

**CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE**

**Faculty of Tropical AgriSciences**



**The Role of the Donkey in the Development of  
Rural Communities and its Potential within  
Animal-Assisted Interventions**

**BACHELOR'S THESIS**

Prague 2021

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## **Declaration**

I hereby declare that I have done this thesis entitled “The Role of the Donkey in the Development of Rural Communities and its Potential within Animal-Assisted Interventions” independently, all texts in this thesis are original, and all the sources have been quoted and acknowledged by means of complete references and according to Citation rules of the FTA.

In Prague, 15th April 2021

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Helena Peterková

## **Acknowledgements**

I would like to express my gratitude to my supervisor Mgr. Martina Komárková, Ph.D. for her expertise, support, enthusiasm, and patience. Her motivation and guidance accompanied me through the whole process.

My gratitude also belongs to my family for emotional as well as financial support during my studies. To Hoksila Toh and Kimimila for their ability to change my perspective.

And finally, I would like to thank my friend Neil T Hendrick and Markus Altkirch for reading and grammatical proofreading.

## **Abstract**

In poor communities in developing countries donkeys are used for work and are commonly affected with health and non-physical welfare problems, such as fear of humans and depression. But donkeys can also contribute to Animal-Assisted Interventions (AAI), a form of rehabilitation developed to support conventional treatments. Supporting improvements in the physical, mental, social, communication, and behavioural development of clients.

The aims of this thesis are: a) to identify the main roles of donkeys in rural communities nowadays, their potential to contribute to the family budget and the level of care they obtain in current conditions; b) to review the scientific literature about Donkey Assisted Intervention and define the specific fields, where the donkeys are and might be used as therapies and what are the predispositions of a therapeutic donkey (specific behaviour, age, sex, physiology). The results show that donkeys are used as cheap, affordable, and sustainable power sources for people within rural communities, but the level of care they receive varies and poor welfare conditions are often present. When donkeys are used as therapists, they show excellent results while improving the physical, mental, social, communication, and behavioural development of clients. The donkey seems to be a suitable therapeutic animal thanks to its low level of aggressive behaviour towards humans (compared to horses) and positive perception from the client's side as well. Based on the search within scientific databases according to the pre-selected keywords (for example: donkey, therapy, equids), only 78 papers dealing with donkeys and therapies were found, compared to 4,370 papers about horses and therapies. Lack of information about the characteristics of donkeys used for therapy (even sex or age) makes the selection of appropriate therapeutic donkeys almost impossible, therefore more research in this area is urgently needed.

**Key words:** donkey, community, welfare, human-animal bond, animal therapy

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## **List of the abbreviations used in the thesis**

AAI - Animal-Assisted Interventions

IUCN - International Union for Conservation of Nature

OIE - World Organisation for Animal Health

FAO - Food and Agriculture Organisation of the United Nations

GASL - Global Agenda for Sustainable Livestock

UN - United Nations

AAA - Animal-Assisted Activities

AAT - Animal-Assisted Therapy

AAE - Animal-Assisted Education

DAI - Donkey-Assisted Interventions

DAT - Donkey-Assisted Therapy

DAA - Donkey-Assisted Activities

EAAT - Equine-Assisted Activities and Therapies

EAGALA - Equine Assisted Growth and Learning Association

# 1. Introduction

For thousands of years donkeys have been used for work, as a tool of transport, and for power in agriculture, despite the fact that they are still considered a sign of backwardness, underdevelopment, and low status (Fernando & Starkey 2004). People of wealth have used larger animals, for example cattle, horses, and camels; leaving donkeys for poorer social classes (Fernando & Starkey 2004). According to Starkey (1995), they are cheap, affordable, and sustainable power sources for people within rural communities, areas where donkeys are highly appreciated. In cities however, it is the other way around. People have a poor opinion of them. In many societies around the world, donkeys are perceived as ridiculous in their appearance and voice and stubborn in their nature (Starkey 1995).

In early western literature, donkeys were used symbolically in a negative way that affected people's attitude towards them and so towards their treatment and management. In the eyes of most people some animals are viewed as being more worthy than others, but donkeys do not belong to that preferred group (Bough 2011).

A study by Bough (2011) examines some references to donkeys in literature. For example, the writings of Homer, Aesop and Apuleius represented donkeys as servile, stubborn, and stupid. In contrast, biblical stories present them as symbols of humility, peace, suffering and service. An example can be the story of Balaam's ass in the Old Testament, where God chose to speak through a donkey to show Balaam the error of his ways. There was a belief that donkeys had a special connection with the spiritual world.

It is possible to choose, refute or confirm the view of the donkey as a stupid, stubborn, and less worthy animal. To be able to better understand their nature, this thesis is introducing the donkey's origin, domestication, some of its behaviours, habits, and ability to learn and react. Further, this thesis explores the donkey's major roles in the development of rural communities and its potential within an approach called Animal-Assisted Intervention (AAI), as a form of rehabilitation developed to support conventional treatments for physical, mental, social, communication, and behavioural development of clients.



## **2. Aims of the Thesis**

This Bachelor Thesis' goal is to review the recent literature on the role of donkeys in:

- a) Modern rural communities, their potential to contribute to the family budget and the level of care they obtain in current conditions
- b) Donkey Assisted Interventions, and to define the specific fields where the donkeys are and might be used as therapy and describing the predisposition of a therapeutic donkey (specific behaviour, age, sex, physiology)

Hypothesis:

- a) Donkeys' potential as a therapy is demonstrated mainly within developed countries.
- b) Donkey Assisted Intervention is a tool to raise the animal's status and better its welfare conditions within rural communities.
- c) Within animal therapy, the donkey is a feasible alternative to the horse.

### **3. Methodology**

This thesis is based on literature review; no primary data has been collected during its completion. The databases used for collecting the relevant information include: Web of Science, Science Direct, Scopus and Google Scholar. Key words used during the literature search were mainly a combination of the following: donkey, role, welfare, animal therapy and human-animal bond.

Based on a literature search within scientific databases, only limited sources of information are devoted to the topic of Donkey Assisted Intervention. And so, it was not possible to gain enough knowledge in terms of predisposition and characteristics of therapeutic donkeys. For example, the result of available scientific papers within the Web of Science database, in the time period 1945-2021, only 78 articles were found under the keyword “donkey AND therapy”, in comparison to “horse AND therapy” where 4,370 articles were found and keyword “animal AND therapy” returned 94,499 results.

## 4. Literature Review

### 4.1. Origin and domestication of the donkey

Animal domestication influenced human development and directly contributed to the increase of agricultural production. Approximately 11,000 years ago the domestication of plants and animals started to transform human interaction with the natural world (Peters et al. 2005). People directly benefited from the relationship they gained, transport of goods, access to meat and milk, and labour for heavy tasks within agriculture.

The first large mammals domesticated in Africa were cows happening 7,000-8,000 years ago. Pastoralists in the Sahara domesticated cattle primarily for meat and additionally for transport and dairy, as evidenced by rock paintings found in the interior Sahara (Lhote 1959).

After the desert became drier, changing conditions forced people to find better solutions for transportation. The African wild ass naturally lived in semiarid and hilly environments, characterized by vegetation with poor nutritional value, remote water sources and severe temperature changes between day and night (Beja-Pereira et al. 2004). Asses were able to survive in the harshest conditions on earth. They are extremely persistent and can travel long distances in search of food and water (Smith et al. 2005). Wild asses have many advantages over cattle and so people preferred to use them for transport. Domestication of donkeys  $\approx$ 6,000 years ago transformed early pastoral societies and ancient states, it also allowed large-scale food distribution in the nascent Egyptian state and expanded overland trade in Africa and western Asia (Rossel et al. 2008).

There are three species of wild asses: African wild ass (*Equus africanus*), Asiatic wild ass/Onager (*Equus hemionus*) and Tibetan wild ass/Kiang (*Equus kiang*) (see Figure 1). The Asian onager was introduced as a possible ancestor of the domestic donkey (*Equus asinus*), but it is now accepted that the African wild ass is the ancestor of the donkey (Orlando et al. 2013).

The IUCN Red List of Threatened Species lists the African wild ass as “critically endangered” with its population of only 28-200 mature individuals. They are located in the area of Eritrea and Ethiopia. In the last 35 years in Ethiopia there has been a population decline of more than 95% (Moehlman et al. 2015).

The Asiatic wild ass is considered “nearly as threatened” with a stable population of around 28,000 of mature individuals. They are found mainly in southern Mongolia and along the Mongolian-Chinese border (Kaczensky et al. 2015).

The Tibetan wild ass is in the category of “least concern”, its population trend is also stable with 60,000-80,000 mature individuals (Shah et al. 2015).

