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The human-animal connection and the donkey's potential in animal-assisted therapy

BACHELOR'S THESIS

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Declaration

I hereby declare that I have done this thesis entitled "The human-animal connection and the donkey's potential in animal-assisted therapy" 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, 10th April 2023

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Acknowledgements

Abstract

A shift in perspective regarding the use of agricultural animals is much needed to help influence changes in global matters concerning modern humanity. This thesis uses the donkey as an example and starting point to argue that farm animals can be valuable companions instead of just products and highlights the benefits of human-animal connections. The donkey is also depicted as an animal in need of a new role in society, benefiting its conservation and welfare. The thesis begins by introducing the concept of care farming and animal-assisted therapies (AATs) before delving into the potential role of donkeys in such therapies. AATs are acknowledged for their benefits on mental well-being especially in cases of treating children, patients with autism spectrum disorder (ASD), and post-traumatic stress disorder (PTSD). The donkey is recognised for its therapeutic values such as its calm nature, curiosity, patience, and low aggression. High levels of sociability have been found in donkeys used in AAT sessions and their ability to learn and form bonds with humans helped argue their suitability for therapy use. However, research identifying the specific parameters of donkeys used in AATs such as age, sex, and breed is needed to define the ideal donkey for therapeutic use.

Key words: donkey, animal, equine, assisted, therapy, onotherapy, human-animal, connection, interventions, welfare

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List of the abbreviations used in the thesis

FAO - Food and Agriculture Organisation of the United Nations

UNEP - United Nations Environment Programme

AAI - Animal-Assisted Intervention

AAA - Animal-Assisted Activities

AAT - Animal-Assisted Therapy

PTSD - Post-Traumatic Stress Disorder

ASD – Autism Spectrum Disorder

EAT - Equine-Assisted Therapy

DAD-IS - Domestic Animal Diversity Information System

1. Introduction

Animals in agriculture have been under ethical concern in the past few years more than ever. Starting with the modern animal welfare movement in the seventies, arguments about animal rights have been steadily increasing (Vinnari 2008). The recent rise of animal welfare interest has gone hand in hand with environmental activists promoting other than ethical reasons as to why animals in agriculture should be handled differently (Buller et al. 2018). Some of these reasons being for example emission levels, global warming, concerns of biodiversity, antimicrobial resistance and most of all the overall unsustainability of meat production (Lichtfouse et al. 2009; Palomo-Vélez et al. 2018). From recent studies it seems how we handle animals in agriculture plays a significant role in some key global issues (Buller et al. 2018). Changes in this field have been considered necessary for the future of food security and safety (Halachmi et al. 2019). Many strategies have been applied such as replacing food products that originate from animals, campaigns increasing consumer knowledge about animal rights and vegetarianism or promoting political decisions to transfer agricultural production away from meat production (Scoones 2009; Halachmi et al. 2019). However, the market demands of animal products are still high and agricultural animals still receive little empathy from the general public. Empathy can serve as an internal motivator for pro-environmental behaviour change (Young et al. 2018). With many internal affective responses, the link is not always directly clear but there is growing evidence suggesting that empathy towards others can influence the likelihood of pro-environmental behaviours, as they relate to individual animals and potentially their larger communities or species (Young et al. 2018). Gaining empathy for agricultural animals in the vast majority of society can be a complicated task yet could at least serve as a foundation for changes in much needed areas.

2. Aims of the Thesis

The aim of this work is to introduce the concept of using farming practices and animals for promoting health, and an approach considering more than just the human perspective. The work continues by presenting the benefits of human-animal connections, and a new option for farmers and agricultural animals. Donkeys are an example of what can happen when an agricultural animal loses its function; by being replaced by motor power after industrialisation. This thesis aims to present content of literature, research, and data currently available that contradicts the general image of what a donkey is for in society, redefining its role and offering its potential value in animal-assisted therapy and interventions.

3. Methodology

This thesis is based on literature review; no primary data has been collected during its completion. Scientific papers and books relevant to the topic were summarised into the thesis. The databases used for collecting the relevant information include Google Scholar, Web of Science, FAOSTAT and Science Direct. The keywords used during the literature search were mainly a combination of the following: donkey, animal, equine, assisted, therapy, onotherapy, human-animal, connection, interventions, and welfare.

4.   Literature Review

4.1.   Livestock farming concerns

Livestock farming is an important source of livelihood for millions of people, especially in marginal areas where farming animals is central to their survival (Haddy et al. 2022). Livestock products such as meat and dairy are an excellent source of protein, minerals, and vitamins, and are an important part of the human diet (Iqbal et al. 2006). If managed correctly, livestock can contribute to important ecosystem functions such as soil fertility, which in turn can support sustainable food production (Herrero et al. 2010).

It is worth noting that livestock production is not inherently unsustainable. In fact, according to the Food and Agriculture Organization of the United Nations (FAO), livestock consume around one third of all cereal production, but more than 80% of their plant-based diet comes from grass, leaves, and other foods that are not suitable for human consumption. This means that livestock can have a positive impact on plant diversity and food security by making inedible plant material edible (FAO 2019).

However, the sustainability of the livestock industry has become a growing concern for the environment (Nardone et al. 2010; Michalk et al. 2019). Livestock uses up to 40% of the global arable land to deliver just 20% of the human calorie intake, making meat production a relatively inefficient way to produce calories. Over two billion hectares of grasslands are being occupied by animals in agriculture, and around 700 million of those hectares could arguably be used more effectively to grow crops that can be eaten directly by humans (Heggie 2019).

The environmental impact of livestock farming goes beyond land use. Livestock production is responsible for a significant amount of greenhouse gas emissions, with some estimates suggesting that it contributes around 14.5% of global emissions (Twine 2021). It also contributes to water pollution and deforestation, which can have negative impacts on biodiversity and the health of local ecosystems (Steinfeld et al. 2006).

