1. Introduction

Donkeys, mules, and hinnies are likely the most misunderstood equines in terms of their behavior. They have served humans for thousands of years, and yet there is still very little known about them from a scientific or clinical point of view.\textsuperscript{1,2} The increasing popularity of donkeys as companion animals and mules as performance and recreational animals has led to an increase in cases being presented at clinics. Oftentimes when donkeys and mules are finally brought to the clinic, they are in advanced stages of a disease due to their stoic nature masking any signs of discomfort or pain.\textsuperscript{1,2} The natural behavior of donkeys and mules is more a freeze or flight behavior than flight, which has been reported to partially (around 20%) depend on a genetic donkey-specific basis.\textsuperscript{3} When compared to horses, studies have shown that mules especially have a keen sense of reasoning and donkeys have a high IQ.\textsuperscript{4,5} Keeping this in mind, the donkey, in particular, will continue to fight through the pain and discomfort by continuing to eat, drink, and appear, from a behavioral standpoint, that nothing is abnormal. Mules and hinnies (the reciprocal cross, where the sire is a stallion and the dam is a jenny, female donkey) may show clinical signs earlier than donkeys, but the disease may well be more advanced than they show. The other challenge to working with both mules and donkeys, from a behavioral standpoint, is getting to know the animal before performing routine procedures, such as taking temperature or performing a physical exam. Mules and donkeys tend to have a greater range of motion for kicking; hence, a practitioner needs to proceed with more caution than when working on a horse. A practitioner’s approach to getting to know a mule or donkey is essential to proceed. Time spent on this stage will enhance the scenario for both the patient and the practitioner. This paper will focus on several tips a clinician can implement when approaching a mule or donkey for the first time, how to safely and effectively restrain a donkey or mule for further examination or procedures, and how to notice subtle differences in behavior related to disease or pain.

Approach and Handling

When approaching mules and hinnies, research has found with over 900 mules, hinnies, and donkeys in many countries, including Egypt, Mexico, Peru,
Spain, and the United States, one should first approach the head of the animal. Research has revealed that oftentimes it is easier for a familiar person (e.g., owner or handler) to interact with mules and donkeys compared to an unfamiliar person (Fig. 1).1,2,6

Practitioners should bear this in mind when they approach mules and hinnies, in particular, or when administering medication or drawing blood, among other actions, as the success in the application of a certain, even routine, action or procedure may strongly depend on the trust of the animal toward the operator or on the strength of the bond between a

![Fig. 1. Approach tests have shown that mules and hinnies are more willing to allow a familiar person to approach their forehead (green) and left side of their neck (blue) and touch their ears (yellow) than an unfamiliar person.](image)

![Fig. 2. Dr. Angie Varnum administering a vaccine at the Peru Equitarian Initiative Project. Notice how calm the mule is with its handler holding him for the vaccine injection.](image)

![Fig. 3. Dr. Farid Shkwy, approaching a mule in the Helwan brick kilns in Egypt. Notice the posture of the head and neck, that the ears are forward, and that nostrils have some flare but is not extensive.](image)
donkey or mule and the operator performing it. Conclusively, it may be helpful or more successful to have the familiar person assist (e.g., to pick up a leg or hold during radiographs compared to an unfamiliar person such as a veterinary technician; Fig. 2).

Fig. 4. Dr. Mauro Madariaga in Veracruz, Mexico at an Equitarian Initiative workshop approaching a mule. Note the following body language indicators of wariness: the flared nostril, position of the head, neck carriage, body posture, and general readiness to flee.

Fig. 5. Dr. Farid Shwky has been able to gain the trust of this mule by first extending his hand; now the mule has allowed him to touch its forehead. Notice the relaxed ear position, head and neck posture.

Fig. 6. An example of a handler using voice and touch while the practitioner takes the hinny’s temperature in Antiqua, Colombia. Dr. Miguel Nova is familiar with these mules, but notice the mule is also tied during this procedure.