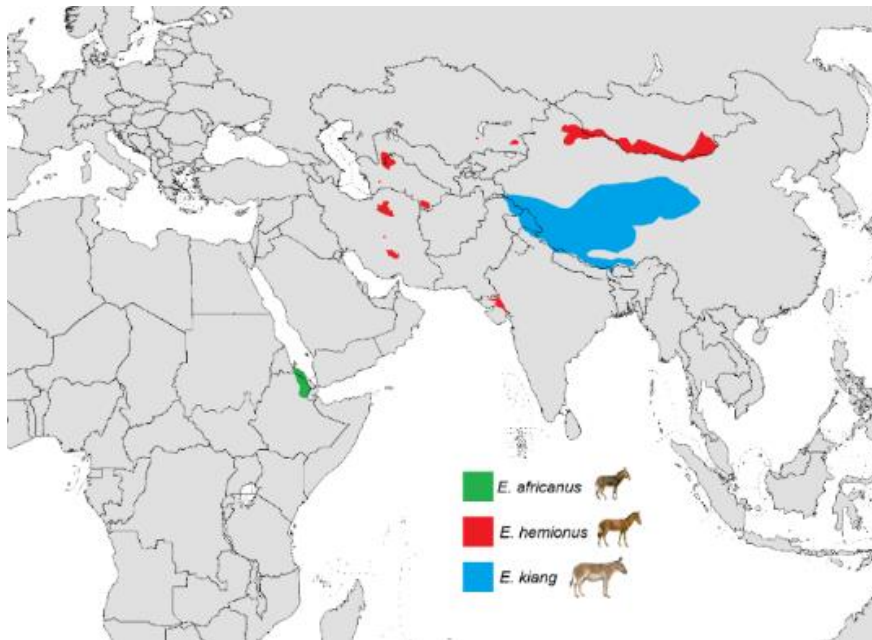


Figure 1. Current distribution of three species of wild asses (Source: Mariomassone 2020, based on The IUCN Red List of Threatened Species 2015)

## 4.2. Natural behaviour and habits

The thesis is focused on the domestic donkey and so the information about natural environment and behaviour is connected to its ancestor, the African wild ass.

#### **4.2.1. Forming groups**

In the natural environment of the African wild ass, availability of sufficient food and water is rare, a larger herd would not be able to survive and that is the reason why they live in very small groups, as based on the study of Moehlman (1998), the only stable groups of feral asses were mother and her offspring, and some stable single-male and multi-male harem groups.

As feral asses are found mainly in groups of two or even living as a solitary unit, they come together only to breed or if the conditions are improved and there are enough resources for everybody, in that case they tend to form stable groups (Klingel 1998). Wild asses are not adapted to live within a linear dominance hierarchy and so they do not show much of dominance or aggression in comparison to horses, ponies, and mules (Osthaus et al. 2013). The signs of dominance were seen just in case of territorial male asses, but no hierarchy is being founded (Klinger 1998).

Donkeys are naturally gregarious animals, even though their wild ancestors were used to a solitary way of life. They can live fuller lives being in a company of their own species, donkey bonding is very strong, and studies have shown the phenomenon of long-term or lifetime “pair-bonding”. If they are removed from their bonded companion, they may refuse food and water and become apathetic (Murray et al. 2013).

#### **4.2.2. Response to predators and fear reactions**

Like many other herbivores, feral asses face the danger of predators as for example wolves, foxes, coyotes, wild dogs, and lions. Asses can respond by fleeing or fighting. It always depends on the situation, the predator, and the environment. If there is a predator close to the mother with her foal, the “flight” response is not always the way to survive. Also fleeing in mountainous terrain is difficult and the better solution is to fight with their teeth, feet, and body weight (Burden & Thiemann 2015). Even though donkeys are usually perceived as docile and nonaggressive animals, its behaviour can change during the mating season or in the case that somebody or something suddenly enters the donkey’s personal space. In that situation, donkeys can feel uncomfortable or even threatened and its reaction can be unpredictable and sometimes even dangerous (Mosbahi et al. 2020). Donkeys responding to danger can involve trampling, kicking, and biting. Their bite force

can be sufficient to cause death, as it was reviewed in a case of a 21-month-old girl that was found dead in a farmyard next to a donkey that belonged to the family (Mosbahi et al. 2020).

#### **4.2.3. Nutrition**

The ancestors of the domestic donkey evolved as browsers as well as grazers and survived on lignin rich, low energy, fibrous plants, which they would have to range for many miles to obtain, spending 14-18 hours per day foraging over distances of 20-30 km per day (Smith et al. 2005). Fermentation of forage occurs in the hindgut so asses can very efficiently digest poor nutritional quality fibre. Donkeys' daily intake and energy requirement are equal to 1.3%-1.7% of their body weight in dry matter (Burden 2012), compared to 2-2.5% for horses (Lawrence 2008).

Higher energy intake in the diet of donkeys brings out many health problems such as obesity, metabolic or hormonal imbalances, hyperlipidemia, and laminitis (Burden et al. 2011). Donkeys are also equipped with numerous water-sparing mechanisms and are renowned for their thirst tolerability. But it should not be confused with water requirements which are similar to that of horses (Burden & Thiemann 2015).

#### **4.2.4. Anatomy**

There are numerous anatomical differences between the body of a horse and of a donkey, the most visible of these are the large ears of a donkey which evolved to receive communication from distant disparate groups and to dissipate heat. Another difference is the donkey's close limbs and upright hoofs which are evolved in order to move through difficult terrain rather than running fast (Collins et al. 2011). Their hoofs are much more solid and therefore do not need horseshoes. The hoof microstructure enables any moisture from the environment to be drawn in (Hopegood et al. 2008), although this is useful only in arid areas of donkey's origin and this adaptation can cause many problems in temperate climates where the rain is much more prevalent (Thiemann & Rickards 2013).

#### **4.2.5. Pain response**

In some regions people are still convinced that donkeys do not feel pain or have a high pain tolerance, but they just display different signs and symptoms of pain and

sickness than horses and other species do (Burden & Thiemann 2015). Olmos et al. (2011) has described the donkey's response to pain as stoic or "subtle". Some of the behaviour signs of pain might be harder to recognize, it can be, for example, reduced intake of food, reduced interest in the environment or companions, ears may not be responsive to noise or other stimuli, or increased frequency of laying down (Olmos et al. 2011). So far there is no evidence that the donkey has a different pain tolerance in comparison to other equids (Burden & Thiemann 2015).

#### **4.2.6. Ability to learn and react**

As written in the introduction, there are some evidence of people perceiving donkeys as stupid and stubborn animals (Starkey 1995). The following studies compared cognitive abilities of donkeys with other equids.

When donkeys were compared to mules and horses within a preservation and detour behaviour test (Osthaus et al. 2013), they ended with better results than those of horses. But mules were the fastest in solving the detour task through a changing gap to reach a food reward. Results presented mules and donkeys being flexible in learning tasks (Osthaus et al. 2013). Donkeys can also be considered as an intelligent animal when evaluated on an analogous human scale (González 2019).

Temperament test (Gonzalez-De Cara et al. 2017) presented younger donkeys as faster and able to stand close to the human for a longer time than the older ones. It can be explained by their more curious nature and less experience with humans and handling. Donkeys showed minimal or no reaction to the sound test. On the other hand, donkeys are more cautious than horses, demanding a longer time for building trust with humans and willingness to interact, but no fear of humans was detected.

According to Baragli et al. (2011) and his study on donkeys' short-term memory, where eight donkeys should examine the location of a hidden object after a short delay, a decrease in performance along with an increasing number of tests was found. The reason may be a decrease in motivation, however, all evaluated donkeys performed above chance level, which demonstrates their capacity for short-term memory.

### **4.3. Working equids**

As the ancestors of domesticated donkeys were well adapted to harsh conditions, their purpose within livelihoods gained importance and so increased their advantages over other livestock (Beja-Pereira et al. 2004). They have become part of the community, together with other working equids, horses, and mules.

According to the Food and Agriculture Organization of the United Nations (FAO 2019), there are over 112 million of equids (horses, donkeys, and mules) in developing countries, most of them serve as a working animal supporting the livelihoods of approximately 600 million people worldwide (McKenna 2007). In general, those working equids are reducing poverty through direct and indirect income generation, providing access to food and services, and being one of the main sources of power and energy within farming (Van Dijk et al. 2014).

Donkeys play an indispensable role for households, especially in rural areas, but also within cities. As it can be seen in Figure 2, the biggest population of donkeys remains in just a few countries, with Ethiopia and Sudan being on the top. When working with donkeys, owners can obtain extra income and some level of security can be achieved for deprived and vulnerable people (Geiger et al. 2020).



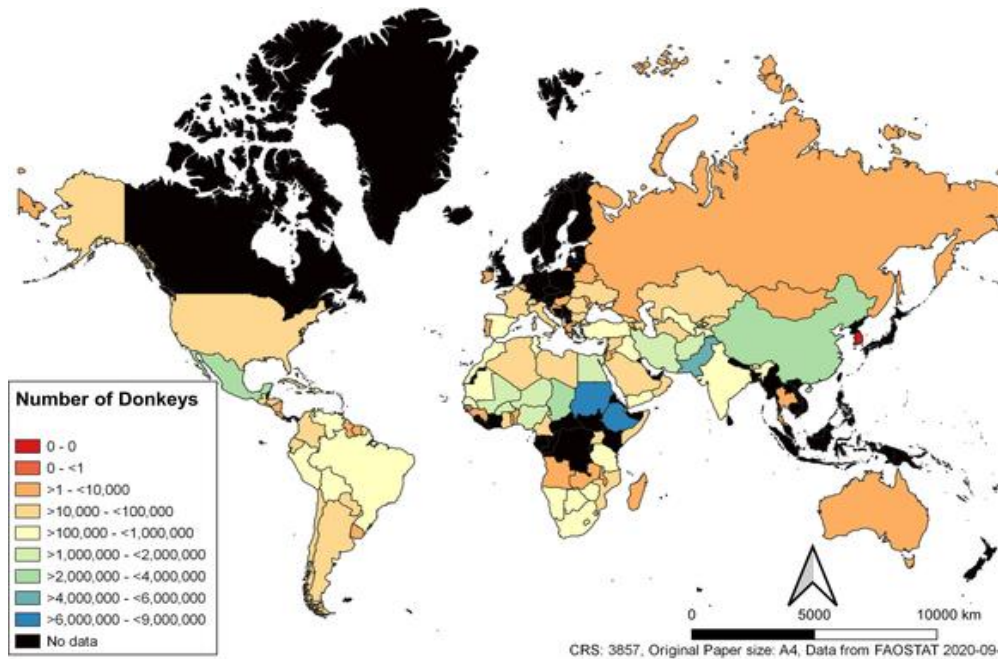


Figure 2. Global donkey population sizes for each country in 2018 (Source: Norris et al. 2021)
















































During a project conducted by Geiger et al. (2020) data on importance of working donkeys were collected in rural, peri-urban, and urban areas within Ethiopia where 20 donkey owners/users and 10 community stakeholders (such as veterinary surgeons, business owners, police officers, and village chiefs) were included. The results showed that not only donkey owners can directly benefit and get extra income from the help of donkeys, but also the whole community is supported. Donkey owners are usually offering help where needed by lending their animal. Participants declare donkeys act as a path from extreme poverty through independence, status, employment, health, and happiness.