The use of antibiotics and hormones in animal agriculture has also raised concerns about the impact on human health, including the development of antibiotic-resistant bacteria and hormone-related health problems (Walker et al. 2005).

To address these challenges, there is a growing need to improve the sustainability of the livestock industry (Herrero et al. 2010). This can be done in several ways, such as reducing the environmental footprint of livestock production through the use of more sustainable farming practices, improving the efficiency of livestock feed and reducing food waste, and promoting the consumption of plant-based diets (Alcorta et al. 2021). According to the United Nations Environment Programme (UNEP), strengthening the ecological basis of food security through sustainable food systems is essential to avoiding future famines (UNEP 2012).

In conclusion, while livestock farming is an important source of livelihood for many people and can contribute to sustainable food production, there is a growing need to address the environmental challenges associated with the industry. Improving the sustainability of livestock production is essential to ensure that it can continue to provide food and livelihoods for millions of people while also protecting the health of our planet.

4.1.1. The concept of care farming

"Care farming" (sometimes called "social farming", "green care in agriculture", "therapeutic agriculture" or "farming for health") is the use of farming practices for a variety of therapeutic uses including promoting healing, mental wellbeing, social health, or educational and care services (Hemingway et al. 2016). It is an approach that is becoming increasingly popular worldwide, with care farms operating in many countries across the globe. (Hine et al. 2008). Care farms commonly provide a supervised and structured programme with a mix of nature, social interaction, and meaningful farming activity (Hine et al. 2008). Clients engage in farm related activities such as animal care, growing crops and vegetables, horticulture, or land management (Hemingway et al. 2016). This gives more initiatives for conservation bodies to connect people with nature and farm animals. At the same time farmers have the opportunity to ensure their economic viability without having to leave the farm, especially the farmers who would be affected by a rise in popularity of animal free products (Waltz 2022). Care farming therefore works

as a partnership between farmers, health and social care providers and participants (Hine et al. 2008; Elsey et al. 2014).

The current situation of care farming worldwide is one of growth and expansion (Leck et al. 2014). Care farming is recognised as an effective approach for providing therapeutic interventions for a range of health and social issues, including mental health, addiction, and social isolation (Hassink et al. 2014). As a result, care farms are being established in many countries, and the number of care farms is increasing every year (Hassink et al. 2010).

In Europe, care farming is well-established, with the Netherlands and the United Kingdom being among the countries with the most care farms. Other European countries with a growing care farming sector include Belgium, Denmark, Italy, and Spain (Hassink et al. 2010). Outside of Europe, care farming is also gaining popularity in the United States, Canada, Australia and New Zealand (Artz & Bitler Davis 2017; Norwood et al. 2019). In Africa, care farming is being explored as a way to address social and environmental challenges such as poverty and land degradation (Hassink et al. 2010; Leck et al. 2014).

Overall, the growth of care farming worldwide reflects a growing recognition of the potential benefits of integrating agriculture and nature-based interventions into health and social care services (Artz & Bitler Davis 2017). However, the availability of care farms and access to care farming services varies greatly by region and country, and more work is needed to ensure that care farming is accessible to all who could benefit from it (Pedersen et al. 2015).

Although most studies available focus mainly on the benefits care farming offers for a human's wellbeing, they do mention the forming of a certain connection to nature and the animals (Hassink et al. 2017; Bruin et al. 2020). Several studies have shown that interacting with animals in various settings, such as therapy animals or animal-assisted interventions, can lead to increased empathy towards animals and more positive attitudes towards them (Mills & Hall 2014; Young et al. 2018). For example, a study published by Seivert et al. (2016) found that participants in a canine-assisted therapy program showed an increase in empathy towards animals, compared to a control group. Though there is some research suggesting that animal therapy may be linked to increased empathy towards animals, the evidence is limited, and the link between animal therapy and reduced

meat consumption is less clear (Rothgerber & Mican 2014; Niemyjska et al. 2018). While some studies have found that people who interact with animals in a positive way are more likely to have vegetarian or vegan diets, other studies have not found a significant relationship between animal therapy and meat consumption (Rothgerber & Mican 2014; Heiss & Hormes 2018).

Therefore, more research is needed to fully understand the relationship between animal therapy, empathy towards animals, and dietary choices.

4.2.   Human-animal connection

Humans have been in contact with animal life forms for the entirety of evolution. The human-animal relationship is an example of a relationship between different species (Odendaal 2000). Most of the time, humans interact with domesticated animals. Domestication is a process by which animals adapt to humans and their environment, either through genetic changes or environmentally induced developmental events (Price & Edward 1984). Domesticated animals serve various purposes in human societies and humans have relied on animals as a source of food, for clothing production, transportation, labour, religious practices, entertainment, sports, research, but also companionship and protection. Each function involves different relationships and interactions between humans and animals. Influence both positive and negative have been inevitable. To start and maintain a relationship between two individuals, interactions are necessary. In human-animal interactions, both the human and animal have an active and reactive role, regardless of who initiates the interaction (Scopa et al. 2019). It is essential to consider that humans and animals may perceive interactions differently. What may be a pleasant experience for a human may be an unpleasant one for an animal (Bokkers 2006). However, interactions with animals are known to have numerous positive effects on human health and well-being. For example, animal ownership can teach responsibility, encourage a caring attitude and behaviour, and provide companionship, social support, security, comfort, amusement, or an outlet for affection (Podberscek et al. 2000). Interactions with animals may promote respect, self-esteem, improve social skills, enhance empathy and compassion for animals and nature in general and teach about the facts of life (Podberscek et al. 2000; Crowley-Robinson et al. 1996;

Nimer & Lundahl 2015). Spending time with animals can also reduce stress and lower blood pressure (Miller & Ingram 2000; Wood et al. 2018).

