How to Perform a Thorough Equine Eye Exam in the Field

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1. Introduction
Complete ophthalmic examinations are imperative for any horse with an ocular complaint (squinting, tearing, cloudy eye, vision loss, etc). It has been reported that more than 50% of horses have observable ophthalmic lesions, whereas 5% to 10% have potential vision-threatening ophthalmic abnormalities; therefore knowledge and ability to perform ophthalmic examinations is a very important veterinary skill. Fortunately, multiple equine ophthalmology resources are available with pertinent information and color images to aid veterinarians. Routine performance of ophthalmic examinations will help to maintain evaluation skills, improve assessment of subtle lesions, and allow one to see the many variations of normal. Last, it is important to teach owners that horse eye problems can deteriorate very quickly; therefore early veterinary evaluation is key to maintain or restore ocular health and vision potential.

2. Materials and Methods
To investigate an ocular problem, it is important to first gather historical information, asking when ocular signs were initially noted, whether they have changed over time, whether empiric treatment has been attempted, and, if so, what response was observed, while also inquiring about possible systemic issues and perform a complete physical exam if indicated. Even if ophthalmic signs are not present, because many systemic diseases have ocular manifestations, a complete eye examination may provide valuable information in any ill animal.

Ocular examinations should optimally be performed in a quiet, protected area that can be darkened to minimize glare and maximize lesion assessment. In the field setting, a barn or lean-to-type shed is optimal, though a large sheet or blanket can be extended over the examiner and animals' heads to achieve a more suitable dark setting if no enclosed structure is available. Cooperative patients can be examined without sedation, but uncooperative or painful horses may require mild sedation and/or a periorcular nerve block. The most common nerve block performed is the auriculopalpebral nerve block with 1 to 2 milliliters of lidocaine or another local anesthetic injected subcutaneously over the zygomatic arch, where the palpebral branch of the auriculopalpebral nerve courses, with the use of a 25-gauge five-eighths-inch needle. This block motor function to the orbicularis oculi muscle and facilitates ocular examination while minimizing the...
risk of compromising a fragile eye during forced eyelid opening (eg, if a deep corneal ulcer or globe penetrating injury may be present). Other periorcular nerve blocks may be used for additional ophthalmic procedures or periorcular surgery.4

Materials needed for equine eye exams can be kept in a tack box or tool box for convenience and ease of transport. A preprinted ophthalmic examination sheet (Fig. 1) is helpful to guide the examination, to serve as a checklist, and to enable drawing of pictures to document ophthalmic lesions and allow for evaluating progress over time. Instruments needed for ocular examination include a bright focal light source (eg, Finoff transilluminator), a condensing lens (eg, 20 diopter), and a direct ophthalmoscope. Additional supplies include fluorescein stain for corneal assessment and nasolacrimal patency evaluation, 1% tropicamide for pupil dilation, topical ophthalmic anesthetic (eg, 0.5% proparacaine or tetracaine) for ocular diagnostic procedures, culturettes for infectious disease testing, cytology equipment for sample acquisition, and eyewash or saline for ocular flushing. A tonometer is advantageous to assess intraocular pressure, with Tono-Pen and TonoVet instruments both easily used in horses. Mean intraocular pressure values for horses are

![Fig. 1. Eye exam sheet.](image-url)
slightly higher than small-animal patients and have been found to generally range between 15 and 30 mm Hg.\textsuperscript{5,6} If a tonometer is not available, digital tonometry can be performed by placing both index fingers over the eyelid when covering the eye, and gentle, alternating digital pressure can be used to palpate for normal mild globe indentability. Alternatively, a soft, blunt device (eg, a cotton-tipped applicator) can be used to attempt to gently indent the cornea after application of topical anesthesia. These methods give an approximation of eye pressure through subjective indentation and may help to identify soft or firm eyes consistent with uveitis or glaucoma, respectively, if a tonometer is not available.