In total, 70% of donkey owners participating in the study (Geiger et al. 2020) demonstrate feelings of comfort, security, and relief through their relationship with donkeys which provide them with higher social status, and improved self-esteem and independence.

Talking about women and their social status within the community, the presence of donkeys is significant. “Donkeys, together with horses and mules, serve as the legs, backs, arms and heads of millions of women throughout the developing world.” (Valette 2014, p. 9). Donkeys are assisting women during their daily tasks, for example transport of water from wells to home, collecting firewood, transport of goods to the market and

home, carrying food and water for other livestock, and taking sick animals to the clinic (Geiger et al. 2020). Without this kind of help women would be more exhausted physically. Table 1 presents the direct and indirect help and source of savings by owning working equids. Women from Kajiado in Kenya highly appreciate the values of donkeys: strength, calmness, disease and drought resistance, and lower vulnerability than other livestock (Marshall & Weissbrod 2011).

Table 1. Use of working equids by women participating in focus groups (Source: Valette 2014)

	Direct							Indirect				Saving												
	Transport of people for a fee	Transport of construction materials	Transport of grains for a fee	Transport of agricultural produce for a fee	Transport/sale of animal feed and manure	Transport/sale of firewood/water	Hire (donkey/horse)	Foal rearing and selling	Rubbish collection	Transport of bricks in brick kilns	Transport of pottery to market	Transport of agricultural produce (to market)	Transport of grains to/from milling houses	Transport of milk to cooperatives	Fetching water and firewood for own use	Transport of goods/household items from market	Transport of dung cakes and clay for own use	Transport of animal feed for household livestock	Transport of grain & agricultural produce for own use	Personal transport for social events/ambulance	Transport of sick animals to health clinics	Transport of construction materials for own use	Transport of manure to field	Transport of pesticides and seeds to the field
<b>Ethiopia</b>																								
<b>Kenya</b>																								
<b>India</b>																								
<b>Pakistan</b>																								

#### 4.3.1. Welfare of working equids

Even though the contribution of donkeys to the lives of men and women has vital impact through economic independence, protection from financial and physical

vulnerabilities and increase in social status within communities (Geiger et al. 2020), the status of an animal remains undervalued and misjudged.

Most of the working equids are owned by one of the poorest social class, and so they may be more overworked, living under unsuitable conditions with inappropriate management and lack of medical care (McKenna 2007). With focus on donkeys, a survey of Diarra et al. (2007) identified reasons why donkeys cannot work at their full potential or are not able to work at all. The total number of included donkeys was 2,500 in the study area of Niono and Segou in Mali, the problems were as follows: many working hours (more than 6 hours daily) was the case in 82%, 79% travelled long distances (more than 20 km per day), 76% were equipped with poor harnesses, and 51% of donkeys suffered from carrying or pulling loads weighing more than 500 kg. The donkey’s physiognomy allows them to carry loads over 60% of its live weight and to walk many hours without food or water (Meutchieye 2014). In a Donkey Care Handbook (The Donkey Sanctuary 2015), in case of regularly loading, it is recommended for an average donkey of 160 kg not to carry more than 50 kg on its back (approximately 30% of its weight) and pull no more than twice its body weight on flat level ground.

One of the welfare problems connected to many working hours is demonstrated in Figure 3, where the total number of working hours is divided into activities through the year, with focus on donkeys from Mwea in Kenya.

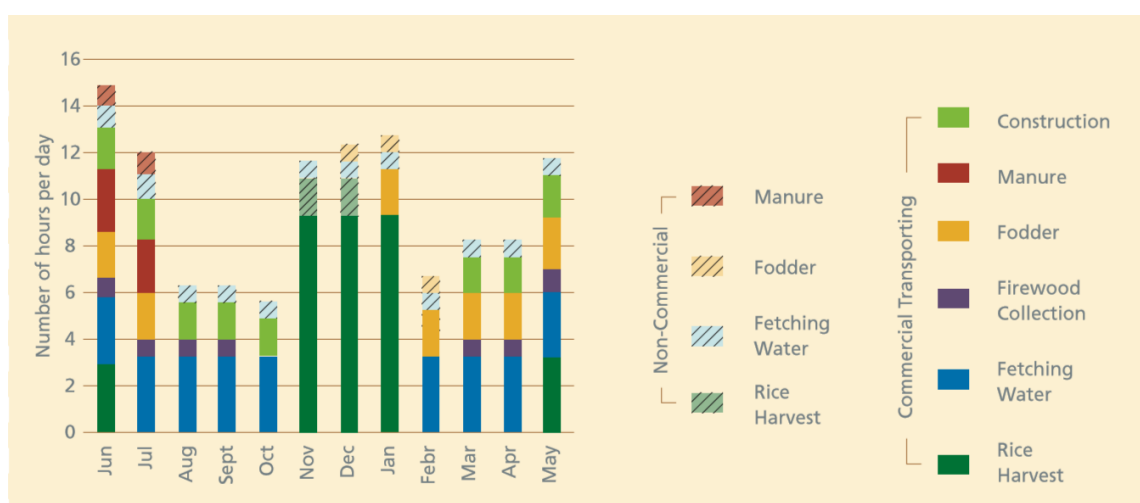


Figure 3. Commercial and non-commercial hours worked by donkeys in Mwea, Kenya (Source: Valette 2015)

Another study (Burn et al. 2010) representing welfare problems of working equids identified data provided by The Brooke Hospital for Animals (The Brooke, introduced in the following chapter), data collection took place from March 2003 to February 2007 across 60 locations in nine developing countries (Afghanistan, Egypt, Ethiopia, Guatemala, India, Jordan, Kenya, Pakistan, and Gambia). Non-invasive behavioural and physical data were collected from 5,481 donkeys, 4,504 horses, and 858 mules (in total 10,843 working equids). Older and thinner equids were more likely to suffer from some welfare problems, younger ones were in better condition. Donkeys suffered sole abnormalities at almost four times the rate of horses or mules, also being thinner and having a higher prevalence of gait abnormalities, apathy, and faecal soiling. In comparison, horses were four times more likely to suffer from ectoparasite and did show aggressive behaviour more often than other equids. Mules had the highest occurrence of skin lesions.

Focusing on work-type, activities such as transporting bricks or goods by pack, carrying local people by cart, or being ridden by tourists were involving animals in which their body was among the thinnest. Welfare problems also differ between urban and rural areas, where urban animals were having more skin lesions and did show more aggression. In rural areas the problem was on the side of malnutrition, ectoparasite, faecal soiling and gait and sole abnormalities (Burn et al. 2010).

Hewson (2003) summarized three main aspects of animal welfare, the first one is based on the body and the physical environment (shelter, feed). Second is a feeling-based approach which is measured by willingness to work and behavioural signs of fear or frustration. And the last aspect is focused on the animal living according to their nature. The above studies show that the needs of working donkeys are not met in these three categories.

#### **4.3.2. Equine welfare organizations**

A solution of this improper management can be found in further education and training for donkey owners (Heleski et al. 2008). Improved nutrient management and avoidance of harsh and abusive training methods would lead to improved welfare and longevity of an animal (Heleski et al. 2008).

Working equids receive minimal attention and recognition from formal service providers such as government agencies, agriculture extension services, animal health services providers (farriers and veterinarian) or development agencies (Blakeway 2014). Remaining ignored in relevant global, regional, and national policy and programming (Valette 2015). According to Valette (2015), Head of Advocacy at Brooke, the following recommendations should be considered:

- a) Working donkeys, horses and mules should be explicitly included in livestock policy and programmes
- b) Increased visibility of working equine animals in data collection and research
- c) Reconciling the multiple values of working equine welfare
- d) Greater political commitment on working equine welfare

There are organizations working within equine welfare in developing countries, helping to prevent problems occurring in the future, offering education, training, and veterinary care.

**The Brooke**, founded in 1934, is an example of such an organization. Being an international animal welfare charity protecting and improving the lives of working horses, donkeys, and mules, operating in Africa, Asia, Latin America and the Middle East, they work with owners, communities and policy makers having goals such as strengthened livelihoods, improved behaviour towards animals and intensification of animal health services.