Overall, the human-animal connection is a powerful and enduring bond that has been a source of comfort, companionship, and inspiration for countless generations.

4.2.1. Biophilia

A possible reason why humans lean towards animal interactions for comfort is a hypothesis conducted by E. O. Wilson in 1984. The so-called "biophilia hypothesis" is described as a tendency of humans to focus on life and lifelike processes. Wilson proposes that this is a consequence of evolution and describes it not as a single instinct but as a complex of learning rules that trigger a variety of emotional reactions to animals. Culture, religion, and environmental factors play a vast role in perceiving these emotions. It explains why some animals may have a calming effect on us, while others, especially those which have posed danger to our ancestors (e.g., snakes, spiders, crocodiles) may not offer the same type of health advantages. In his studies, Wilson finds the biophilia effect is more apparent in early stages of life (Wilson 1984). Babies were found to focus more on animals than other objects, and children with impaired social skills (e.g., autism spectrum disorders) often showed an increase in social behaviour when exposed to animals and displayed a preference for the animals (Wells DL. 2019). However, caution must be exerted when using the term "biophilia" as a primary reason to promote animal related health outcomes in humans. It has been argued that the construct is still too under-determined to use as a theoretical conclusion for AAT study purposes (Joye & De Block 2011).

4.2.2. Animal-assisted therapy and its benefits

Conventional knowledge has long supported the use of animals in promoting human well-being (Nimer & Lundahl 2015). The first scientific evidence of positive effects of pet ownership on both a human's physical and mental wellbeing dates back to the late 1960s when Levinson (1969) "accidentally" stumbled upon the concept of animal effect in therapy by having his dog, Jingles, present during one of his therapy sessions with a child he had been treating at the time (Levinson 1969). He then continued research in "pet-oriented child psychotherapy" and was the first to publish professional literature

in the human-companion animal bond field. In his studies, he concluded that the young, the nonverbal, the inhibited, the autistic, the withdrawn, the obsessive-compulsive, and the culturally disadvantaged child would benefit most from pet-oriented psychotherapy and identified possible benefits of the therapy to be opportunities for touch, alleviation of loneliness, exercise, and companionship. Levinson also found that children in his study cases related more easily or quickly to animals. He concluded that the primary reason was that the animals; in his studies mainly dogs, could offer the children unconditional, non-judgmental, and essentially non-threatening attention and affection. In 1969 Dr. Levinson wrote:

"It has by no means been the intention of this writer to indicate that pets are a panacea for all the ills of society or for the pain involved in growing up and growing old. However, pets are both an aid to and a sign of the rehumanization of society. They are an aid in that they help to fill needs that are not being met in other, perhaps better ways because society makes inadequate provisions for meeting them. In the meantime, animals can provide some relief, give much pleasure, and remind us of our origins."

In the last two decades, animal-assisted activities (AAA) and animal-assisted therapy (AAT) have seen a significant increase in interest resulting in many studies confirming and further describing the benefits human-animal interactions can offer (Fine 2019). The benefits of children and adults with diverse additional needs gained from animal contact or companionship are well-documented, and it has been asserted by Dashnaw Stiles (2001) that every study inspecting AAT showed positive outcomes. Studies have demonstrated that AAT can lead to a reduction in symptoms of anxiety, depression, and post-traumatic stress disorder (PTSD), as well as an increase in socialization, communication, and emotional well-being (Dietz et al. 2012). Furthermore, AAT has been shown to be particularly beneficial in the treatment of children with ASD, who have shown increased social functioning and interactions, and decreased stress levels and feelings of loneliness after AAT sessions (Becker et al. 2017; Martin & Farnum 2002; Griffioen et al. 2020; Hardy & Weston 2020; London et al. 2020).

However, in the abundance of studies on the topic of AAT, not every animal has been taken into consideration. The most research in the AAT field has been conducted in the context of canine-therapy. For example, when using the key words "dog" and

"therapy" the database of Google Scholar generated 3,130,000 results in comparison to using the words "horse" and "therapy", where it generated 1,450,000 results. Using the words "donkey" and "therapy" found only 163,000 results.

However, not every animal has the desire to engage in a connection with humans. Further research is needed to identify the characteristics of animals that are most beneficial for animal-assisted therapy and to determine the specific animal-related interventions that may be most effective for different populations (Fine 2019).

4.2.3. A "more-than-human" approach

Although there is currently an abundance of research focusing on AAT, these studies tend to focus solely on the human benefit perspective. As an example, Hatch (2015) notices that animal-assisted programs and the way that they are evaluated and measured are often constructed around the question "What can animals do for us?".

Animal welfare is a concept referring to the physical and emotional state of an animal. In history, animal welfare contained three main agendas regarding the state of the animal being; a) normal biological functioning (including good health and nourishment), b) the animal's emotional state (including the absence of negative emotions), c) the ability to express normal behaviour (Boissy et al. 2007). However, a major shift in animal welfare has taken place in the last twenty years and a motion that animals are deserving of rich and complex lives has taken place. Welfare from the emotional point of view is no longer promoted to be only the absence of negative emotions but also the presence of positive ones (Clancy et al. 2022).

"More-than-human" is a phrase worded by Whatmore (2006) in his work dedicated to the contributions of nonhuman plants and animals in social settings. Leading to post humanist interventions and the "animal turn" in the social sciences; this academic movement suggests nonhuman animals to be considered under new terms as subjects with their own needs, interests, and agendas, with complex emotional intelligence, and worthy of ethical and academic inquiry (Clancy et al. 2022). In the context of agriculture, farming and AAIs, a "more-that-human" approach involves recognising and valuing the interconnectedness and interdependence between humans, animals, and the environment (Whatmore 2006).