Fig. 7. This hinny has its head and neck leaning away as the practitioner approaches and has worked her hand backward. She is continuing to be calm and providing tactile support to quiet the animal (Equitarian Initiative Peru Project, 2016).
Reading Body Language

Approach the equine slowly, extending a hand for a gentle pet or rub on the forehead and move slowly and with patience.\textsuperscript{1,2,8,9} The long-eared equid will allow you to proceed if it drops its head and neck or extends its nose forward (Fig. 3). Even if donkeys tend to be less timid or resistant when meeting unfamiliar people than mules and hinnies, caution must be paid when approaching donkeys or horse-donkey hybrids. If the donkey, mule, or hinny remains alarmed, a difference will be noticed in body posture and stance, along with ears facing forward, enlarged nostrils, and a swishing tail, especially with mules and hinnies (Fig. 4). As aforementioned, this may make attempting routine veterinary or husbandry procedures more challenging when treatment is being provided by an unfamiliar person.\textsuperscript{1,2,8,9} Furthermore, the specific knowledge of operators on the particular stoic nature and of the pertinent cautions that approaching donkeys and their hybrid congeners require have been reported to condition the misinterpretation of body signs.\textsuperscript{1} A nervous or scared donkey may turn their ears to the side and clamp their tails. Previous studies have found that donkeys, mules, and hinnies tend to respond well to voice and touch.\textsuperscript{1,10} A soothing tone of voice appears to provide some comfort to the animal, likely allowing the practitioner to proceed (Fig. 5). Once the practitioner has made it past the equid’s forehead, the next step is to slowly work up its neck; if planning to use a

Fig. 8. A, When frightened, mules may pin their ears and/or show tightening around the eye/nostrils. B, Other signs include turning their bodies away. Do not proceed in this case; have the handler try to calm the mule and then extend your hand.

Fig. 9. Mules in both figures A and B are accepting of an unfamiliar person and are allowing chin contact. It is likely that one could continue to perform an exam, but continue to communicate with the mule by using vocal and tactile stimuli.
stethoscope and listen to the heart, lungs or gastrointestinal sounds without incident, get to know the animal first.2,8,9 Gaining the trust of a mule or donkey is essential for performing a clinical exam (Figs. 5 and 6). When taking their temperature, make sure and stand to the animal’s side or simply place them in stocks if they are available. In some cases, the practitioner may have to apply a restraint to modify the equid’s behavior for both the practitioner’s and the animal’s safety. Many mules, hinnies, and donkeys are quite resistant to rectal thermometers; injections can also present challenges (Fig. 6). Based on how adept they are at using their neck for leverage, particularly when trying to evade an uncomfortable procedure, mules, hinnies, and donkeys seem to have a knack for pulling away from handlers. Mules and donkeys are less likely than horses to panic when tied. Consequently, practitioners may need to restrain the patient in this way if a stock is not available to apply more restraints. In these regards, restraints (e.g., a twitch) used in a proactive manner can be quite useful. The strength of mules and donkeys in their head and neck is unlike any horse many have dealt with, and they will slowly and easily move where they turn their heads or necks to evade any uncomfortable procedures.1 When lifting a leg, the action of mules and donkeys to lean into the operator instead of away from him/her is not an uncommon reaction. As a result, it may be necessary to ask the handler to lift the patient’s leg when performing a lameness exam and/or hold up a leg when examining another leg. Among all the body parts that can be informative about the behavioral status of a certain animal, donkeys and mules will tell a lot about their behavior by their ear posture, nostril flare, head and neck position, and tail movement (Figs. 7, 8A and B, 9A and B).1,2,8,11

Other methods to proactively work with mules and donkeys is by offering a food reward if allowed by the owner or handler.3 In some cases, a mule or donkey may prove to be calmer and less resistant when in the presence of a familiar equid. If mules or donkeys are kept in the hospital, it is not uncommon for mules to be restless in stalls and express vocalization. If possible, place the mule where it can see a horse (or other equid) or has horses on either side. This will generally decrease their restless behavior, which can sometimes be counterproductive depending on the procedure or surgery that has been performed.4

Fig. 10. Twitches, when used judiciously, have shown to calm mules and hinnies that do not tolerate routine procedures (twitches at Idaho Equine, Nampa, ID). The twitch may actually decrease the stress on the mule or hinny when it is resisting a procedure.1,2,12

Fig. 11. Farrier Eric Growns and Dr. Gapser de Laoyza using two forms of restraint to trim a mule’s hooves in Peru at the Equitarian Initiative Project.
### Table 1. Recommended Drug Doses for Sedation, Induction, Maintenance, and Analgesia of Donkeys and Mules

