**EMERGENCY MANAGEMENT FOR DONKEYS AND MULES**

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**Title:** Emergency management for Donkeys and Mules

**Author Names, Degrees, and Affiliations:**

Debra C Archer BVMS PhD

\*Rebekah J.E Sullivan BVSc Cert AVP (EM)

\*Karen Rickards BVSc PhD

**Mailing addresses and Email addresses:**

Department of Equine Clinical Studies, University of Liverpool, Leahurst Campus, Neston, Wirral UK CH64 7TE

\*Veterinary Department, The Donkey Sanctuary, Brookfield Farm, Offwell, Honiton, Devon, UK

**Corresponding Author:** Debra Archer

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**Key Points**

* Emergency management of donkeys and mules follows the same key principles as horses (and ponies) with some variations in presenting clinical signs, approach to handling, physiology, pharmacology and local anatomy.
* Donkeys and mules show less overt signs of clinical disease and dullness or lack of normal behaviour may indicate potentially severe underlying disease.
* Hyperlipaemia is a common secondary consequence of illness or stress and must be monitored for and treated at an early stage.
* Pet / companion donkeys are more likely to present with obesity-associated and geriatric disease conditions and emergency presentations may be acute exacerbations of chronic underlying disease.
* Working donkeys and mules may present with a wide variety of emergency presentations, and economic and social factors need to be considered when deciding upon treatment options.

**Synopsis**

This chapter provides an overview of initial assessment and management of common emergency presentations in donkeys and mules. The principles are similar to those in horses (and ponies) but clinicians must be aware of differences in recognition of signs of pain / disease, approach to handling, pharmacology of some drugs and subtle differences in the physiology and local anatomy in donkeys and mules. The epidemiology of common disease presentations will vary between pet / companion or working / farmed donkeys and mules. Regular dental checks, deworming, vaccination and monitoring of behavior and quality of life are important aspects of preventive care.

**INTRODUCTION**

Emergency management of donkeys and mules follows the same key principles as the approach to emergencies in horses (and ponies). However, it is important to be aware of their normal stoical behaviour and key differences in approach to handling, clinical presentation of various disorders, physiology, pharmacology and specific anatomical variations compared to horses 1. In the developed world, donkeys and mules are frequently kept as pets or companions. Some may be used as working pack animals or may be kept as farmed animals in some countries for meat or milk production 2. Pet / companion donkeys or mules have a longer lifespan and are more prone to obesity compared to their working counterparts making geriatric and obesity-related disease common in this population 3. Donkeys and mules may be checked and handled less frequently and may receive little preventive care e.g. dental checks and vaccinations, and subtle signs of disease or changes in behaviour may be missed by owners. Emergency presentations may be due to acute exacerbation of chronic underlying disease. Owner education is vital including careful monitoring of behaviour, health and quality of life (where chronic disease is present), good management and appropriate preventive healthcare. Donkeys in the production industry are more likely to present with reproductive and neonatal emergencies as the jennies will be part of a breeding program. Donkeys and mules in the developing world are more likely to be used as working animals and those presented for emergency care are usually younger. Common emergency presentations include wounds / traumatic injuries, gastrointestinal disease due to ingestion of foreign bodies or parasitism, exhaustion due to overwork / malnutrition, hyperthermia, respiratory disease, tetanus, rabies and other infectious diseases. The working donkey or mule may be the only source of income for a family so relatively simple conditions that may not constitute an emergency in the developed world, can have a potentially disastrous impact on a family, complicating and potentially compromising treatment options. Appropriate communication and consideration of social and economic factors is important in these populations.

**KEY DIFFERENCES IN DONKEYS AND MULES**

The general approach to assessment and management of emergencies in donkeys and mules is similar to that in horses. Key considerations include:

