EQUINE VISION - WHAT DOES YOUR HORSE SEE?

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For millennia, the horse has depended on its visual abilities for it's survival. In the current world, survival has become less of an issue but the visual function of the horse is still critically adapted to a "flight" response from threats or predators. Therefore, understanding horses normal vision is critical to understand normal behavior and the effects of disease on vision. Changes in vision secondary to disease can result in abnormal behavior and poor performance.

WHAT DOES THE HORSE "SEE"?

The horse's vision is adapted to function in both bright light and dim light. The act of seeing is a complex process that depends upon: 1) light from the outside world falling onto the eye, 2) the eye transmitting and focusing the images of these objects on the retina where they are detected, 3) the transmission of this information to the brain, and 4) the brain processing this information so as to make it useful.

VISUAL PERSPECTIVE AND FIELD OF VIEW

Visual perspective varies greatly depending on whether the horse's head is up or down (i.e. grazing) and how tall it is (i.e. miniature horse or a draft breed). The position of the eyes in the skull of a horse allows for a wide, panoramic view. Their visual field is enormous (up to 350°) and provides nearly a complete sphere of vision with few small "blind spots".

DEPTH PERCEPTION

Stereopsis (binocular depth perception) is the fusing of 2 images from slightly different vantage points into one image. If the image from both eyes did not fuse, double vision would result. A horse's depth perception is generally good. From 2 meters away horses can detect a 9-cm difference in depth, which approximates the

ability of a cat. The work to detect variation among horses has not been done. This comes in very handy when jumping over objects!

MOTION DETECTION

Horses maintain the image on the retina during motion in much the same way as do people, and like people, they more easily detect moving objects than stationary ones. The ability to detect motion is greater in the horse's peripheral visual field. Visual acuity is also low in this area and may explain, in combination with the horse's prey mentality, why horses shy so easily from objects located in their peripheral visual field.

VISUAL ACUITY

Visual acuity is the ability to see the details of an object separately and without blurring. In humans, the most familiar method of measuring visual acuity is to ask an observer to read an eye chart. The horse cannot read an eye chart, however, visual acuity has been estimated at 20:30 to 20:60. This means the horse's visual acuity is among the best of the domestic mammals and better than that of many people.

REFRACTIVE STATE

The refractive state is based on an image being accurately focused on the retina. If not focused on the retina, the image can be focused in front of the retina (i.e. myopia) resulting in near-sightedness or behind the retina (i.e. hyperopia) resulting in far-sightedness. Although some individuals are slightly myopic or hyperopic, the average resting refraction is near normal in the horse. Various diseases can result in refractive errors and possibly result in behavioral changes or poor performance.

COLOR VISION

Because many predators also evolved coat colors that closely matched the background in terms of color, and in some cases texture, color is relatively poor way

for the horse to "break the camouflage" of a predator. This may mean that color detection became relatively unimportant and therefore not very useful to the horse. Humans typically have trichromatic color vision. The 4 basic hues seen are blue, green, yellow, and red. Horses have only dichromatic color vision. This results in horses seeing only 2 unique hues, yellow and blue. It is probable that this also results in colors appearing as washed-out pastels or sepia. Horses most likely have difficulty in differentiating orange and blue much like some color-blind men cannot differentiate between red and green. In effect, the horse is believed to have a form of color blindness and sees only yellow, blue, green and gray. Why does your horse always spook at the red fence then? It is probably not the color but other factors such as its brightness, etc.

VISION ASSESSMENT IN HORSES

Currently, veterinarians are unable to recognize anything but the most serious visual changes in horses because of the crudeness of the visual testing tools the clinician has available to them. Known diseases such as cataract and corneal scarring probably affect vision in the horse in much the same way as the diseases do in humans. Behavioral or orthopedic issues can frequently masquerade as visual problems. Any time you suspect a visual abnormality in your horse you should have him evaluated by your primary care veterinarian. A referral to a veterinary ophthalmologist can then be obtained for further examination and testing, if an ocular problem is suspected.

Contact Brandon Equine Medical Center at 813-643-7177 or email info@brandonequine.com with any questions regarding this topic.

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