**The Donkey Sanctuary** as another example of a worldwide known charity devoted to the welfare of donkeys, founded in 1969 in the United Kingdom. Providing permanent homes to over 7,000 donkeys and mules within 10 sanctuaries around Europe and reaching approximately 1.8 million donkeys and mules through their work in 35 countries. Among their activities is the provision of veterinary care, the organization of global programmes oriented on animal welfare education, sharing knowledge within schools, supporting, and collaborating with donkey owners, and also raising awareness. They cooperate with organisations such as The World Organisation for Animal Health (OIE), the Food and Agriculture Organisation of the United Nations (FAO), The Global Agenda for Sustainable Livestock (GASL), the United Nations (UN and the World Bank.

The Donkey Sanctuary is also involved in the activity known as Donkey-Assisted Interventions, which will be described in the following chapters.

#### **4.4. Animal as a way of healing**

In today's world, animals are not seen only as a source of power within agriculture or a tool of transport for people living within rural areas. During the last decades they have gained another purpose, many different animal species have become healers and provided support within conventional treatments in the field of human health and well-being. Therefore, the second part of this thesis is focused on the potential of an animal to interact with humans and so be helpful in the process of healing and recovering.

##### **4.4.1. Human-animal relationship**

Throughout history, animals have played a fundamental role for humanity, they were the source of survival for hunter-gatherer societies, providing food and their skin to protect people from inhospitable climatic conditions (Larson & Fuller 2014). Later on, during the Neolithic revolution, animals started to be used as a source of power and work. Cave paintings and other art forms demonstrate that animals formed part of the lives of our ancestors (Amiot et al. 2016).

During the process of domestication, the status of animals went through changes. In the close relationship with humans, animals' environment and behaviour have transformed, starting to be managed by owners more than by nature.

However, people do not own animals only because of their strength and ability to help with daily tasks. There are specific groups of animals which are called "Companion animals", they are kept as pets, and as animals people live with which do not provide any specific function except the psychological benefits of their relationship with humans (Serpell & Paul 1994). Many species (dogs, cats, rabbits and other rodents, horses, birds, and others) play an important role within the society and have become constant companions in many households. Pleasure, relaxation, affection, loyalty and security, are positive features of connections within human-animal bonds (Walsh 2009). These relationships may even function on a therapeutic basis in terms of companionship and unconditional acceptance (Risley-Curtis 2010).

The bond between a person and an animal can be strong and make crucial changes within the person's life. Interaction among children and companion animals contributes to a child's cognitive and language development, improvement of empathy, self-esteem, and social participation (Melson 2001). For people experiencing end of life trauma in palliative and hospice care, animals can ease their suffering and anxiety (Geisler 2004). In general, human-animal relationships reduce anxiety, depression, and loneliness by enhancing social support and well-being, there are also positive impacts on the treatment of heart disease, dementia, and cancer (Friedmann & Tsai 2006).

#### **4.4.2. Animal as a part of therapy**

Animals have many positive impacts on human physical as well as mental health. Many different species of animals (for example dogs, cats, horses, donkeys and other farm animals, dolphins, or birds) are being used as a part of therapy and are implemented as a form of supportive treatments and complement conventional treatments (Nimer and Lundahl 2007). Therapy can be applied to many different health and behaviour problems, covering medical outcomes (improvements in heart rate, blood pressure, motor skills and coordination), emotional well-being (anxiety, depression, or fear) or observable behaviours (verbal resistance, aggression, violence, or compliance with rules). Different age groups are involved as well, children, adolescents, adults, and the elderly. Animals can also improve the quality and strength of relationships between the therapist and the patient (Kruger et al. 2004).

The term Animal-Assisted Intervention (AAI), which includes Animal-Assisted Activities (AAA), Animal-Assisted Therapy (AAT) and Animal-Assisted Education (AAE), is characterized by Pet Partners (the national leader in demonstrating and promoting the health and wellness benefits of animal-assisted therapy, activities, and education founded in 1977) in Figure 4.

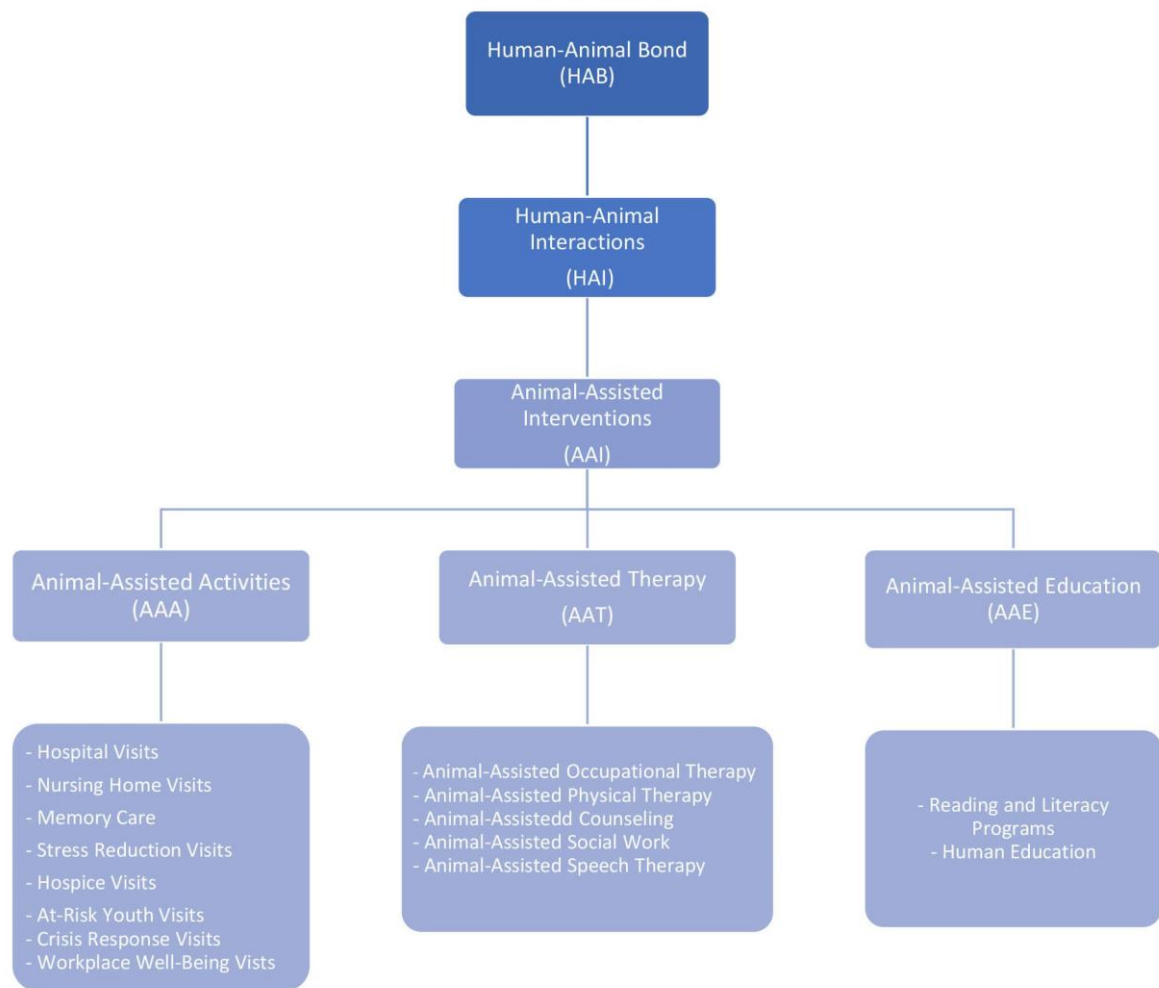


Figure 4. Guide to Animal-Assisted Intervention Terminology (Source: Pet Partners 2019)

“Animals that participate in AAA/T are purposefully selected, healthy, safe, and meet risk management criteria. They possess appropriate aptitude, and an appropriate size and age, and demonstrate appropriate skills for their participation to be beneficial to all team members” (Delta Society 1996).

#### 4.4.3. Case study as an example

The following case study is implemented to complete the introduction into the field of animal therapy. It was chosen based on the multicultural environment and cooperation with people from developing countries.

A study focused on heart and limits of animal therapy was designed by Every et al. (2017), containing online survey for Australian therapists mainly working with



children and adolescents, refugees from following countries: Sri Lanka, Iraq, Iran (16% each); Myanmar, Afghanistan (13% each); Pakistan (9%); Vietnam (4%); South Sudan, Liberia, Yugoslavia, Cambodia, Zimbabwe, and Egypt (2% each).

It was found out that interactions with animals have positive outcomes for increasing social interactions, building trust, and reducing difficult behaviours. If the animal is incorporated into the communication between therapist and child, there is a change in behaviour, children become calmer, more focused and also more gentle. Study outcomes identify that animal-assisted therapy is a bridge of trust between therapist and participant, building connections and reducing problem behaviour. In conclusion, the appropriate choice of an animal based on the cultural origin of the participant may be useful non-language therapy.

According to the study (Every et al. 2017), most research on human-animal relationships and animal therapy is based on the cultural aspects of Western society. But when working with refugees, different perspectives exist on the selection of appropriate animals for therapy. In countries such as Afghanistan, Iran or India, emotional connections are formed also with birds and donkeys. Some participants of the study have shown a fear or unwelcome attitude toward dogs, as in their country of origin (mainly Islamic countries) dogs are not kept as companion animals. For example, working animals, especially donkeys, are perceived as an appropriate companion within the therapy.

#### **4.5. Donkey-Assisted Interventions**

As the topic of this thesis is focused on the role of the donkey in the development of rural communities, the following section reviews the fields where donkeys can be used in therapies, and some examples of providers are introduced.