* Thorough history taking to identify chronic disease, determine tetanus prophylaxis, vaccination and deworming status.
* Detailed clinical examination including careful palpation to detect subtle pathology and to assess body condition score. This is important in individuals with thick coats as considerable weight loss can go undetected.
* Donkeys and to a lesser extent, mules, may not express the true severity of pain they are experiencing and ‘dullness’ or absence of normal behaviour may be the only presenting sign. Donkeys and mules with overt changes in behaviour or signs of disease may be more systemically compromised than they appear externally. Pain scoring systems developed specifically for donkeys may be helpful for assessment and monitoring of treatment4.
* Donkeys and mules may be handled less than horses and owned by less physically capable handlers. This, in combination with their natural behaviour, can present challenges during clinical examination and drug administration. Mules and working donkeys may be wary of human contact and can be unpredictable in their movements. Even with a leg held up they can kick accurately and effectively. Patience and consistent, firm but considerate handling are paramount.
* As a species, donkeys have evolved to fight, rather than run away from an attack and their so called ‘stubbornness’ is more likely an expression of their natural tendency to display caution when unsure of a situation5. Donkeys are usually easy to restrain once a headcollar has been fitted. Mules can be much more challenging to deal with and behave more unpredictably and violently, making human safety important e.g. wearing of head protection. Ear twitching is not recommended as it elicits an aversive response presumably as a result of pain, but some donkeys and mules may tolerate and respond well to careful application of a nose twitch for a short time. Chemical restraint should be used as an adjunct to manual restraint when needed.
* Donkeys are physiologically and pharmacologically different from horses and mules will have some features common to both. As a desert-adapted species, the donkey appears better able to tolerate dehydration 6. Use of the skin-tent technique to assess hydration status is unreliable in donkeys 7.
* Table 1 lists key clinical parameters and techniques that clinicians dealing with donkeys / mules should be aware of. Key hematological and biochemical parameters in donkeys and mules are summarized in a recent review article 8.
* Body water compartmentalization differs from the horse and the volume of distribution may vary for many drugs 6. Metabolism of many drugs is generally quicker in the donkey, such that standard equine dosages are used but dosing intervals may be more frequent.
* Dosages of commonly administered medications are given in Table 2. Few drugs are licensed for use in donkeys and drugs should be administered in accordance with relevant national legislation and based on weight and consideration of body condition score (for a more comprehensive review see Mendoza et al. 2019 9).
* Donkeys may shower fewer clinical signs for some trans-boundary diseases e.g. African Horse Sickness (AHS), which should be considered where unusual disease presentations are seen in association with recent import of them or in-contact equids from other countries / regions.
* Donkeys have a propensity to develop hyperlipaemia and situations that result in development of negative energy balance must be avoided. Any ill or stressed donkey must be monitored for hyperlipaemia and treated early as the condition can progress rapidly resulting in a high mortality rate. Hyperlipaemia complicates treatment of any primary disease and worsens the prognosis.
* Most pet donkeys will have a bonded companion and they should be kept in sight of each other (irrespective of species) wherever possible during treatment, to reduce stress.

***Emergency sedation and anaesthetic protocols***

An excellent review of anaesthesia, sedation and pain management is detailed in a recent tutorial article 10; anaesthetic protocols are also available from the Donkey sanctuary (<https://www.thedonkeysanctuary.org.uk/>). In general, the initial dose of sedative, pre-medication and induction agents is the same for donkeys as for horses. The major difference is the faster metabolism of many drugs requiring more frequent ‘top up’ dosing intervals. Importantly mules may require up to 50% higher initial doses than horses, which may initially need to be given intramuscularly if temperament dictates. Oral detomidine gel, where available, can be useful for donkeys and mules that are more tolerant of being handled around the head than for injections. However, the effects can be less precise compared to intravenous administration of sedatives. Incorporating acepromazine into the sedation regime may also be of benefit for mules. A multimodal drug combination (e.g. detomidine, acepromazine and butorphanol mixed in a syringe and administered intramuscularly) has been described in fractious horses and has proved successful in many mules 1. Use of sedation and local anaesthetic nerve blocks (same as in the horse) may avoid the need for general anaesthesia. Care should be taken to avoid administration of standard volumes used in horses which may result in toxic limits of local anaesthetics occurring where multiple blocks are used e.g. enucleation. Therefore, the volume used at each site and the maximum total volume should take into consideration their weight. For longer procedures, additional sedation needs to be administered more frequently or consideration could be given to use of continuous rate infusions (CRI) using similar protocols as described for horses, adjusted according to effect 10.

***Administration of medications and stall rest***

Oral medications can be hidden in treats such as jam sandwiches or paste formulation medications can be given sandwiched between ginger biscuits. Administration of medications via nasogastric tube can be done as for horses but consideration should be given to the size of the tube used and the potential for stress created by repeated administration increasing the risk of hyperlipaemia. If there is requirement for a donkey to be on stall rest, it is essential that owners / carers monitor for signs of inappetence and changes in behaviour. Any bonded companion will have to be kept on stall rest too in order to minimise stress. If a patient is receiving intravenous fluid therapy, both patient and companion will require constant monitoring to prevent chewing or dislodging of the venous catheter. Where this is impractical companions have been separated but kept in full view of each other through methods such as using gates or hurdles to divide a stall.

It is important to reduce risk factors for impaction colic and hyperlipaemia. Consideration should be given to bedding the patient/s on alternatives to straw, such as wood shavings, ensure constant access to fresh water consider enrichment of the environment to reduce stress and boredom (<https://www.thedonkeysanctuary.org.uk/>what-we-do/knowledge-and-advice/for-owners/environment-enrichment).

**METABOLIC AND HEPATIC EMERGENCIES**

***Hyperlipemia***

When dealing with any sick donkey or mule it is essential to consider the potential for development of hyperlipemia, particularly in individuals at higher risk. Dyslipidemias including hyperlipemia are more frequent in donkeys than in other equids. The incidence in mules is unknown but is assumed to be higher than in horses 11. In addition to investigating and treating any underlying disease process, it is essential to diagnose hyperlipemia at an early stage and restore a metabolic positive energy balance as soon as possible to improve survival. Development of hyperlipemia will complicate the treatment and prognosis of any donkey or mule presented as an emergency case and it is essential to measure blood triglyceride (TG) levels as part of routine investigation, monitoring and prognostication.