Though tear film deficiency is not commonly reported in horses, a Schirmer tear test may be performed in animals suspected of having keratoconjunctivitis sicca, such as those with a dull corneal surface, unexplained corneal pathology, or those with facial nerve dysfunction. The tear test strip is folded at the notch while still in its plastic packaging and is then gently placed over the lower eyelid margin so that the folded tip sits within the conjunctival fornix. After 1 minute, the strip is removed and the reading is immediately recorded where moisture has traversed the test strip. Normal tear values in horses are highly variable, with results in one study never below 10 mm/min and sometimes exceeding 35 mm/min.\textsuperscript{7}

When beginning an eye exam general facial and ocular symmetry should first be assessed from a distance in addition to looking for any signs of blepharospasm or ocular discharge. Cranial nerve evaluation can then be performed with a palpebral reflex (evaluates trigeminal and facial nerves), menace response (evaluates optic and facial nerves), and pupil light reflex testing (evaluates optic and oculomotor nerves), although pupil light reflexes are commonly slow and incomplete in horses. Animals that do not menace because of impediments in the ocular media (eg, profound corneal edema, hyphema, cataract, etc) can have a dazzle reflex assessed by rapidly shining a very bright light at the eye and observing for a blink response or head jerk to indicate retinal and optic nerve functioning. Ocular motility can also be consciously evaluated because both eyes should be able to move in all directions and to do so concurrently (evaluates oculomotor, trochlear, and abducens nerves). Periocular palpation can be used to assess around the orbital rim. Globe retroillumination allows for further orbital examination by attempting to caudally displace the globe through digital pressure on a partially closed upper eyelid. Retroillumination also allows easier evaluation of the third eyelid because of its passive elevation with posterior globe movement.

Retroillumination is a technique in which light is shone toward the eyes at arm’s length (~2–3 feet from the cornea) and the fundic reflection is visible through the pupil. It allows for easy assessment of pupil size and symmetry and draws immediate attention to any impediments in the reflection (eg, focal corneal scar, cataract, etc). Detailed examination of the ocular structures should proceed in a systemic manner with both direct and transillumination, in which light is directed with the line of gaze, and at alternating perpendicular angles to the line of gaze so that the eye is truly assessed in all three dimensions.

The individual anatomical structures that should be consciously examined during a complete ocular evaluation include the eyelids, third eyelid, conjunctiva, sclera, cornea, anterior chamber, iris, lens, vitreous, and fundus. Anterior segment examination requires only a light source and, ideally, a means for magnification. Inexpensive head loops or the ophthalmoscope head on a Welch Allyn examination set serve as good magnification tool options. Complete lens and posterior segment examination should be performed after pharmacologic dilation with 1% tropicamide (acts within 20–30 minutes), though adequate cursory evaluation is commonly possible in a darkened environment with the rheostat on the light source dimmed down slightly to minimize the pupillary light reflex. In addition to fundus evaluation, the direct ophthalmoscope can also be used to assess for aqueous flare, an indicator of anterior segment inflammation, by selecting the smallest focal circular beam of light and holding the instrument 5 to 10 mm in front of the cornea while viewing from the side (45–90° angle) in a very dark exam setting. Normal eyes will show the light beam hitting the cornea, a void in the anterior chamber, then light hitting the anterior lens capsule and coursing through the lens to end at the posterior lens capsule. An eye for which the light beam continues through the anterior chamber (like a head light beam in the fog) to connect the cornea and lens has aqueous flare, which is common with intraocular inflammation or uveitis.

Fundic examination can be performed with the direct ophthalmoscope focused at 0 to −2 diopters (red numbers) to give a highly magnified direct upright image. This method is good for detailed optic disc or fundic lesion assessment but is difficult for general examination, given the very limited field of view (<2% of the fundus). The Welch Allyn PanOptic attachment is also a direct ophthalmoscope that gives a 5-times-larger field of view with less magnification. Indirect ophthalmoscopy with the use of a light source (eg, Finoff transilluminator) and handheld condensing lens (eg, 20 diopter) gives the greatest field of view to more easily assess the entirety of the fundus and is the author’s preferred initial assessment tool. The view with this technique is inverted and reversed; therefore observed anatomy is effectively 180° off.