Donkey-Assisted Interventions (DAI) can occur also under the term “onotherapy” or “asinotherapy”, which is basically the involvement of donkeys within AAI, complementary to other rehabilitation methods (Kapustka & Budzyńska 2020). As well as AAI, DAI is also a blanket term for Donkey-Assisted Therapy (DAT) and Donkey-Assisted Activities (DAA).

Donkeys are smaller and slower, having longer and softer hair compared to horses, which makes them a good alternative to horse therapy (Equine-Assisted Activities and Therapies (EAAT)) (Camillo et al. 2018). The temperament test (Gonzalez-De Cara et al. 2017) demonstrates donkeys' potential within the AAT, showing minimal or no reaction to the sound test, in comparison to horses which showed more sensitivity to the stimuli. This is important within the AAI where loud environments are very common. Gonzalez-De Cara et al. (2017) was the first (and only) in describing temperament traits in donkeys for AAI selection and so more studies need to be done to increase institutional knowledge.

#### **4.5.1. In which cases can a donkey heal?**

Unfortunately, only a limited number of studies focusing on donkeys as a therapy are available, that is the reason why the following studies are described in more detail.

Based on the study (Rose et al. 2011), donkeys were described as an excellent motivation builder, booster for communication, verbal language skills and reading non-verbal signs. Increased curiosity, attention and motivation was obtained from the relationship between child and donkey. Four children aged between 6 and 12 were included into a 6-month treatment, with 45-minute sessions weekly. Children were diagnosed with emotional-relational disturbances, communication difficulties, psychic distress and depression symptoms, behavioural disturbances, hyperactivity, and mental retardation. It was described that donkeys proved to be a flexible animal in terms of therapeutic effectiveness. Children were able to connect with themselves as well as with the surrounding world and its reality, identifying their strong points on which motivation can be built. In conclusion, the study identified donkeys as a potential contributor towards improvement in patient's rehabilitation in addition to traditional practices. No specific data about donkeys involved in the study were included.

A study on the evaluation (Borioni et al. 2011) of effects within horse and donkey therapy on physical and psycho-social performance of people affected by intellectual disability was conducted at a rehabilitation centre in Viterbo, Italy, including eight adults (mean age 42.9) undergoing equine therapy with horses and fifteen adults (mean age 38.6) attending therapy with donkeys. Horse therapy included phases such as hippotherapy, riding and vaulting and horse carousel. On the other side, donkey therapy uses stages as approaching and contact, interaction with donkeys and training the donkey to respond to

commands. As a result, the study found there were positive impacts of horse/donkey therapy in non-clinical environments on physical, mental, social, communication, and behavioural development of clients, alleviating feelings of loneliness and isolation. The evaluation was made by psychologists and instructors. According to both, there was an improvement in the autonomy, cognitive and affective-relational areas within the horse therapy. In donkey therapy, the psychologists noticed the same improvements as horse therapy, instructors recorded positive effects on motor-praxis and communication areas. As in the previous study (Rose et al. 2011), no specific data about donkeys were included.

Colombo et al. (2020) and their study illustrated the use of donkeys in the field of intellectual disability, including 37 adults with this diagnosis (between 20 and 70 years old), six donkeys chosen by two certified operators, one health care professional, and a veterinarian (female adults of different breeds, medium size, good state of health, suitable for behaviour and specifically trained as co-therapist). Operators and donkeys were part of Association Passi e Crinati in Italy. The donkey therapy session took place once per week (one session is around 60 to 150 minutes) over a period of nine weeks. Each session was formed by 4 to 7 participants, 2 donkeys, 2 operators and 1 health care professional. The therapy was divided into 3 phases: 1) familiarizing the patients with the environment and the animals, improving their knowledge about donkeys, and reminding basic safety rules, 2) patients were taught how to groom and care for the donkey, activities as talking, stroking, playing and brushing were included, 3) train the donkey to respond to patients' commands, and lead the animal for a short walk. Evaluation was made by those operators and health care professional involved in the intervention, reviewing five factors: mental functions, learning and applying knowledge, communication, domestic life and interpersonal interactions and relationships. There was a significant improvement in all areas, major ones in mental functions and learning and applying knowledge.

#### **4.5.2. Example of Donkey-Assisted Interventions providers**

The fields, where the donkey is a source of human health improvement, are reviewed above. It is possible that there is a wider range of potential fields where the donkey therapy can heal, but so far there is no supporting evidence. The second part of this chapter is mainly focused on some providers and organizations dedicated to DAI.

A good example has been introduced within the study of Galardi et al. (2020), which is collecting information about the features of DAI providers in the Veneto Region in Italy. It is a questionnaire-based pilot study interviewing 21 providers, both profit and non-profit DAI services, most of them started between 2010 and 2015. As the result showed, mainly Donkey Assisted Activities (compared to DAT and DAE) are provided due to its flexibility, lower costs, and easier management thanks to the small number of required team members. Involved providers considered donkeys to be a versatile and suitable animal for AAI. There are plenty of variables: donkeys are involved alone or with others, within single or group sessions, in open fields and inside areas.

In total, 67% of all providers declare that DAI does not serve as their main business, only being a supplementary income to other activities, such as agriculture production or social services. In Table 2 there is also an argument describing unwillingness to pay for such an activity, where related costs (for example expertise, management) are not being considered by potential customers. Another weakness is formed by lack of knowledge and lack of respect from institutions, required standards of quality are also missing within this field. Moreover, providers are motivated mostly by beneficial effects on users and improvement in human relationships between users and providers, followed by positive and non-judgemental relationships between donkey and users.

Table 2. Strengths and weaknesses of DAI (Source: Galardi et al. 2020)

%	Strength	Weakness	%
48	Beneficial effects on users	No weaknesses	19
48	Improvement in human relationships between users and providers	Low regard by institutions	19
24	Positive and non-judgmental relation between donkey and users	Insufficient knowledge of this field	19
19	Willingness of donkeys to every category of user	Low profitability	19
14	Power to involve and interest users that are usually passive	Difficulties in defining adequate charges	14
9	Beneficial effects on providers	Lack of targeted insurance policies	14
9	Possibilities of multidisciplinary collaborations	Deficiency of practitioners with expertise	9
9	Operate in the rural environment	Economic uncertainty	9
9	Donkeys as a medium to encourage self-improvement		
9	Opportunity of diversification for small organizations		
9	Innovative and challenging field for providers		

Table 3 compares the AAI fees of single and groups sessions, where the mean fee for a single user is 41 € per session and 20€ for group sessions per session per user.

Table 3. AAI fees (€/session per user) (Source: Galardi et al. 2020)

	Minimum	Maximum	Mean	Median	Standard deviation
Single user	27.0	80.0	41.0	35.0	17.7
Group of users	6.0	35.0	20.0	19.0	12.8

AAI, Animal Assisted Interventions.

As mentioned in the chapter 4.3.2. Equine welfare organizations, The Donkey Sanctuary is also providing therapy with donkeys, they are involved in many countries in terms of support and development of the therapy. For example, the Donkey Sanctuary is funding the project with an independent non-profit organization called Cheshire Ethiopia, providing orthopaedic and social rehabilitation services for children and young people with disabilities (see Figure 5). The pilot project has been running since 2015 and it consists of Donkey-Assisted Therapy, assisting children with disabilities, developing their life skills including communication, decision making and critical thinking skills, and coping and self-management skills. Together with DAT, Cheshire Ethiopia conducts awareness education on donkey behaviour and basic welfare services.



Figure 5. Donkey-Assisted Therapy, Cheshire Ethiopia (Source: <https://cheshirethiopia.org>)

El Refugio del Burrito is another subsidiary of The Donkey Sanctuary, it was established in 2003 in Málaga, Spain. Rescued donkeys are becoming part of the therapeutic team (see Figure 6). Mostly young, healthy, and of calm character, those are characteristics of donkeys suitable for therapy.



Figure 6. El Refugio del Burrito, Málaga (Source: <https://elrefugiodelburrito.com>)

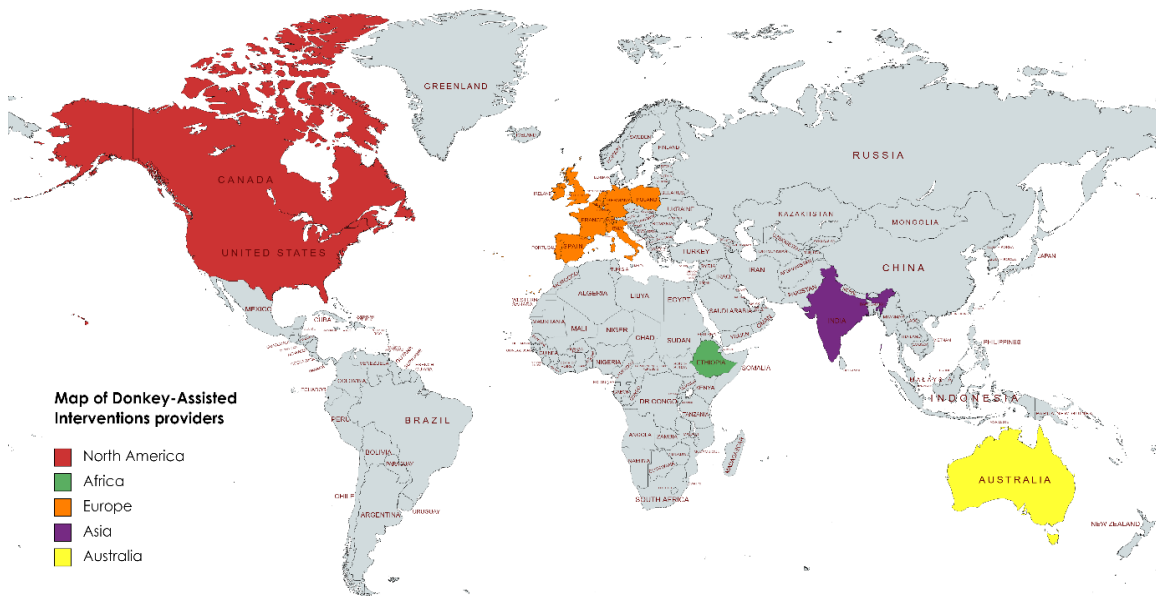


Figure 7. Map of DAI providers (created with mapchart.net, based on <https://donkeywise.org/>, <https://www.thebetterindia.com/>, <https://cheshirethiopia.org/>)

Figure 7 illustrates the distribution of DAI providers, Ethiopia and India are the only developing countries practising donkey therapy, the rest exist within developed regions of the world.