Risk factors for hyperlipemia in donkeys include increased age, obesity, female sex, pregnancy and lactation, feeding of concentrates, concurrent disease, recent weight loss or inappetence, dental disease, recent change of premises and cardboard bedding 12 13. Hyperlipemia is most commonly secondary to some form of stress or other illness; 72% of donkeys with hyperlipemia had concurrent disease in one study 12. Mortality is high in donkeys varying from 41-76%, and is directly correlated with blood TG levels 12 (see Table 3).

Clinical signs include change in behavior (dullness), anorexia, sham-eating, reduced fecal output and mucus covered feces, halitosis, reduced borborygmi and ileus. Diagnosis is based on history, clinical signs and confirmation of elevated serum TG. Concurrent evaluation for any underlying disease process is vital, including identification of dental disease or gastrointestinal pathology. Care should be taken when performing rectal examination as the rectal mucosa may also be friable.

Treatment includes management or treatment of any underlying cause of disease or stress, reversal of the negative energy balance, analgesia and potential use of gastroprotectants. A recent review article provides an in-depth review of the pathophysiology and treatment 11. Donkeys / mules should be encouraged to eat by offering a variety of palatable feedstuffs. Provision of bramble cuttings, fresh grass, addition of peppermint cordial and/or fruit juices to feed and treats such as apples, carrots, bananas, ginger biscuits have all been used as appetite stimulants. It is essential to minimize stress and keep the donkey with their bonded companion at all times during treatment. If they will not voluntarily eat, nasogastric intubation of the following may be utilized: 2-3 litres warm water (estimated total volume for 150-200kg donkey), with added electrolyte powders/tablets, dextrose powder (approximately 1g/kg bwt but will need to tailor depending on glucose content of electrolyte powders) and 250-500g ground instant oat breakfast cereal which should be added just prior to administration and stirred well to prevent blockage of the tube (see Evans and Crane 2018 for further details1).

If repeat administration is not efficacious, ileus is present or repeated intubation is causing further distress then intravenous fluid therapy should be considered. Where hospitalization is not an option, administration of fluid boluses outside of the clinic setting is a practical option. Duphalyte 100mls/50kg bwt (B-vitamin, electrolyte, amino acid and dextrose solution) and dextrose 1-2ml/kg 5% solution can be added to a 3L bag of Lactated Ringers solution. Partial or total parenteral nutrition (PPN/TPN) combined with insulin therapy may be required in severe cases1,14 but this requires hospitalization for careful monitoring of glucose status and can be expensive. Cost and prognosis should be discussed with the owner, alongside the risk of further stress of transportation to hospital facilities.

***Acute hepatic disease***

Chronic hepatic disease is common in non-working donkey populations and emergency presentation of a donkey or mule with severe signs of liver disease is most likely to be due to acute exacerbation of chronic hepatic disease 7. Clinical signs are similar to those seen in horses including dullness, blindness, neurological signs (aimless wandering, head pressing) and abdominal pain but these clinical signs are likely to be less overtly displayed. Some cases may present with pyrexia; in those cases, it is important to establish whether this is due to an underlying inflammatory process only or whether an infectious agent may be responsible (Sullivan, personal observation). Acute hepatic disease is likely to be complicated by development of secondary hyperlipemia.

Serum biochemistry will aid the diagnosis and assessment of severity of disease and ultrasonographic examination of the liver and biopsy can provide additional diagnostic and prognostic information 7; at present there is no specific donkey histopathology scoring system so the scoring system devised in horses is used 15. If biopsy results can be obtained quickly, this can aid to decision-making regarding continuing with treatment. However, the potential benefit of biopsy results must be weighed up against the risks of causing further stress and hyperlipemia.

***Hyperthermia / hypothermia***

Hyperthermia (heat stress) can occur in working donkeys in hot / humid climates pushed beyond their normal levels of fitness, where underlying disease is present or where they are not acclimatized to the environmental conditions 16. Hypothermia is more likely to occur in donkeys compared to horses due to their larger body surface area relative to volume allowing for greater heat loss. This can develop in donkeys during periods of extreme cold during winter months in certain geographical regions17. It should be noted that use of rugs can be helpful to conserve body heat but a significant amount of heat loss occurs through the ears.

**ORAL AND GASTROINTESTINAL EMERGENCIES**

***Colic***

Donkeys are less likely to display the overt signs of colic seen in horses and are more likely to present as dull and/or inappetant 7. Owners should be aware of the importance of anorexia, sham eating and reduced fecal and urinary output as key potential signs of colic. The underlying etiology will vary depending on use, signalment and geographical location. Gastrointestinal obstruction is a common cause of colic in the donkey; in a working donkey it is most likely the result of severe dehydration or foreign body obstruction whilst in the pet donkey, increased risk for impaction is associated with underlying dental disease, diet and increasing age 18. Donkeys have a propensity to browse and are highly inquisitive, so it is important to remove any objects within reach of the donkey patient or their companion. Whilst most foreign objects will not be swallowed, ingestion of plastic bags and other objects is a common issue in working equids scavenging for food.

Investigation of the colic case is similar to that in the horse (an in-depth review on managing the colic patient in the field can be found elsewhere in this issue). Hematology and biochemistry is important to rule out hyperlipemia as the primary underlying cause, to assess overall systemic status and to monitor for secondary development of hyperlipemia. Peritoneal and blood lactate may be measured to assist with prognosis if facilities are available. There are no published data relating to normal lactate reference ranges in donkeys, but work performed at the Donkey Sanctuary indicates that levels may be comparable with those from horses.

