effective, and to enhance this further, he has a tapetum, which is a reflective area on the retina that helps to gather all the available light at night. These specialised features enable your horse to see considerably better in the dark than you can.

However, it takes your horse's eyes much longer to adjust between light and dark than it does your own, and it can take up to 20 minutes for them to adjust fully. It's important to remember this when asking your horse to jump from light into dark on a bright day, or to walk into a trailer or lorry – you might be able to see what's coming, but to your horse it's like going into a black hole. ■

The long and short of it

Because horses are prey animals, they have evolved to be long sighted so they can detect any potential predators from a long distance. Interestingly, around one third of domestic horses are short sighted, possibly due to the fact that being long sighted is of no advantage in a domestic situation.

DID YOU KNOW?

When the light of a torch or car headlight catches your horse's eyes in the dark, the glow in his eyes is caused by the tapetum.