## 4.6. Equine-Assisted Activities and Therapies

Because of the lack of scientific literature about Donkey-Assisted Interventions, the chapter about the therapy with horses is being implemented as a proxy for DAI. The search within the scientific database “Web of Science” explicitly shows the gap in the literature about DAI.

Key words, timespan 1945-2021:

1. animal AND therapy: 94,499 results
2. horse AND therapy: 4,370 results
3. donkey AND therapy: 78 results

The term Equine-Assisted Activities and Therapies (EAAT) covers various interactions with an animal. Selected interventions are introduced as there is little knowledge about quality and standard of DAI (Galardi et al. 2020).

The most frequent one is hippotherapy, which is defined by American Hippotherapy Association (1995) as following: “Hippotherapy (i.e., treatment with the help of the horse) comes from the Greek word *hippos*, meaning horse. Specially trained physical and occupational therapists use this medical treatment for clients with movement dysfunction. In classical hippotherapy, the horse influences the client, rather than the client controlling the horse. The client is positioned on, and actively responds to the movement of the therapy horse. The therapist directs the movement of the horse, analyses the client’s responses, and adjusts the treatment accordingly. The goals of classic hippotherapy are to improve the client’s posture, balance, mobility, and function.” (p.12)

Another intervention, Equine-Assisted Activities, is designed to meet the improvement in socialization, companionship, personal boundaries, and self-esteem, including activities such as therapeutic riding, ground activities, grooming and stable management (Selby & Smith-Osborne 2013).

Equines-Assisted Learning includes grooming, riding, and saddling together with non-violent communication, in order to strengthen communication skills, build self-awareness, confidence and self-control (Burgon et al. 2018).

Equines-Assisted Psychotherapy consists of sessions with a licensed psychotherapist or psychologist. Horses are able to detect the human body language and

emotions and according to that horses can provide an immediate response to the participant's behaviour, which is further interpreted by the facilitator (Wilson et al. 2017).

Equine-Assisted Therapy interconnects aspects of the already mentioned interventions in order to improve gross motor, social and self-help skills (Ratliffe & Sanekane 2009).

#### **4.6.1. Horses and their impact on mental health**

In general, EAAT improves posture and balance, and decreases muscle stiffness, patient's confidence and feelings are influenced as well by touching, grooming and human-animal contact in general (Borioni et al. 2011).

The following part is focussed on the effects of horse therapy on mental health. This specific field was chosen because of the evidence that donkeys can improve mental functions, learning and applying knowledge (Colombo et al. 2020) and communication skills (Rose et al. 2011, Borioni et al. 2011). And so, this chapter can offer some of the potential development within DAI and specific areas where it can be implemented.

Many providers of EAAT are part of an Eagala organization (The Equine Assisted Growth and Learning Association), as one of the first to develop a model of professional standards within the incorporation of horses into psychotherapy. Nowadays it is a worldwide network between mental health practitioners and equine specialists in order to practice equine-assisted psychotherapy. Figure 8 demonstrates the map of providers involved in the Eagala approach. There are also other providers of horse therapy, but they are not included on the map.



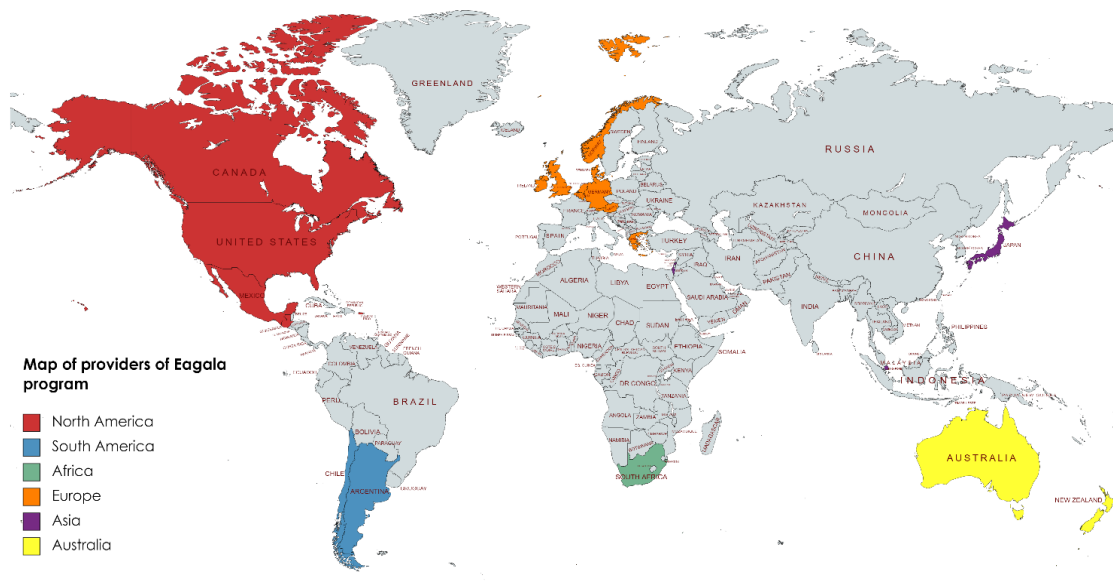


Figure 8. Map of providers of Eagala program (created with mapchart.net, based on <https://eagala.org>)

The study from Lee and Makela (2015) aims to review the experiences of eight mental health practitioners, which already practiced traditional psychotherapy as well as Equine-assisted psychotherapy according to the EAGALA approach. Interviews were carried out with four social workers and four counsellors, each of them having from 2 to 38 years of experience within the field. The aim of the study was to explore the therapeutic factors of horses which led to improvement in client life.

In this kind of intervention, the client is working with a horse from the ground, the client's and horse's behaviour is observed by mental health practitioners and equine specialists and together they discuss the interpretation (Lee & Makela 2015). The whole process helps the client to develop self-awareness and to be able to process emotions. (Lee & Makela 2015). In conclusion, based on the study of Lee and Makela (2015), clients attending the equine-assisted psychotherapy with horses can develop their empathy, mindfulness (being here and now) and understanding of their own feelings and emotions, by naming and accepting them. Slowing down the process of thinking makes clients calmer and more conscious. As Lee and Makela concluded, horses' behaviour reflects the human inner world.

Coping with the death of loved ones and depression mitigation can be another field where equine psychotherapy can contribute to healing. Based on the pilot study

(Graham 2007), only five 90-minutes interventions have shown a significant decrease in levels of depression and a higher ability to face the loss.

Horses can also be great helpers for children coping with being a witness to family violence. After 18 months and 19 equine-assisted psychotherapy sessions (EAGALA approach), the greatest improvements in various behaviour and mental health issues were reached in the case of the youngest ones (Schultz et al. 2007). Equine-assisted psychotherapy can also be applied to patients with eating disorders, anxiety, trauma history, attention-deficit hyperactivity disorder, oppositional defiant disorder, and delinquency (Lentini & Knox 2009). In case of such a wide range of potential clients, therapists can use various techniques and theories suitable for every concrete case. Therapy can be done within groups or based on an individual approach, consisting of activities such as herding and leading, vaulting, traditional riding and may also focus on animal husbandry (care of the animal) (Lentini & Knox 2009).

As in the case of donkey therapy studies, no specific data on appropriate choices of therapeutic horses were provided in the above reviewed cases.

## 5. Conclusions

The Bachelor thesis goal was to review the recent literature on the role of donkeys in rural communities and the level of care they obtain. The potential of donkeys to contribute to therapies within Animal-Assisted Interventions was also studied together with the identification of the predispositions of a therapeutic donkey. The first hypothesis assumed that donkey therapy is practiced mainly within developed countries. The second hypothesis focused on Donkey Assisted Intervention as a tool to raise the animal's status and better its welfare conditions. In the third hypothesis we consider donkeys as a good alternative to the horse within AAI.

Sufficient materials were collected to be able to define the donkey's role and contribution to the community livelihood and the level of welfare and animal management. Their help is especially appreciated by women in carrying out everyday tasks, for example fetching water and firewood or transporting goods to the market and back. Donkey owners also demonstrate feelings of comfort, security, and relief through their relationship with donkeys which provide them with higher social status, and improved self-esteem and independence (Geiger et al. 2020). Donkey ownership represents a path from extreme poverty through independence, status, employment, health, and happiness.