It is safe to perform rectal examination in most adult donkeys and mules except those in miniature breeds or those that are very small. Care must be taken to avoid personnel injury, particularly when performing rectal examination of mules. Outside of a clinic setting, stocks are unlikely to be available so well-placed hay bales can be placed between the hindquarters and the examiner. Short-acting chemical restraint, such as xylazine and or use of butylscopolamine, at standard equine doses can facilitate examination. See Table 1 for practical tips on performing nasogastric intubation and abdominocentesis. Trans-cutaneous ultrasonographic examination of the abdomen can provide useful additional diagnostic information. Donkeys usually have heavy coats and will require clipping and skin preparation to increase the likelihood of obtaining diagnostic images. Ultrasonography can be useful to locate a suitable site for abdominocentesis and determine the quantity of ventral abdominal fat as this can be significant in donkeys, particularly those that are obese.

Treatment of colic in donkeys and mules is similar to that in horses. The key aims are 1. correction of the underlying problem (including the potential need for surgical intervention), 2. provision of analgesia 3. maintenance or restoration of normovolaemia, 4. monitoring for development of hyperlipemia and 5. identification and management of underlying disease / aetiological factors (e.g. unidentified dental pathology or high levels of gastrointestinal parasites). To prevent development of hyperlipemia, starvation of donkey colic patients is not recommended. Small volumes of easily digestible feedstuffs and walking in hand to pasture, if manageable for the patient, are important. Intravenous fluid therapy types and administration rates can be extrapolated from horse data.

If a surgical lesion is suspected, early discussion with the referral center is important. Given their ability to mask pain, donkeys may have already developed significant systemic compromise by the time veterinary advice is sought by owners. If a patient is to be transported, provision must be made for their bonded companion/s to accompany them. The companion will also require monitoring during any hospital stay as the process of transportation and stress is a risk factor for hyperlipemia. Provision should be made for appropriate sized hospital accommodation – if stable doors cannot be lowered then a gate or hurdle may need to be used to enable donkey patients to see out of their stall.

***Colitis***

Colitis in the donkey may be a life-threatening condition that is challenging to diagnose 7. The etiologies are assumed to be similar to the horse, with cyathostominosis, *Clostridial spp, Salmonella spp* and other infectious or toxic ingested agents identified in a UK population. Dullness, fever and occasionally diarrhea may be evident, and treatment is similar as for horses. The authors have used smectite as an intestinal adsorbent at standard equine dosages but note that the frequent nasogastric intubation needed may present additional unwanted stress to the patient. The donkey gut microbiome differs from that of the horse 19 so the efficacy of standard equine probiotics is questionable.

*Other*

A number of other gastrointestinal diseases have been identified in donkeys and are detailed in a recent review article 7. The presentation and treatment of esophageal obstruction ‘choke’ is similar to that in the horse. It is paramount that any donkey presenting with choke has a full dental examination once the obstruction has resolved as, particularly in geriatric donkeys, dental pathology is an important risk factor. Gastric impaction has also been reported as a cause of colic in UK donkeys and there is sparse literature detailing diagnosis and management. Ileus, pain following nasogastric intubation and enteral fluid administration, and evidence of gastric distention on transabdominal ultrasound justify gastroscopy to confirm a diagnosis. Rectal prolapse is seen more commonly in working donkeys associated with exhaustion and / or parasitism 20. Treatment is the same as for that in the horse. Pancreatitis may be suspected in donkeys or mules with non-specific abdominal pain and raised amylase and lipase, but definitive diagnosis is rare. It may also develop secondary to hyperlipemia.

**RESPIRATORY EMERGENCIES**

***Asthma***

In pet donkeys, crises associated with acute exacerbation of chronic equine asthma are seen frequently 21. The specific challenge with donkeys is suitable provision of a clean air environment and dust-free feedstuffs suitable for the patient and companion. Whilst unlimited pasture access may enhance respiratory health, this can result in unwanted weight gain and obesity-related disease. Turnout onto bare pasture is ideal if weight gain is or becomes an issue or use of a grazing muzzle can be employed. As with horses, soaking hay and feeding of straw may reduce dust and calorific content. There are commercial dust-free donkey-specific short-chop products available in some countries, if dental disease prevents the feeding of long fibers. If long fibers are soaked, a ration balancer containing vitamins and minerals should be provided to prevent micronutrient deficiencies.