In the case of the donkey there has been a lack of this approach in the past. Welfare conditions have been neglected especially with working donkeys and in developing countries and their resilience has been exploited for the benefit of humans (Bough 2011; McLean & Navas Gonzalez 2018; Watson et al. 2020). Population declines in areas where donkeys have been replaced by motor power are concerning and serve as an example of what can happen when an agricultural animal loses its function in society (Camillo et al. 2018; Norris et al. 2021). In this case it is worth and furthermore necessary to explore the potential of the donkey.

4.3. History of the donkey's origin and behavioural background

To better understand an animal's behaviour, we must know about its origin and take it into consideration. Domestic donkeys we know today (*Equus asinus asinus*); belong to the order odd-toed Ungulates (*Perissodactyla*), sub-order Horse-like (*Hippomorpha*) and they belong to the Horse Family (*Equidae*). This family includes the genus Horse (*Equus*). Due to archaeological findings, we know that three different wild asses existed in Africa 2000 years ago, two of which have survived into modern times; the Somali wild ass (*Equus africanus somaliensis*), known for its striped legs and large size, and the Nubian wild ass (*Equus africanus africanus*), identified by its prominent shoulder cross. These are the closest relatives of the domestic donkey (Rossel et al. 2008).

The donkey, originating in Africa, developed specific behavioural traits and physiological adaptations due to its specific environment that last until today. These behavioural traits differentiate donkeys from their close relative, the horse, to which the donkey is often compared to (McLean et al. 2019).

4.3.1. Donkey's behavioural background

In deserts, where water and nutrition are scarce, the donkey's ancestors have had to fend for their resources making them an animal of territorial nature (Rudman 1998). Each wild ass has an area where they live called a home range. These ranges may overlap with the ranges of other asses (Rudman 1998). Their social behaviour is flexible and adjusts to a variety of conditions. If the ecological variables allow; there is enough food and water available, donkeys will preferably form a type of social structure called "harems". Harems can consist of either multiple females with offspring plus one or more

adult males, or of multiple adult male groups; bachelor herds (Rudman 1998). However, harems are less common, due to the harsh natural environment wild asses commonly occupy (McCort 1984; Moehlman 1998; Rudman 1998). When resources are scarce, asses form rather looser social structures or even function solitarily for a better chance of survival. Small temporary groups of an average of 3 form and rarely last more than a few days (Moehlman 1998; Svendsen 1997). Mixing and splitting of groups are fluid and the only permanent social structure, in this case, is between a female and her offspring who stay together for at least 12 months (Klingel 2015). Females are rarely seen on their own (Svendsen 1997). Males that would normally dominate a harem will still dominate breeding activities in their given range. Males of similar rank and dominance with overlapping ranges may fight over females in their area. This type of social organization predominates in arid and semi-arid regions (Svendsen 1997).

As African deserts provide a rather harsh environment a wild asses daily routine will be determined by their need for food, water, and shelter (De Santis et al. 2021). Wild asses will commonly spend 50% of their day browsing their uncompromising habitat for food (Svendsen 1997). Their hoof has good blood circulation, making them very surefooted in rough terrain (De Santis et al. 2021). Rarely do asses stroll or gallop, only when under close threat, in mating actions, or during play (Moehlman 1998). Most asses will trot in response to alarms and threats or when approaching waterholes (Svendsen 1997). However, under nonalarming circumstances, asses will most often move between feeding areas at a walking speed. Seasonally, they may travel great distances and take rests during the hottest time of the day, being most active during dawn and dusk and remaining active throughout the night (Svendsen 1997, Klingel 2015).

Asses have been observed to engage in a regular skincare routine. They often roll and shake after resting on the ground to revive their flattened coats and remove ectoparasites and moulted hair (Moehlman 1998). Asses usually have a favourite rubbing post that they use to reach less accessible body parts. When in groups, they often help each other groom and tend to have a grooming partner who is likely to be a close relative (Svendsen 1997, Moehlman 1998).

4.4.   The role of donkeys today

For many years, donkeys (*Equus asinus*) have worked alongside humans and have played a valuable role in many societies and cultures. First domestication records date back to 7 000 years ago (Mitchell 2018). Although donkeys have served humans for such a long time, they have received very little recognition in return and are generally considered beneath notice (Bough 2011).

4.4.1.   Donkeys worldwide

Ever since their domestication, donkeys have played a key role in the expansion of human populations and trading activities. To this day millions of people in less industrialised countries still depend on donkeys for their livelihood and the donkeys play an economically and socially vital role (Haddy et al. 2022). Probably over 95% of the donkeys in the world are used for work, mostly for transport and draft work (Starkey & Starkey 2000). People in rural areas chose to work with donkeys because of their strength, calmness, and disease and drought resistance (Marshall & Weissbrod 2011).