<table>
<thead>
<tr>
<th>Phase</th>
<th>Drug</th>
<th>Dose</th>
<th>Route of Administration</th>
<th>Expected Duration</th>
<th>Duration is Dose Dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedation</td>
<td>Xylazine</td>
<td>0.8 mg/kg (0.3–1.0 mg/kg)</td>
<td>IV, IM</td>
<td>15–20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Romifidine</td>
<td>0.08 mg/kg (0.05–0.1 mg/kg)</td>
<td>IV, IM</td>
<td>30 mins to 2 hrs</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Detomidine</td>
<td>0.01 mg/kg (0.005–0.04 mg/kg)</td>
<td>IV, IM, sublingual</td>
<td>30–40 mins</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Dexmedetomidine</td>
<td>0.005 mg/kg (0.0025–0.01 mg/kg)</td>
<td>IV, IM</td>
<td>30 mins to 2 hrs</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Acepromazine</td>
<td>0.03 mg/kg (0.02–0.05 mg/kg)</td>
<td>IV, IM, sublingual</td>
<td>30 mins to 2 hrs</td>
<td>No</td>
</tr>
<tr>
<td>Induction</td>
<td>Ketamine</td>
<td>2.5 mg/kg</td>
<td>IV</td>
<td>15–20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Diazepam/midazolam</td>
<td>0.05 mg/kg (0.02–0.08 mg/kg)</td>
<td>IV</td>
<td>15–20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Propofol</td>
<td>2.0 mg/kg</td>
<td>IV</td>
<td>15–20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Alfaxalone</td>
<td>2.0 mg/kg</td>
<td>IV</td>
<td>15–20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Thiopental</td>
<td>8.0 mg/kg</td>
<td>IV</td>
<td>20 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Telazol</td>
<td>1.0 mg/kg</td>
<td>IV</td>
<td>20 mins</td>
<td>No</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Triple drip</td>
<td>12.5 g guaifenesin 500 mg keta-</td>
<td>IV (requires infusion</td>
<td>45 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mine 150 mg xylazine (combined</td>
<td>via IV catheter)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>in a 500-mL bag of LRS or 0.9%</td>
<td>Administering a bolus</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NaCl)</td>
<td>often results in apnea.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analgesics</td>
<td>Butorphanol</td>
<td>0.03 mg/kg (0.02–0.05 mg/kg)</td>
<td>IV, IM</td>
<td>30–50 mins</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Buprenorphine</td>
<td>0.006 mg/kg</td>
<td>IV, IM, sublingual</td>
<td>6 hrs</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Morphine</td>
<td>0.01 mg/kg</td>
<td>IV, IM</td>
<td>3 hrs</td>
<td>No</td>
</tr>
</tbody>
</table>

Abbreviations: IV, intravenous; IM, intramuscular; LRS, lactated Ringer’s solution.
performed. Donkeys that stay in the hospital tend to do best if they can have a donkey mate or, again, a familiar animal with them.

Digestive Behavior
Both donkeys and mules may not drink well in the clinic and additional sweeteners may need to be added to the water to prevent dehydration and other complications like colic. The specific habits of the owner in regard to feeding and water provision must be also considered as particularly donkeys may display unexpected avoidance to patterns or practices to which they may not be accustomed.10

Reproductive Behavior
When working with breeding jacks in the clinic, recognize that they may be very shy breeders, will need a quiet area to be collected, and again, will need to get to know the handlers and gain trust before being collected. Many jacks are very slow to be collected compared to horses, and the slightest change in their environment can decrease reproductive behavior. Also, be aware that jacks can be very strong when being handled so consider a stud chain across the nose. In some cases, they may show excessive signs of aggression toward mares or jennies and a muzzle may be needed.7