***Pulmonary fibrosis***

In the UK population of donkeys at The Donkey Sanctuary, respiratory emergencies have also presented that are not the result of RAO but are instead due to underlying pulmonary fibrosis, with a prevalence of 35% identified in one study 22. This condition can be very difficult to diagnose until an advanced stage, assumed to be due to the sedentary nature of companion / pet donkeys masking signs of progressive, slow respiratory compromise. Acute deterioration of respiratory function is likely a result of secondary bacterial infection and/ or following acute exposure to allergens e.g. during removal of manure from the stall and placement of fresh bedding material (Sullivan, personal observation). Secondary tracheal collapse may also be seen. Reduced lung sounds may be evident on thoracic auscultation and ultrasonographic evaluation of the pleural surface may reveal comet tail reverberation artefacts and areas of consolidation of the lung tissue, consistent with fibrosis (Fig. 1). The pathology of pulmonary fibrosis appears to be different in donkeys compared to horses, beginning in the subpleural tissues then extending diffusely into the parenchyma as interstitial fibrosis. Asinine Herpes Viruses (AHV) - 4 and - 5 have been isolated in a case series of donkeys with interstitial pneumonia 23 suggesting that herpesvirus may have a role in the etiology of donkey pulmonary fibrosis. Dyspnea as a result of acute exacerbation of pulmonary fibrosis does not resolve with administration of smooth muscle relaxants or systemic B-2 agonists. Treatment is currently confined to symptomatic treatment and clean air management but the prognosis for severely dyspneic cases is extremely poor. TG levels should be checked in any dyspneic donkey or mule as development of hyperlipemia will worsen the prognosis further.

***Tracheal collapse***

Tracheal collapse is more common in geriatric donkeys, likely due to age related tracheal cartilage degeneration 21. It can also develop secondary to other respiratory pathology including pulmonary fibrosis. Acute cases may present with moderate to severe dyspnea, flaring of nostrils and efforts to mouth breathe. Treatment is symptomatic including immediate movement to a clean air environment, if possible, without further exacerbating the degree of stress. Long-term, affected donkeys and their companion should be kept in dust-free environments and their weight monitored carefully to prevent obesity.

***Infectious respiratory disease***

Many donkeys are not vaccinated against equine herpes viruses and / or equine influenza and pet donkeys may not mix with others very often.  Donkeys infected with equine influenza virus are likely to be more severely affected than horses and to develop secondary bronchopneumonia (not so in mules). Early treatment with antimicrobials and careful monitoring is important.  Avian influenza has been shown to infect in donkeys and should be considered as a potential cause of respiratory disease in groups of donkeys in affected areas during disease outbreaks 24.

In working equids respiratory disease is a common clinical presentation, with varying severity of disease evident 25. It is not uncommon for different groups of donkeys to mix at locations such as markets making disease spread a significant problem. Coughing, nasal discharge, submandibular swellings and pyrexia are frequent signs of *Strep. equi. var equi* (Strangles) which can develop into an emergency situation if large numbers of animals in close contact are affected and unable to work, in addition to individual cases of dyspnea due to lymph node enlargement. Education regarding Strangles and appropriate biosecurity should be part of any community engagement initiative.

**MUSCULOSKELETAL EMERGENCIES**

Foot abscesses and laminitis are common causes of acute lameness in donkeys and mules 26. Usually pathology is at a more advanced stage when clinical signs of overt lameness are seen due to their stoic nature.  If recumbent, feed intake may have been reduced and so it is essential to check for evidence of hyperlipaemia and ensure good nursing care to make sure they are eating and drinking. Hoof testers are also less useful for detecting response to foot pain compared to horses, particularly in hot climates where the hoof capsule can be extremely hard. Treatment is similar to horses; paring the sole to establish drainage, remove any necrotic or undermined sole, soaking the foot and/or application of a poultice.

The radiographic anatomy of the donkey foot is slightly different to that in the horse 27 and the differences are less marked in mules. Generally, in donkeys the foot has a more upright anatomy and the distal phalanx is positioned more distally within the hoof capsule. The extensor process in donkeys is not normally in line with the coronary band (Fig. 2).

*Laminitis*

Episodes of laminitis in pet / companion donkeys kept on soft ground may go unnoticed by owners. Donkeys will not develop the classic stance seen in horses / ponies unless on hard ground and the only clinical signs may be slow weight shifting or the hind legs placed further under abdomen, lying down for longer periods or reduced physical activity. The key radiographic signs are similar to those in horses with increased angular deviation between the dorsal aspect of the distal phalanx and dorsum of the hoof wall and increased distal displacement of the distal phalanx 27. Due to the position of the distal phalanx in relation to the frog in donkeys compared with horses, traditional frog supports are not advised as they may act as a fulcrum rather than providing mechanical support. In the immediate presentation of the emergency case, thick cotton wool pads or Styrofoam blocks for heavier donkeys may be utilized. Once the condition is stabilized acrylic resin can be used to create a custom shoe with or without a gel insert for solar support 1. Providing a deeply bedded stall can be also be helpful to reduce discomfort. Use of NSAIDs to provide analgesia is also important (Table 2).

**WOUNDS & OTHER INTEGUMENTARY EMERGENCIES**

Wounds, severe abrasions and bite injuries are more common in working equids. The potential for rabies should be considered in endemic areas where a bite injury has occurred. Tetanus prophylaxis should also be administered in any donkey or mule that sustains a wound and is not current on tetanus prophylaxis. Working equids clinical evaluation should also include a general assessment of systemic health including underlying acute issues such as dehydration and pain and chronic issues such as low body condition score. Malnourishment and use of ill-fitting harnesses and inappropriate tack such as bits is likely to be a significant problem in many working equid wound presentations. Preventive care should focus on education regarding appropriate harness / bit use and care and maintaining donkeys in as good general health and weight as possible.