The earliest estimated number of donkeys reared worldwide available on FAO is from 1961 stating a population of 37 million. The population numbers have been steadily increasing since then (Starkey & Starkey 2000). The current estimated population is around 46 million donkeys worldwide (Rickards & Toribio 2021). Donkey populations are not evenly distributed around the world. The majority are in developing countries with numbers of approximately 42.6% of the worldwide production of asses in Asia, followed by 38.7% in Africa and 17% in America (Norris et al. 2021).
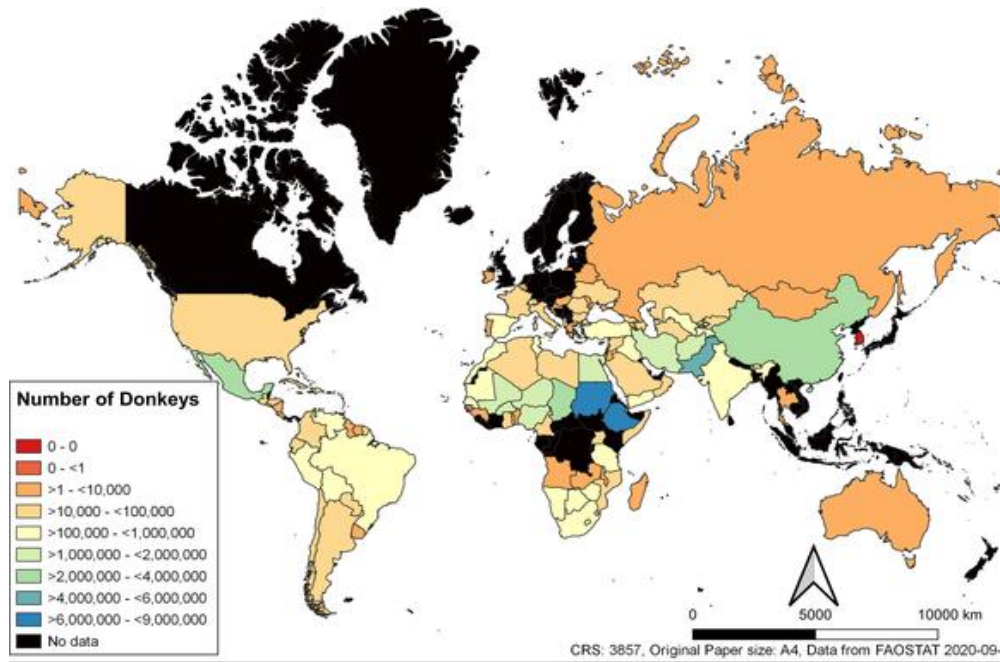
Figure 1. Global donkey population sizes for each country in 2018 (Source: Norris et al. 2021)

While the worldwide donkey population is showing a consistent increase, large regional increases and decreases can be seen. Europe alone accounts for only 1.6% of the worldwide production of asses and has seen a 50% decline in population since 1994 (Camillo et al. 2018). In population research conducted by Paul and Malcolm Starkey in 2000, it was concluded that urbanisation and industrialisation only start to have a significant effect on declining donkey populations when rural people are wealthy enough to replace donkey power with motor power. Although this is the case in Europe it still has a long way off in many parts of Africa, Asia, and Latin America (Norris et al. 2021).

A) Donkey Population			
Country	**1997**	**2018**	**Percentage Change**
Sudan	700,000	7,608,854	90.8
Chad	341,576	3,080,235	88.9
Zimbabwe	104,000	585,048	82.2
Switzerland	9,038	34,028	73.4
Cuba	6,200	17,400	64.4
Ethiopia	3,150,000	8,542,747	63.1
Mozambique	21,000	49,428	57.5
Gambia	32,734	63,781	48.7
Burkina Faso	643,689	1,230,042	47.7
Namibia	85,188	153,126	44.4
Bulgaria	286,874	19,000	-1409.9
Greece	77,847	8,547	-810.8
Ecuador	267,000	47,035	-467.7
Portugal	44,757	7,884	-467.7
Turkey	689,000	141,375	-387.4
Colombia	450,000	97,545	-361.3
Armenia	6,837	1,758	-288.9
India	882,000	229,296	-284.7
China	9,444,000	2,677,800	-252.7
Russia	26,000	8,148	-219.1

Table 1. Countries with the 10 greatest increases and reductions in donkey (A) population size between 1997 and 2018 where the population in 2017 was greater than 2500 (Source: Norris et al. 2021)

4.4.2. Donkeys in Europe

The current situation of donkeys in Europe varies greatly depending on the region and country. In some areas, donkeys are still used for transportation, farming, and tourism, particularly in rural communities (Camillo et al. 2018). However, in many parts of Europe, donkeys have been replaced by motorised vehicles and machines, leading to a decline in their numbers and a loss of traditional knowledge and skills associated with their use (Rodrigues et al. 2021). Despite this, there are ongoing efforts to promote the conservation of donkey populations and their cultural significance (Clancy et al. 2021). Some organizations are working to raise awareness of the importance of donkeys in Europe and their role in sustainable agriculture, while others are focused on protecting endangered breeds and improving animal welfare standards for working donkeys (Kugler et al. 2008; Marshall & Asa 2013).

4.4.3. Breeds in Europe

Unlike other livestock, donkeys are rarely systematically bred (Kugler et al. 2008). Even systematic breeds are often not defined with such precision as other species of livestock. Many physical differences can be found under one category or breed and most donkeys are crossbred and cannot be categorised into specific breeds (Kugler et al. 2008).

In 1992 the Conservations on Biological Diversity was issued. Since then, there has been an increase in effort to find and officially recognise donkey breeds. In 1995 there were 77 donkey breeds recorded globally, in 2000 this number increased to 97 and currently, there are 185 breeds registered in the Domestic Animal Diversity Information System (DAD-IS). These efforts of data collection have been made mostly in Europe and more effort is needed in developing areas, as the number of animals is much greater (Kugler et al. 2008).

In some regions where donkey breeding became a tradition, we can identify and officially recognise a breed (Camillo et al. 2018). These areas are mainly throughout Europe in places where donkeys were strategically bred to create working mules (Camillo et al. 2018). However, many of these systematically bred donkeys are currently threatened with extinction due to their low numbers after being phased out because of technological development after the Second World War. Industrialization affected the donkey population with a concerning 80% decrease in the 20th century (Kugler et al. 2008, Camillo et al. 2018).