Fluorescein stain should be performed on every horse with an ocular complaint to evaluate corneal health and nasolacrimal duct patency. Stain can be applied to the ocular surface either by direct
application to the conjunctiva or by spraying fluorescein liquid (0.5 mL of eyewash added to fluorescein strip tip in a syringe) onto the corneal surface through a needle hub (needle should be gently broken off) held a few millimeters from the eye, with care taken not to contact the globe with the hub of the needle. Eyewash rinse is rarely needed because ample tearing in horses naturally flushes excessive fluorescein from the eye. Intact corneal epithelium will not retain fluorescein dye, whereas areas of corneal epithelial loss stain green as the result of fluorescein adhering to the hydrophilic exposed corneal stroma and are diagnostic for corneal ulceration. Very deep corneal ulcers that extend down to the innermost layer of the cornea (Descemet membrane) may have a clear, dark, nonstaining center as the result of complete corneal stromal absence and are termed descemetoceles. Corneal lacerations or potentially ruptured corneal ulcers can also be evaluated for leakage after concentrated fluorescein stain application (Seidel testing) because escaping aqueous humor will dilute concentrated fluorescein in the tear film and result in a darker stream flowing down from the rupture site.

After ocular fluorescein application, the nares should be examined for stain appearance (Jones testing). This is especially helpful in patients with epiphora or mucopurulent ocular discharge and no obvious ophthalmic cause to investigate nasolacrimal system patency. If fluorescein does not passively appear within the nostrils within a few minutes, active nasolacrimal duct flushing can be performed as a diagnostic test or treatment to remove occluding debris. Topical anesthetic should be applied to the ocular surface and the lacrimal puncta located just inside the inner eyelid margin dorsally and ventrally approximately 5 millimeters from the medial canthus. A lacrimal cannula or soft catheter (eg, 3.5F tomcat catheter or 20-gauge intravenous catheter with stylet removed) attached to a syringe with eyewash can be gently advanced into one lacrimal punctum, and flushing is then performed. Fluid should be seen exiting the opposite lacrimal punctum, and digital pressure can then be applied to both the upper and lower eyelids at the level of both puncta to allow flushing down the nasolacrimal duct and out the nasal punctum. If material emerges from the puncta, it can be collected for culture and cytology. If anterograde flushing is unsuccessful or not possible because of patient noncompliance, retrograde flushing can be performed by introducing a longer soft catheter into the nasal opening of the nasolacrimal duct. After topical nasal punctum anesthesia (eg, lidocaine liquid or gel) is given, a catheter is introduced and gentle digital pressure is applied over the opening to prevent backflow while flushing with eyewash and monitoring for flow at the level of the eye.

3. Results
A systematic ophthalmic examination approach and the use of appropriate diagnostic equipment and techniques will afford optimal results and prevent missed lesions or lacking information. Ophthalmic examinations performed in an appropriate environment will be more successful than if attempted out in the elements with possible wind, glare, and corneal reflection aberrations, to name a few problems. Complete findings will help allow accurate diagnosis and appropriate therapy, allow for serial monitoring of ophthalmic conditions, and will result in identification of lesions early enough to avoid vision-threatening complications. Thorough exams will also display the value of services to clients so that they more readily call when ophthalmic problems are noted.

4. Discussion
Eyes are special structures that require a few extra considerations and additional equipment for clinical evaluation. Even in barn and field settings, complete eye exams can be performed with the right knowledge, equipment, and diagnostic tests. A systematic approach will help to avoid missed steps and facilitate arriving at the correct diagnosis for optimal management. Fluorescein staining, retroillumination, and aqueous fare assessment are just a few examples of critical steps that should always be implemented during equine ophthalmic examinations. Abbreviated ocular evaluations are also warranted during general physical examinations and prepurchase examinations and may be of particular benefit for systemically ill patients.

References