**NEUROLOGICAL EMERGENCIES**

Donkeys can develop neurological signs secondary to equine herpes virus (EHV) and asinine herpes virus (AHV-3, now known as EHV-8) 28. Testing is available in some specific centers using PCR.

**REPRODUCTIVE AND URINARY EMERGENCIES**

Covering dates may be unknown so it can be difficult to assess readiness for birth and prematurity. Gestation is approximately 12 months (331-421 days) in the donkey and due to the greater density of microcotyledons in the donkey chorioallantois, jennies are more likely to deliver live twins than mares 29. Dystocia is managed in the same way as for mares, but the narrow, tortuous lumen of the cervix predisposes to cervical lacerations during dystocia. Donkeys are also more likely to develop necrotic vaginitis after prolonged dystocia and topical antimicrobial and steroid cream can be used to prevent cervical and vaginal adhesions 29. Management of retained fetal membranes is the same as for the mare, with additional need to monitor for development of hyperlipemia.

Male donkeys have relatively larger reproductive organs than the horse and in particular have a very large testicular artery. This increases the risk of post-castration haemorrhage unless the testicular artery is ligated directly or indirectly via placement of a transfixing ligature around the vaginal tunic. This will depend on age of the donkey and technique used. They commonly have large quantities of scrotal fat also which can make ligation more difficult and which can prolapse from the castration site 1.

**OPHTHALMIC EMERGENCIES**

Ocular pathology is commonly seen in geriatric donkeys and ophthalmic examination should form part of routine / annual assessment. In comparison withhorses, the donkey orbital socket is usually deeper, and the globe is positioned in a more sunken position 30. The corneal surface is large and corneal ulcers are common ocular pathology, although donkeys are generally less prone to traumatic injuries, presumed to be due to the fact that they are less ‘flighty’ than horses. The conjunctival sac is large, and the distal nasolacrimal duct opening can be found on the dorso-lateral aspect of the nares, not ventrally as in horses.

In the case of an acutely painful eye, examination should include assessment to check for foreign bodies. Donkeys often bury their heads in hay / straw and have a thick coat and periorbital hair, particularly in the winter, increasing the risk of organic foreign bodies becoming lodged in and around the eye. The donkey’s inherent stoical behavior can mask ocular lesions until disease is advanced or pain is severe and both eyes must be checked for the presence of subtle underlying chronic pathology.

**NEONATAL EMERGENCIES**

Donkey and mule foals require around 250 mL of colostrum per hour for the first 6 hours of life and failure of passive transfer (FPT) can by assessed using commercial equine snap tests to assess IgG status1. Equine hyperimmune serum can also be administered in donkey foals with FPT. This is used as standard at the Donkey Sanctuary and no adverse reactions have been observed. Commercial foal milk replacer can also be used in orphan foals. Due to their small size and narrower nasal passages compared to horses / ponies, suitable sized equipment must be used. An equine male urinary catheter can be useful for nasogastric intubation and 20-22G catheters used for intravenous fluid therapy. Neonatal isoerythrolysis is more common in mule than horse foals. The principles of treatment are the same as for foals (See Chapter XX).

**CARDIOVASCULAR EMERGENCIES**

Where severe hemorrhage has occurred requiring blood transfusion, ideally blood should be obtained from a donor donkey and cross matching should be performed as for horses. Where this is not possible, horse blood can be administered safely to donkeys. Importantly, donkey / mule blood cannot be administered to horses due to the presence of RBC antigens [donkey factor] that cause transfusion reactions in horses

**PREVENTIVE CARE**

Education of owners / handlers working with donkeys or mules is critical regardless of whether they are kept as pets, production or working animals. They should be aware of the normal behaviors and be alert to even subtle changes in behaviour or lack of normal behaviour as indicators of underlying pain or disease. For those working with working equids in developing countries this can be a difficult balance as the owners / handlers themselves may have severe health challenges or be facing extreme poverty. Treatment of donkeys / mules in these situations has to take into account the economic and behavioural drivers and the need to understand the practical challenges including barriers to veterinary treatment / rest and challenges around communication.

Routine healthcare checks should include assessment of general management, vaccination and deworming status, regular dental checks and monitoring of weight and body condition score. Where donkeys / mules have ongoing medical issues, owners should be advised of the need to consider quality of life (QOL) issues.

**QUALITY OF LIFE ASSESSMENT**

Acute exacerbation of chronic disease conditions is common in pet / companion donkeys and consideration of Quality of Life (QOL) can assist decision-making regarding whether it is appropriate to attempt treatment for an emergency condition or not. This may need to be done immediately, or over the ensuing days, depending on the severity of the presenting condition. Owners may struggle to come to terms with advice to euthanise a pet donkey or mule who, to a lay person, has not been ill prior to this point. It is crucial to take a holistic standpoint, taking into account the history and general assessment of the donkey / mule. Gradual weight loss, severe dental disease, reluctance to move, hair rubs or even superficial wounds over carpi and hocks may all be indicative of underlying pathology which is relevant to the decision making in any emergency situation, particularly in geriatric donkeys / mules. There are numerous tools and guidelines available for owners and vets to use together to assess individual animals (for example <https://www.thedonkeysanctuary.org.uk/what-we-do/knowledge-and-advice/for-owners/monitoring-your-donkeys-quality-of-life>).