4.5. Donkeys in AAT

Donkeys have gained a few prepossessions among the public throughout the years due to this lack of knowledge and have become the most psychologically misinterpreted and cognitively undermined species of all time (Navas González et al. 2019). The general public would mostly describe a donkey as stubborn, pain resilient, and sometimes even generalize them as stupid (Burden & Thiemann 2015).

There is much more to donkeys than is generally acknowledged, and their potential for human-animal connection is yet to be properly explored (Every et al. 2017). As for their smaller size in comparison to the horse, donkeys offer a less intimidating

interaction to the client. The use of donkeys in therapy is based on their gentle and calm demeanour, which can have a comforting and soothing effect (Panzera et al. 2020). When confronted with a new situation, the donkey does not run away from it but rather stops and ponders what to do; it's neither impulsive nor anxious and is instinctively curious (Rose et al. 2011). Because of the lack of literature characterising donkeys used in AATs and AAIs a study was conducted by Panzera (2020) aiming to obtain scientific data useful for the development of methodologies and standardised protocols for welfare donkey monitoring during AAIs. The study tested 13 donkeys used in AAIs and found that the donkeys used demonstrated high levels of sociability and a desire to interact with humans (Panzera et al. 2020). The study also found that donkeys used in AAT were able to form strong bonds with humans, which is an important characteristic for an effective therapeutic animal.

A study focused on a child's approach to the donkey in AAT sessions indicated that while communicating with the animal, children relied more on the physical expressions than on verbal communication (Rose et al. 2011; Muñoz Lasa et al. 2015). Utilizing the donkey as a facilitator in the motivation-building process can be highly effective. This approach can promote positive and active forces that stimulate the child's development and support both psycho-affective and psycho-cognitive processes. AAT sessions with donkeys can help in identifying children's strong points, on which motivation could be built (Rose et al. 2011).

There is currently not enough scientific literature to state the exact characteristics and parameters of a therapeutic donkey, however we can conclude from information available that the overall key characteristics of a therapeutic donkey include sociability, strong bonds with humans, gentleness, and patience. These characteristics make them well-suited for AATs and AAIs (Muñoz Lasa et al. 2015; Gonzalez-De Cara et al. 2017; Clancy et al. 2022).

4.5.1. Donkey vs horse in equine-assisted therapy

Even with the increase of interest in AAT in the last 20 years, there is still limited evidential data focusing on the benefits of equids in AAT. The majority of equine-assisted therapy (EAT) studies have focused mainly on the physical benefits of "hippotherapy", therefore, involving contact with horses *(Equus caballus)* and therapeutic horseback

riding (Casady & Nichols-Larsen 2004; Silkwood-Sherer et al. 2012; Diniz et al. 2020). Hippotherapy is generally led by a physiotherapist and tends to focus on the improvement of posture, balance and mobility in patients (Silkwood-Sherer et al. 2012). Horseback riding has been shown to elicit a pelvis movement pattern that closely resembles human walking (Lechner et al. 2007). Studies have confirmed improvements in balance, strength, head and trunk stability, spasticity, coordination, and posture gait on the most commonly treated groups; being children with cerebral palsy and physical disability and adults with spinal cord injuries (Martín-Valero et al. 2018). Additionally, it has been observed that horseback riding can assist in the normalization of muscle tone by reducing spasticity and may sometimes even result in a recovery, allowing patients to move independently again (Beinotti et al. 2010).

Fewer studies have focused on the psychological and psychosocial benefits of hippotherapy. However, children with autism are frequent participants of hippotherapy and seem to benefit greatly from human-equine interactions (Steiner & Kertesz 2015).

4.5.2. Behavioural differences between donkeys and horses

While donkeys and horses share a close genetic relationship, there are significant behavioural differences between the two species that must be recognised. Beyond differences in their anatomy and physiological structure, donkeys and horses also exhibit distinct behavioural patterns that cannot be easily generalised (Burden & Thiemann 2015). It is crucial to understand these differences as they offer diverse potential and can impact our ability to draw accurate conclusions from behavioural case studies conducted on horses and apply them to donkeys (McLean et al. 2019).

For example, donkeys are known for their cautious nature that may result in them taking longer to adjust to new environments or situations compared to horses (Burden & Thiemann 2015). In a case study, donkeys showed minimal or no response to sound tests making them suitable candidates for AATs due to their cautious and calm nature (Gonzalez-De Cara et al. 2017). They are also less likely to be aggressive towards humans, even when being mistreated, and despite their reputation for being stubborn (Burn et al. 2010). Donkeys tend to freeze when they perceive a threat, while horses are more likely to exhibit a flight response (Burden & Thiemann 2015). Another notable difference is in their social behaviour. Horses tend to be more social and form larger

herds, while donkeys are more solitary and form smaller social groups (Svendsen 1997, McDonnell 2003). Donkeys are also less likely to engage in social grooming behaviour compared to horses (Marshall & Asa 2013).

These behavioural differences highlight the importance of treating donkeys as a unique species with its own distinct behaviour patterns, rather than simply as a smaller version of a horse. It is essential to consider these differences when developing training or management strategies for donkeys to ensure their health and welfare.

4.5.3.   The donkey's ability to learn

There is a general misconception about the donkey's intelligence, but despite that, the donkey is not inherently stubborn or unintelligent. Donkeys have been unfairly labelled as such throughout history due to their tendency to freeze when frightened, and their calm, stoic nature (Burden & Thiemann 2015; Navas González et al. 2019). However, recent research conducted at The Donkey Sanctuary revealed that donkeys and mules actually outperformed horses and even dogs in spatial cognition and problem-solving skills. In a test where they had to navigate a changing gap to obtain a food reward, both donkeys and mules were more efficient and accurate than the other animals (Osthaus et al. 2013). However, it is crucial to consider their quick learning abilities when training donkeys and mules, as they can easily learn both desirable and undesirable behaviours (Seganfreddo et al. 2022).