Restraint
To perform a clinical exam, the mule or donkey must remain calm and still. This can be a challenge considering the abovementioned methods of introducing oneself to a mule. To reduce the amount of stress on the animal, handler, and practitioner, it is best to begin with the animal being calm. If a routine health task cannot be safely performed, nose twitches can be an effective form of restraint, especially a twitch with a long handle to hold and string twitch (Fig. 10). Blindfolds used to cover the mule’s and hinny’s eyes have also proven to be effective methods of calming an animal to receive treatment ranging from deworming to vaccinating to farrier work (Fig. 11). Another form of restraint that may work, but must be done by someone trained in the safe application of the procedure, is the lifting of an opposite leg and tying the leg up with a safety knot to a loop made around the neck of the mule that does not slip. Last but not least, chemical restraint has been reported to work well when aiming to administer an injection.8,12 Pharmacological restraint can decrease the level of fear and resistance for routine procedures. Sedation with α2-adrenoceptor agonists (xylazine and detomidine) alone or in combination with opioids (e.g., butorphanol) can be used as ancillary chemical restraint methods.2 When using xylazine in mules, studies have shown a shorter half-life, and a typical horse dose of 0.6 mg/kg intravenously (IV) should be increased 50% for mules, but this is not required for donkeys.12,13 Detomidine oral gel may also be useful for mules and donkeys if obtaining intramuscular or intravenous access is difficult.12,14 One should allow for at least 40 minutes of sedation for donkeys when using the typical horse dose.12 Currently, no reports have been given for doses and level of sedation when using detomidine oral gel in mules.13 Often, analgesic agents may be metabolized at a higher rate and need to be readministered to produce the same effect in mules (refer to Table 1 for doses).11,12,13,15 Pay close attention to the level of reaction and alertness when the mule is sedated to determine if more sedatives should be administered (Figs. 12, A and B).

Subtle Signs of Pain
Both donkeys and mules generally show subtle signs of pain.12,13 Lameness may be evidenced when donkeys, mules, or jennies shift weight on all four limbs and occasionally rest or take weight off one hind limb. Still, the signs can generally go unnoticed. Contextually, owners and handlers who are very familiar with their donkeys and mules may be their best advocates and will often pick up on signs more quickly than anyone else. Example signs might be a slight decrease in appetite, shifting weight, slight twitch of the tail, standing in different places than usual, increased tension in the orbital area/nostrils, and ear positioning down or back, along with changes in their eyes from bright and alert to glossy or glazed. Any or all may suggest that the donkey or mule is showing signs of discomfort. Attempts to define facial and body assessments related to pain in donkeys were recently published by the authors (Figs. 13-16).11 Current ongoing research by the authors is investigating the use of sensor technology (SmartHalter) to assist in detecting pain or discomfort in mules and donkeys to better assist with detecting slight changes in physiological signs such as heart rate and respiration paired with behavioral signs such as recumbency or rolling.
2. Summary

A key to donkey and mule behavior is being patient and working to gain their trust. To safely work with mules and donkeys, reading their body language and preventing them from evading the procedure are necessary to perform a clinical exam. It may be necessary to have the owner or handler stand by to assist with holding or comforting the animal prior to beginning the procedure. Physical restraints, such as nose twitches are very effective in mules and somewhat in donkeys. Chemical restraint is likely the safest form of restraint, but make sure to use the proper dosage for a donkey or mule (Table 1). Both will metabolize medications more quickly than horses of the same size. When attempting to define pain or signs of discomfort in mules and donkeys, start by examining the face and take in the overall body stance and posture. Keep in mind both donkeys and mules will likely mask pain and signs of pain due to their fight or freeze nature, but one can still notice signs by observing facial action units, body posture, and tail movement. If a mule or donkey appears healthy but the owner is describing a difference in their behavior, the animal is likely sick or in pain, so consider their information and remember both donkeys and mules are generally in a more advanced stage of distress but will likely show fewer signs. Suggest to owners who are raising mules to handle their foals from day one so that routine procedures such as taking a temperature, using a stethoscope, picking up hooves, or administering an injection are not complicated and stressful.

Fig. 13. Images A-I show examples of ear position and how it may relate to discomfort and pain. Notice the ear position in images C, D, F, and H; these positions can be associated with discomfort.
and donkeys that have been handled from birth are much easier to interact with and better tolerate routine procedures. Additional information on mule and donkey medicine can be found in the Vet Clinics of North America 2019 special issue dedicated to mules and donkeys.

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Fig. 14. A, slight change in nostrils expressing more flare such as B, may indicate discomfort or pain.11

Fig. 15. The eyes of donkeys and mules are expressive as shown in illustrations A–E. Changes in the shape and orbital tightening may indicate pain. Images A, B, C, and E suggest the donkey is in pain. These images were captured postcastration. Orbital tightening is observed as an indicator of pain in images B and C.11
and the staff and practitioners at Idaho Equine Hospital, Nampa, Idaho.

Declaration of Ethics
The Authors have adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest
All Authors have no actual or potential conflicts of interest including any financial, personal, or other relationships with other people or organizations that could inappropriately influence, or be perceived to influence, their work.

References