**EUTHANASIA**

The same techniques for euthanasia of horses and ponies are applicable to donkeys and mules (see Chapter XX). These primarily involve use of chemical agents, use of a free bullet or captive bolt followed by pithing / exsanguination. The landmark for placement of the gun or captive bolt is 1 – 2cm above the intersection of lines drawn from the base of the ear to the contralateral lateral canthus (Fig. 3). Due to the strong bonds that form between donkeys, a remaining bonded donkey companion should have the opportunity to spend time with the body prior to removal. The companion should also be monitored closely as they will be at increased risk of developing hyperlipemia. Use of chemical agents is the same as for those licensed for use in the horse.

One of the challenges in performing euthanasia of equids in the developing world may be the lack of suitable drugs or availability of firearms. Options for disposal of the carcase, which may be eaten by scavengers may also preclude use of chemical agents such as barbiturates. Aortic severance per rectum may be an acceptable technique to use where no other option is available. The donkey or mule must be anaesthetised or heavily sedated in recumbent patients before this is performed for welfare and personnel safety.

**SUMMARY**

Donkeys and mules may present with a variety of emergency conditions which follow the same basic principles of diagnosis and management as in horses with some key differences in diagnosis and management. It is important to be aware of important differences in donkey and mule behavior and few overt clinical signs may be demonstrated unless severe pain or advanced disease is present. Different emergency conditions are more likely to present in companion / pet donkeys and mules compared to working donkeys and mules or those used for production purposes. Stress and illness frequently result in development of secondary hyperlipemia in donkeys which must be monitored for and treated early.

Table 1. Common parameters / procedures and donkey / mule specific notes. Data adapted from Evans and Crane (2018)1 and Matthews et al. (2019)10.

Table 2. Commonly used medications in donkeys and specific notes of key differences from horses. Adapted from Evans & Crane (2018)1 and Mendoza et al. (2019)9. IV intravenous; IM intramuscular; PO per os; SL sub-lingual.

Table 3. Prognosis associated with different triglyceride levels in aged donkeys with hyperlipaemia based on data from The Donkey Sanctuary.

Fig. 1. An 11-year-old donkey in good body condition presented with severe tachypnoea and dyspnea. Thoracic ultrasonographic examination revealed extensive pleural surface irregularities and altered echogenicity (a). Postmortem examination (b) confirmed extensive chronic, diffuse, severe fibrosing interstitial pneumonia.

Figure 2. Lateromedial radiographs of a normal donkey hoof (a) and a donkey with laminitis (b).

Fig. 3. Landmark for free bullet / captive bolt placement; this is slightly higher than in the horse / pony and should be 1-2 cm dorsal to the intersection of a line drawn between the base of the ear and the contralateral lateral canthus (Image courtesy of The Donkey Sanctuary).

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Table 1.

|  |  |
| --- | --- |
| **Parameter / procedure**  / terminology | **Normal value or range / notes** |
| Terminology | Jenny – female donkey; jackass - male donkey  Mule – product of mare bred to a jackass; Hinny – product of a jenny bred to a stallion |
| Rectal temperature | Adult donkey 36.5 - 37.80C / 97.2-100.0 0F   (average 37.10C / 98.8 0F ) |
| Heart rate | Adult donkey 36 - 52 beats per minute (average 44 beats per minute) |
| Respiratory rate | 12-28 breaths per minute  (average 20 breaths per minute  )  \*in working equids resting respiratory rates may normally be up to 59 breaths per minute to maintain normal body temperature in hot climates |
| Weight | 90-400kg (average 180 kg); miniatures ~100kg, Mammoth 350 - 400Kg.  Horse and pony weigh tapes are not suitable for estimating the weight of donkeys – see donkey weight estimator tool ([www.the](http://www.the)donkeysanctuary.org.uk) |
| Intramuscular injection | Use neck or gluteal muscles – do not use the pectoral region  Adults 18g 1.5inch needle, smaller donkeys / foals 19g/21g 1 inch needle  Donkeys have thicker skin and tolerate pushing the needle slowly through the skin better than the slap technique used in horses |
| Intravenous injection / catheterisation | Due to the thick coat of donkeys clipping is always advisable to allow clear visibility of the jugular vein. The prominent cutaneous colli muscle can particularly conceal the middle third of the jugular groove and the angle of needle introduction is typically steeper than in the horse or pony.  A small volume of intradermal local anaesthetic and a small skin incision facilitate intravenous catheter placement. A 14g catheter is suitable for most donkeys. |
| Epidural anesthesia | 2nd intercoccygeal space (the 2nd is wider than the 1st inter-coccygeal space) – easier to palpate than in horses  Use a 30-degree angle from the horizontal for needle entry  Various analgesic combinations described; 2% lidocaine hydrochloride at 0.22mg/kg bwt diluted with sterile 0.9% sodium chloride solution to a volume of 0.2ml/kg total volume shown to be effective in donkeys |
| Emergency field anesthesia | Various protocols in veterinary anesthesia texts and articles. Injectable anesthetics may need more frequent administration of boluses due to more rapid drug metabolism in donkeys. Example emergency protocol using ketamine:  Pre-medication:   * similar doses as for horses - alpha 2 agonist / opioid   Induction:   * Ketamine 2.2 - 2.8 mg/kg & Diazepam 0.1mg/kg IV   Maintenance:   * 1/3rd induction dose of ketamine administered every 10 minutes * 1/3- ½ initial induction dose of alpha-2 agonist given after 15 min if xylazine used; after 30 min if detomidine used; after 60 mins if romifidine used |
| Endotracheal intubation | Can be performed blindly but can be more difficult compared to horses due to differences in regional anatomy in donkeys.  Consider a laryngoscope / use of a flexible endoscope if difficult to perform; abnormal conformation / tracheal hypoplasia more common in dwarf donkeys.  Adults – 14-16mm (internal diameter) endotracheal tube; foals 12mm internal diameter endotracheal tube |
| Nasogastric intubation and administration of fluid | Donkeys have relatively narrower nasal passages compared to horses; use a small diameter (13mm) pony or foal sized stomach tube to avoid trauma and epistaxis.  The recommended volume of fluids that can be administered for a standard donkey of 150-200kg is 2-3L; volumes greater than this cause excessive gastric distention and pain. |
| Rectal examination | Can be performed safely depending on the size of the donkey or mule and rectal tears are rare if performed carefully  Butylscopolamine (0.3mg/kg IV) use can facilitate safer examination. |
| Abdominocentesis | Large ventral subcutaneous fat deposits (up to 10-14cm) can make abdominocentesis challenging. Ultrasound guided needle placement and use of a catheter / spinal needle may be required in obese individuals. |