It is often debated how individual characteristics, such as sex and age impact the learning capabilities of equids (Hausberger et al. 2004). When it comes to learning, some studies have pointed out that sex does not significantly affect the success of learning operant conditioning tasks (Proops et al. 2009; Williams et al. 2004). However, there are studies suggesting that females may learn faster than stallions (Wolff & Hausberger 1996), and other individual factors, including sex, can also influence an equid's ability to learn (Navas González et al. 2020). In a study conducted by Seganfreddo et al. (2022) female donkeys performed better than males, having taken an average of two-thirds of their time to solve given cognitive tasks in the study. In this same study, age also proved to have an effect on the donkey's learning abilities. Donkeys increased the task solving time progressively by about 1.2 s for each additional year of age. When focusing on females, younger individuals tended to be quicker than the older donkeys in the first

sessions of learning a new task. In support of this study, Mader and Price (1980) conclude that younger equids are predisposed to learn faster and adapt more easily to changes in their environment.

However, for therapy purposes it is also valuable to note that older equids have been found to be more sensible, docile, and quieter than young or middle-aged individuals (Navas González et al. 2020). There is still a need to conduct more detailed studies on these factors to have a better and more reliable overview of the influence of sex and age on the donkey's learning ability and its value in therapeutic characteristics (Seganfreddo et al. 2022).

4.6. Donkey welfare conditions

Donkeys have been known to be resilient to disease, drought, and pain. Although in comparison to a horse this may have relevance, donkeys still do acquire timely and proper veterinary care (Grosenbaugh et al. 2011; Middlecote 2020). Donkeys can be affected by a variety of both infectious and non-infectious diseases. Some of the most common infectious diseases that affect donkeys include equine influenza, African horse sickness, equine infectious anaemia, and tetanus (Barrandeguy & Carossino). Additionally, and more commonly in domesticated conditions, donkeys can also suffer from non-infectious diseases such as colic, lameness, dental and hoof issues, and dermatological problems. Other health issues that can affect donkeys include obesity, parasitic infections, respiratory problems, and injuries (Toit & Dixon 2012; Thiemann 2012; Thiemann & Poore 2019).

Despite the common misconception that donkeys have a high tolerance for pain or do not feel pain at all, they do experience pain and exhibit clear signs of discomfort (Regan et al. 2016). As donkeys have been compared to horses, that have different behavioural pain responses, donkeys have been greatly misunderstood (McLean et al. 2019). For this reason, it is important that veterinary care of the donkey must take into account both physical and psychological differences that the donkey has when compared with the horse. There is no evidence to suggest that donkeys have a higher pain tolerance than other equines (Burden & Thiemann 2015). A study conducted by Grint et al. (2015) revealed that donkeys exhibit a similar or even greater cerebral cortical response to

a noxious stimulus, as measured by an electroencephalogram, during castration compared to ponies undergoing the same procedure. This suggests that any differences in the way pain is expressed through behaviour is not due to differences in cortical processing. It has been found that when assessing and treating a donkey patient, it is often essential to have their bonded companion present, and this is especially true if the sick animal is to be moved for further treatment (Burden & Thiemann 2015).

A very common behaviour that must also be considered when keeping donkeys is their vocal communication (De Santis et al. 2021). Most often donkeys bray. Braying is a sound much more prominent than a horse's or a pony's neigh (Browning & Scheifele 2004). Female donkeys may bray after separation from their young or in response to other separated members of the group. It is also used by dominant males to call upon their group, or vocally mark their territory (Svendsen 1997; Moehlman 1998; Browning & Scheifele 2004).

When planning AAT and AAI sessions, it is important to provide a reasonable amount of emotional refreshment time for the animals between sessions or at the end of the activities. This was evidenced in a study conducted by Panzera et al. (2020) evaluating the behaviour and heart rate values of 13 donkeys during AAI sessions. To minimize any stress induced by AATs/AAIs, it is advised to allow donkeys to move freely in groups, to promote social buffering and ensure their strong sociability (Panzera et al. 2020). Donkeys are known to be social animals and form emotional connections with each other. Studies have shown donkeys prefer to be in the company of their species rather than in solitude (Burden & Thiemann 2015).

For this reason, it is also recommended to house donkeys in collective shelters, ensuring that social affinity is verified beforehand (Panzera et al. 2020).

Shelter should be provided for protection against elements such as excessive sunlight, wind and mostly rain and snow as donkeys are not equipped to face wet conditions of temperate climates. Consequentially, the donkey's hooves have also evolved into a different microstructure in comparison to those of a horse due to the low rainfall of their natural environment (Burden & Thiemann 2015). A donkey's hooves are therefore more prone to wet conditions and risk becoming waterlogged. This can lead to a series of hoof problems such as white line disease and abscess formation that must be considered when caring for donkeys (French 1993, Burden & Thiemann 2015).

As for nutritional requirements, donkeys have evolved to survive on low energy, fibrous plants which they would range for miles to obtain, spending most of their day foraging (Burden & Bell 2019). However, donkeys in domestic environments rarely have the opportunity to exhibit these natural behaviours (Burden & Bell 2019. Unlike horses, donkeys are highly efficient at digesting poor quality fibre, and require considerably lower maintenance energy levels (Smith & Wood 2008). Health problems can occur if energy intakes are excessive, such as obesity and metabolic imbalances. Donkeys rarely require energy-rich feeds and should be fed greater proportions of highly fibrous feedstuffs such as cereal straw or low-energy hay, with other fibre sources fed as required (Burden & Bell 2019. Safe logs and branches should also be provided to satisfy natural browsing behaviours. Donkeys have similar water requirements to horses and will vary depending on workload and ambient temperatures (Burden & Thiemann 2015).