It was found that on one hand donkeys provide an irreplaceable and unique help to people living in rural areas and poor communities, they are still misunderstood and misjudged and therefore their welfare is compromised. The lack of knowledge about the physiology and behaviour of the donkey causes many problems in terms of animal welfare, mismanagement, and mistreatment. But donkeys are not the only ones, the welfare of draught animals (bullocks, horses, camels, mules, and others) in developing countries is very poor in general. Animals suffer from malnutrition, overloading, overworking, and cruel handling (Rahman 2004).

On the other hand, there is a growing potential within international organizations, such as The Brooke or The Donkey Sanctuary, to provide basic training for better animal management and affordable and accessible veterinary care. Which leads subsequently to raised status for donkeys and so changes their perception in eyes of others.

Another field where the donkey brings many benefits to human life is Animal-Assisted Intervention, mainly with focus on psychotherapy. Donkeys are having great outcomes connecting with clients. Based on human-animal bonds, there are positive impacts on client's development and recovery. Donkey-Assisted Intervention is still a new approach with little attention in the field of science. Based on available literature sources there is still a huge gap in describing the characteristics and disposition of an ideal therapeutic donkey. Almost no existing data on specific behaviour, age, sex, and physiology exists to fulfil this part of the thesis objective. In reviewed studies (Rose et al. 2011, Borioni et al. 2011, Colombo et al. 2020, Galardi et al. 2020), focusing on donkey therapy effects on human health, there was no information about age, sex, behaviour or physiology of the donkeys. The only available data came from studies of Colombo et al. (2020), incorporating six donkeys chosen by operators and veterinarians (female adults of different breeds, medium size, in a good state of health, suitable for behaviour and specifically trained as co-therapist). This lone description is still very poor and insufficient to identify the ideal donkey disposition for successful therapy. More research on this topic is crucial for better understanding and further development of donkey therapy. In the above reviewed studies on the topic of horse therapy (Lee & Makela 2015, Graham 2007, Schultz et al. 2007, Lentini & Knox 2009), there is a lack of provided data on appropriate choices for therapeutic horses as well. At least in case of horses, attempts have already been made to characterize therapeutic animals (Pyle 2006, Moisa et al. 2012).

The first hypothesis, that donkeys' potential as a therapeutic tool is demonstrated mainly within developed countries, has been confirmed. Based on internet research of donkey therapy providers, it was found that mainly developed countries are included. Exceptions can be found in Ethiopia and India, where the local providers are in direct cooperation with The Donkey Sanctuary.

In the case of developing countries and rural communities, where the majority of the world donkey population is located, animal therapy could serve as a new approach where donkeys would have a new purpose and their owners would see them from another perspective, which could also lead to improved animal welfare and better handling. If someone wants to provide such an activity, animals must be in a good state of health, both physical and mental. Fear of humans or aggressive behaviour cannot be present. That

serves as a baseline for the second hypothesis, but it still needs further research to be able to confirm it.

Horses within animal therapy do receive more attention than donkeys, but according to Borioni et al. (2011) they have an almost identical impact on human health. So, what makes donkeys a better alternative than horse therapy? Firstly, they show less aggression towards the human than horses, even if they are treated poorly (Burn et al. 2010). Donkeys also showed minimal or no reaction to sound tests which makes them a good candidate for AAI, while donkeys are more cautious than horses, demanding a longer time to build trust with humans (Gonzalez-De Cara et al. 2017). Based on nutrition and energy requirement, it is more efficient to keep a donkey, as their daily energy intake is equal to 1.3%-1.7% of their body weight in dry matter (Burden 2012), compared to 2-2.5% in case of horses (Lawrence 2008). Women in the Kajiado region of Kenya highly appreciate working with donkeys because of their strength, calmness, and resistance to disease and drought (Marshall & Weissbrod 2011). They could also be used within animal therapy in cases of fear of horses caused by their large body size or previous bad experiences.

Most research on human-animal relationships and animal therapy is based on Western cultural aspects, but in cases of other cultures and traditions, the appropriate choice of an animal could differ (Every et al. 2017). For me personally it is very important to know that people from different cultures are willing to cooperate with work animals, especially with donkeys (Every et al. 2017). It might indicate a potentially closer relationship in not only accepting a donkey as a source of power and help within the household.

## 6. References

- American Hippotherapy Association. 1995. Overview Curriculum. North American Riding for the Handicapped Association, Denver
- Amiot C, Bastian B, Martens P. 2016. People and companion animals: It takes two to tango. *BioScience* **66**: 552-560.
- Baragli P, Paoletti E, Vitale V, Sighieri C. 2011. Looking in the correct location for a hidden object: brief note about the memory of donkeys (*Equus asinus*). *Ethology Ecology & Evolution* **23**: 187-192.
- Bardill N, Hutchinson S. 1997. Animal-assisted therapy with hospitalized adolescents. *Journal of Child and Adolescent Psychiatric Nursing* **10**: 17-26.
- Beja-Pereira A, England PR, Ferrand N, Jordan S, Bakhiet AO, Abdalla MA. 2004. African origins of the domestic donkey. *Science* **304**: 1781.
- Blakeway S. 2014. The multi-dimensional donkey in landscapes of donkey-human interaction. *Beyond Anthropocentrism* **2**: 59.
- Borioni N, Marinaro P, Celestini S, Del Sole F, Magro R, Zoppi D, Bonassi S. 2012. Effect of equestrian therapy and onotherapy in physical and psycho-social performances of adults with intellectual disability: a preliminary study of evaluation tools based on the ICF classification. *Disability and rehabilitation* **34**: 279-287.
- Bough J. 2011. The mirror has two faces: Contradictory reflections of donkeys in Western literature from Lucius to Balthazar. *Animals* **1**: 56-68.
- Burden F, Thiemann A. 2015. Donkeys are different. *Journal of Equine Veterinary Science* **35**: 376-382.
- Burden F. 2012. Practical feeding and condition scoring for donkeys and mules. *Equine Veterinary Education* **24**: 589-596.
- Burden FA, Du Toit N, Hazell-Smith E, Trawford AF. 2011. Hyperlipemia in a population of aged donkeys: description, prevalence, and potential risk factors. *Journal of veterinary internal medicine* **25**: 1420-1425.

- Burgon H, Gammage D, Hebden J. 2018. Hoofbeats and heartbeats: Equine-assisted therapy and learning with young people with psychosocial issues: Theory and practice. *Journal of Social Work Practice* **32**: 3-16.
- Burn CC, Dennison TL, Whay HR. 2010. Environmental and demographic risk factors for poor welfare in working horses, donkeys and mules in developing countries. *The Veterinary Journal* **186**: 385-392.
- Camillo F, Rota A, Biagini L, Tesi M, Fanelli D, Panzani D. 2018. The current situation and trend of donkey industry in Europe. *Journal of Equine Veterinary Science* **65**: 44-49.
- Charnetski CJ, Riggers S, Brennan FX. 2004. Effect of petting a dog on immune system function. *Psychological Reports* **95**: 1087-1091.
- Cheshire Ethiopia. 2021. Donkey Assisted therapy (DAT) projects. Available from: <https://cheshirethiopia.org/> (accessed February 2021).
- Collins SN, Dyson SJ, Murray RC, Burden F, Trawford A. 2011. Radiological anatomy of the donkey's foot: Objective characterisation of the normal and laminitic donkey foot. *Equine veterinary journal* **43**: 478-486.
- Colombo E, Manti F, Milani L, Bernardini D. 2020. Assessing the Effects of Donkey-Assisted Therapy on Adults with Intellectual Disabilities Using the ICF Framework. *Society & Animals* **1**: 1-22.
- Delta Society. 1996. Standards of Practice for Animal-Assisted Activities and Therapy. Delta Society, Renton Washington.
- Diarra MM, Doumbial A, McLean AK. 2007. Survey of working conditions and management of donkeys in Niono and Segou. *Journal of Dairy Science* **90**: 139-139
- El Refugio del Burrito. 2021. Donkey therapy. Available from: <https://www.elrefugiodelburrito.com/en> (accessed February 2021).
- Every D, Smith K, Smith B, Trigg J, Thompson K. 2017. How can a donkey fly on the plane? The benefits and limits of animal therapy with refugees. *Clinical psychologist* **21**: 44-53.
- FAO. 2019. FAOSTAT: Production - Live animals. FAO, Rome. Available from <http://faostat.fao.org/> (accessed February 2021).