Table 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Drug generic name** | **Dose** | **Dosing interval / duration of action** | **Route** | **Comments on use in donkeys** |
| NSAIDS | | | | |
| Flunixin | 1.1mg/kg | q.12h | IV |  |
| Phenylbutazone | 2.2- 4.4mg/kg | q.12h – standard  q. 8h - miniatures | IV, PO | Cleared more rapidly than in horses and in miniature donkeys compared to standard donkeys |
| Carprofen | 0.7-1.3mg/kg | q.24h | IV, PO | Give IV as single dose  Metabolized more slowly in donkeys |
| Firocoxib |  | Shorter than in horses and ponies | PO | Good oral availability (more data required) |
| Meloxicam |  |  |  | not recommended for use in donkeys due to very short half-life |
| SEDATIVE / ANAESTHETIC DRUGS | | | | |
| Detomidine | * 1. – 0.04 mg/kg   0.04 – 0.08 mg / kg  0.04 mg / kg | 20-40 min, longer for sublingual | IV  IM  PO (oral gel)\* | Alpha 2 agonists should be given in donkeys at similar dosage to horses; for mules higher dosages should be used (approx. 50% higher dose recommended; \*no current data for optimal dosage for oral detomidine gel in Mules).  Usually combined with an opioid to increase the degree of sedation and analgesia |
| Romifidine | 0.05 - 0.1mg/kg | 30-60 min | IV |
| Xylazine | 0.4 – 1.5 mg / kg | 15-20 min | IV |
| Acepromazine | 0.02 – 0.05 mg / kg | 30 min – 2h | IV, IM, sublingual |  |
| Butorphanol | 0.02 – 0.05 mg/kg | 30-60 min | IV, IM |  |
| Buprenorphine | 5 – 10 µg/kg | q.8h | IV |  |
| Ketamine | 2.2 – 2.8 mg/kg |  | IV | Cleared more rapidly in donkeys especially miniatures; more frequent top-ups required |
| Guaifensin | To effect – 50-110mg / kg for induction |  |  |  |
| ANTIMICROBIALS | | | | |
| Na Penicillin G | 20,000 IU/kg | q4-6h | IV | Shorter dosing intervals required in donkeys for beta-lactam antimicrobials |
| Gentamicin | 6.6 mg/kg | q.24h | IV | Care in Mammoth asses – lower volume of distribution, take care to avoid toxicity |
| Oxytetracycline | 5 – 10 mg / kg | q.12-24h | Slow IV | Shorter elimination half-life – dosing interval half that recommended for horses |
| Trimethoprim sulphamethoxazole | 30 mg / kg | q.12h | PO | Optimal dose not currently known for donkeys |
| OTHER | | | | |
| Dexamethasone | 0.05 – 0.2mg/kg | q.24h | IV, IM, PO | Contraindicated if hyperlipaemia evident |
| Heparin sodium | 100-200 IU/kg | q.8-12h | IV | May be used in hyperlipaemia; check clotting factors first |

Table 3.

|  |  |
| --- | --- |
| **Plasma triglyceride concentration (mmol/L)** | **Treatment / prognosis in donkeys with hyperlipaemia** |
| < 10 | Good prognosis with rapid intervention and reversal of negative energy balance using enteric support |
| 10 - 15 | Fair prognosis with aggressive fluid therapy including parenteral nutrition |
| >15 | Poor prognosis even with aggressive therapy – total parenteral nutrition will be required. |