4.6.1. Risk factors

Although animal therapy can provide numerous benefits for individuals, potential hazards must also be taken into account when considering interactions with animals. Potential risks may include allergies (Davenport & Smith 2020); though uncommon in the case of equids, injuries or zoonotic pathogen transmission. For these reasons a One Health approach within the programme of AAT's must be implied along with appropriate hygiene and welfare conditions of the given animals (Bert et al. 2016). Proper training and handling of animals by experienced personnel are crucial to minimize the risk of harm to both the animals and humans involved (Serpell et al. 2010). In the case of any animal, the psychological wellbeing plays a large role in behaviour influencing interactions in AAT (Dalton et al. 2020).

5. Conclusions

As this work has aimed to point out, the human-animal connection and its benefits have potential in various areas. However, the ways we can use this in the context of agriculture and global issues is scientifically less underlined and connected. Empathy has been offered as a possible tool for influencing pro-environmental behaviour change in the general public through internal motivation and relating to individual animals and their larger communities (Young et al. 2018). To further understand this potential correlation, it is important for future research to explore the potential of an enhanced ability to generalize empathy from companion animals to farm animals (Heiss & Hormes 2018). The introduced concept of care farming has shown benefits of use in promoting health and educational use where participants benefit from engaging in outdoor activities in a meaningful way and connecting to nature (Hine et al. 2008; Hemingway et al. 2016). It has offered a potential partnership between farmers, health care providers, conservation bodies and the general public (Hine et al. 2008; Elsey et al. 2014).

Further, the human-animal connection has shown to have great benefits when used in therapies (Fine 2019; Dashnaw Stiles 2001). AATs have proven to be especially useful in cases involving therapy with children and the young, as children relate more easily to animals and benefit from the non-verbal interactions the therapy animals provide (Levinson 1969). Studies have shown a reduction in symptoms of anxiety, depression, and PTSD as well as an increase in socialization, communication, and emotional well-being after AAT sessions (Dashnaw Stiles 2001; Dietz et al. 2012). When treating ASD, therapy with animals has demonstrated particularly beneficial outcomes improving patients' social functioning and interactions and decreasing stress levels and feelings of loneliness (Becker et al. 2017; Martin & Farnum 2002; Griffioen et al. 2020; Hardy & Weston 2020; London et al. 2020).

While there is an abundance of literature supporting the benefits of AAT it has been pointed out with the number of findings on Google Scholar, that not every animal has been taken into thought when considering their therapeutic value. Most findings have focused on the benefits of a dog companion. Regardless, benefits of EAT have also been mentioned with a predominance of findings involving horses, therefore hippotherapy. These studies focus more on the physical benefits of rehabilitation with horses connected

to horseback riding and its ability to resemble pelvis movement patterns of the rider to the movements of human walking (Martín-Valero et al. 2018). This has been beneficial in treating cerebral palsy and other physical disabilities and spinal cord injuries sometimes even resulting in recovery of patients allowing them to move independently again (Beinotti et al. 2010; Martín-Valero et al. 2018).

However, despite the genetic similarities of horses and donkeys, the differences in their potential therapeutic uses and values have been pointed out. As horses are large and have a flight response, donkeys offer a less intimidating option and have a calming effect (Panzera et al. 2020). Donkeys require more time to adjust to new environments than horses but offer a more stable emotional ground and are not easily startled (Gonzalez-De Cara et al. 2017). Donkeys have also shown less aggression towards humans despite being labelled as stubborn (Burn et al. 2010). Donkeys demonstrated a high level of sociability and a desire to interact with humans as well as the ability to form strong bonds and connections with humans (Panzera et al. 2020). In therapy sessions it was found that donkeys were very effective facilitators in the motivation building process of the therapy session. They promoted positive and active forces that stimulated a child's development and supported both psycho-affective and psycho-cognitive processes (Rose et al. 2011). There is still a lack of research in the field preventing the ability to conclude the exact parameters of a therapeutic donkey opposed to canine-therapy or hippotherapy, where animals are required to fulfil specific criteria such as age, health or breed and must often undergo tests evaluating for example their obedience and temperament (Jones & Gosling 2005; Serpell et al. 2020; Seganfreddo et al. 2022).

However, in the case of the donkey we can conclude from available scientific literature that the overall key characteristics of a therapeutic donkey include sociability, strong bonds with humans, gentleness, and patience (Clancy et al. 2022).

As for the ability of donkeys to learn, some studies revealed that donkeys and mules actually outperformed horses and even dogs in spatial cognition and problem-solving skills and performed more efficiently and accurately than the other animals (Osthaus et al. 2013). Therefore, donkeys really do have potential in AATs and AAIs and are worthy of the role of a therapist, henceforth deserving more research. It is also notable that the nutritional requirement of a donkey is lower than the requirements of a horse (Smith & Wood 2008; Burden & Bell 2019). Their resilience to diseases also serves as a

positive value when arguing the practicality of their potential use in therapy (Grosenbaugh et al. 2011; Middlecote 2020).

When looking at the role of the donkey in the world presented in this thesis, we could see that there are large differences in donkey populations. Less industrialised countries have larger donkey population numbers and rely on donkeys as workforce. On the other hand, countries that are wealthy enough to replace donkey power with motor power, have significantly lower donkey population numbers with some breeds of those regions even facing extinction. Here the donkey poses as an example of what can happen when we no longer have use for an agricultural animal.

Overall, it is valuable to recognize the potential benefits of the human-animal connection in various fields, including agriculture, global issues, conservation, and therapy. More research is needed to connect these topics and describe their influence on each other. Additionally, the differences in donkey populations worldwide highlight the importance of valuing and protecting these animals, even after their traditional roles in agriculture may no longer be needed.

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Appendices

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