- Fernando P, Starkey P. 2004. Donkeys, People and Development. Technical Centre for Agricultural and Rural Cooperation, Wageningen.
- Friedmann E, Tsai CC. 2006. The animal-human bond: Health and wellness. Pages 95-11 in Fine A editor. Animal-assisted therapy: Theoretical foundations and practice guidelines. Academia Press, San Diego.
- Galardi M, Contalbrigo L, Toson M, Bortolotti L, Lorenzetto M, Riccioli F, Moruzzo R. 2020. Donkey assisted interventions: A pilot survey on service providers in North-Eastern Italy. *Explore* 00: 1-7.
- Geiger M, Hockenhull J, Buller H, Tefera Engida G, Getachew M, Burden FA, Whay HR. 2020. Understanding the Attitudes of Communities to the Social, Economic, and Cultural Importance of Working Donkeys in Rural, Peri-urban, and Urban Areas of Ethiopia. *Frontiers in Veterinary Science* 7: 60.
- Geisler AM. 2004. Companion animals in palliative care: stories from the bedside. *American Journal of Hospice and Palliative Medicine*® 21: 285-288.
- Goleman M, Drozd L, Karpiński M, Czyżowski P. 2012. Cat therapy as an alternative form of animal-assisted therapy. *Medycyna Weterynaryjna* 68: 732-735.
- González FJN, Vidal JJ, Jurado JML, McLean AK, Bermejo JVD. 2019. Dumb or smart asses? Donkey's (*Equus asinus*) cognitive capabilities share the heritability and variation patterns of human's (*Homo sapiens*) cognitive capabilities. *Journal of Veterinary Behavior* 33: 63-74.
- Gonzalez-De Cara CA, Perez-Ecija A, Aguilera-Aguilera R, Rodero-Serrano E, Mendoza FJ. 2017. Temperament test for donkeys to be used in assisted therapy. *Applied Animal Behaviour Science* 186: 64-71.
- Graham JR. 2007. An evaluation of equine-assisted wellness in those suffering from catastrophic loss and emotional fluctuations. University of Utah, Salt Lake City.
- Heleski CR, McLean A, Bauson L. 2008. Donkeys and bribes...., maybe more than just a cartoon. *Proc. Int. Appld. Ethol. Mtg. Procd. Eth. Mtg.* 72.
- Hewson CJ. 2003. What is animal welfare? Common definitions and their practical consequences. *The Canadian Veterinary Journal* 44: 496.



- Hopegood L, Collins S, Latham R, Reilly JD. 2008. Comparison of tubule density of donkey, horse and pony hoof horn. British Equine Veterinary Association, Liverpool.
- Kaczensky P, Lkhagvasuren B, Pereladova O, Hemami M, Bouskila A. 2015. *Equus hemionus*. The IUCN Red List of Threatened Species. Available from: [www.iucnredlist.org](http://www.iucnredlist.org) (accessed January 2021).
- Kapustka J, Budzyńska M. 2020. The use of various animal species for therapeutic purposes in Poland: current perspectives. *Acta Sci. Pol. Zootechnica* **19**: 3-10.
- Klingel H. 1998. Observations on social organization and behaviour of African and Asiatic wild asses (*Equus africanus* and *Equus hemionus*). *Applied Animal Behaviour Science* **60**: 103-113.
- Kruger KA, Trachtenberg SW, Serpell JA. 2004. Can Animals Help Humans Heal? Animal-Assisted Interventions in Adolescent Mental Health. University of Pennsylvania School of Veterinary Medicine, Pennsylvania.
- Larson G, Fuller DQ. 2014. The evolution of animal domestication. *Annual Review of Ecology, Evolution, and Systematics* **45**: 115-136.
- Lawrence L. 2008. Nutrient needs of performance horses. *Revista Brasileira de Zootecnia* **37**: 206-210.
- Lee PT, Makela C. 2015. Horses' roles in equine-assisted psychotherapy: Perspectives of mental health practitioners. *Journal of Psychology and Behavioral Science* **3**: 78-95.
- Lentini JA, Knox M. 2009. A qualitative and quantitative review of equine facilitated psychotherapy (EFP) with children and adolescents. *The open complementary medicine journal* **1**.
- Lhote H. 1959. The search for the Tassili frescoes. Dutton, New York.
- Lundqvist M, Carlsson P, Sjö Dahl R, Theodorsson E, Levin LA. 2017. Patient benefit of dog-assisted interventions in health care: a systematic review. *BMC complementary and alternative medicine* **17**: 358.
- Marshall F, Weissbrod L. 2011. Domestication processes and morphological change: through the lens of the donkey and African pastoralism. *Current Anthropology* **52**: 397-413.

- McKenna C. 2007. Bearing a Heavy Burden. The Brooke, London.
- Melson GF. 2001. Why the wild things are: Animals in the lives of children. Harvard University Press, Cambridge.
- Meutchieye F, Kwalar NN, Armelle R, Nyock F. 2014. Donkey Husbandry and Production Systems. Current Donkey Production and Functionality: 1-24.
- Moehlman PD, Kebede F, Yohannes H. 2015. *Equus africanus*. The IUCN Red List of Threatened Species. Available from: [www.iucnredlist.org](http://www.iucnredlist.org) (accessed January 2021).
- Moehlman PD. 1998. Behavioral patterns and communication in feral asses (*Equus africanus*). Applied Animal Behaviour Science **60**: 125-169.
- Moisa CM, Barabasi J, Papuc I. 2012. Selection Methods For Horses Used In Hippotherapy. Bulletin of the University of Agricultural Sciences & Veterinary Medicine Cluj-Napoca. Veterinary Medicine **69**: 156-163.
- Mosbahi A, Majdoub W, Naouar M, Turki E. 2020. Fatal donkey bite in children: a casereport. Forensic Science, Medicine and Pathology: 1-4.
- Murray LM, Byrne K, D'Eath RB. 2013. Pair-bonding and companion recognition in domestic donkeys, *Equus asinus*. Applied Animal Behaviour Science **143**: 67-74.
- Nimer J, Lundahl B. 2007. Animal-assisted therapy: A meta-analysis. Anthrozoös **20**: 225-238.
- Norris SL, Little HA, Ryding J, Raw Z. 2021. Global donkey and mule populations: Figures and trends. Plos one 16.
- Olmos G, McDonald G, Elphick F, Gregory NG, Burden FA. 2011. A case study to investigate how behaviour in donkeys changes through progression of disease in Proceedings of 45th Congress of the International Society for Applied Ethology, Indianapolis.
- Orlando L, Ginolhac A, Zhang G, Froese D, Albrechtsen A, Stiller M, Moltke I. 2013. Recalibrating Equus evolution using the genome sequence of an early Middle Pleistocene horse. Nature **499**: 74-78.

- Osthaus B, Proops L, Hocking I, Burden F. 2013. Spatial cognition and perseveration by horses, donkeys and mules in a simple A-not-B detour task. *Animal cognition* **16**: 301-305.
- Pet partners. 2019. A Beginner's Guide to Animal-Assisted Intervention Terminology. Pet partners. Available from: <https://petpartners.org/> (accessed February 2021).
- Peters J, von den Driesch A, Helmer D. 2005. *The First Steps of Animal Domestication*. Oxbow Books, Oxford.
- Pyle AA. 2006. Stress responses in horses used in Hippotherapy [Doctoral dissertation]. Texas Tech University, Texas.
- Rahman SA. 2004. Animal welfare: a developing country perspective. *Global conference on Animal Welfare: an OIE initiative* **14**: 101-112.
- Ratliffe KT, Sanekane C. 2009. Equine-assisted therapies: Complementary medicine or not? *Australian Journal of Outdoor Education* **13**: 33-43.
- Rose PD, Cannas E, Cantiello PR. 2011. Donkey-assisted rehabilitation program for children: a pilot study. *Annali dell'Istituto superiore di sanità* **47**: 391-396.
- Rossel S, Marshall F, Peters J, Pilgram T, Adams MD, O'Connor D. 2008. Domestication of the donkey: Timing, processes, and indicators. *Proceedings of the National Academy of Sciences* **105**: 3715-3720.
- Schultz PN, Remick-Barlow GA, Robbins L. 2007. Equine-assisted psychotherapy: A mental health promotion/intervention modality for children who have experienced intra-family violence. *Health & Social Care in the Community* **15**: 265-271.
- Selby A, Smith-Osborne A. 2013. A systematic review of effectiveness of complementary and adjunct therapies and interventions involving equines. *Health Psychology* **32**: 418-432.
- Serpell JA, Paul ES. 1994. Pets and the development of positive attitudes to animals. Pages 127–144 in Manning A, Serpell JA, editors. *Animals and Human Society*, London.
- Shah N, St. Louis A, Qureshi Q. 2015. *Equus kiang*. The IUCN Red List of Threatened Species. Available from: [www.iucnredlist.org](http://www.iucnredlist.org) (accessed January 2021).

Smith DG, Burden FA. 2013. Practical donkey and mule nutrition. *Equine applied and clinical nutrition* **1**: 304-316.

Smith DG, Pearson RA. 2005. A review of the factors affecting the survival of donkey in semi-arid regions of sub-Saharan Africa. *Tropical Animal Health and Production* **37**: 1-19.

Starkey P. 1995. The donkey in South Africa: myths and misconceptions. *Animal traction in South Africa: empowering rural communities*: 139-151.

Stasi MF, Amati D, Costa C, Resta D, Senepa G, Scarafioiti C. 2004. Pet therapy: A trial for institutionalized frail elderly patients. *Archives of Gerontology and Geriatrics* **9**: 407-412.

The Donkey Sanctuary. 2015. *Donkey Care Handbook* fourth edition. United Kingdom.

Thiemann A, Rickards K. 2013. Donkey hoof disorders and their treatment. *In Practice* **35**: 134-140.

Valette D. 2014. *Invisible helpers. Women's views on the contributions of working donkeys, horses and mules to their lives*. The Brooke, London.

Valette D. 2015. *Invisible workers: the economic contributions of working donkeys, horses and mules to livelihoods*. The Brooke, London.

Van Dijk L, Duguma BE, Hernández GM, Marcoppido G, Ochieng F, Schlechter P, Zanella A. 2014. *Role, impact and welfare of working (traction and transport) animals*. FAO, Rome.

Walsh F. 2009. Human-animal bonds I: The relational significance of companion animals. *Family process* **48**: 462-480.

Wilson K, Buultjens M, Monfries M, Karimi L. 2017. Equine-assisted psychotherapy for adolescents experiencing depression and/or anxiety: A therapist's perspective. *Clinical Child Psychology and Psychiatry* **22**: 16-33.