



Assessment of donkeys' welfare in Addis Ababa and Ambo, Ethiopia

Välfärdsbedömning av arbetande åsnor i Addis Ababa och Ambo, Etiopien

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I denna serie publiceras olika typer av studentarbeten, bl.a. examensarbeten, vanligtvis omfattande 7,5-30 hp. Studentarbeten ingår som en obligatorisk del i olika program och syftar till att under handledning ge den studerande träning i att självständigt och på ett vetenskapligt sätt lösa en uppgift. Arbetenas innehåll, resultat och slutsatser bör således bedömas mot denna bakgrund.

Summary

In Ethiopia, working donkeys provide an essential transport resource and the people in the poor communities are highly dependent on these animals. The donkeys are often owned by people who belong to the poorest section of society, which results in that the animals are forced to work hard without adequate resources as feed, water, veterinary treatment and appropriate loading equipment. Consequently, the working donkeys in Ethiopia suffer from multiple welfare problems. The main aim of this study was to perform an animal welfare assessment and analyse the prevalence of different health and behavioural problems of the working donkeys in the cities Addis Ababa and Ambo, Ethiopia. An animal welfare assessment protocol in line with Welfare Quality[®] was used to assess 84 pack donkeys. The donkeys living and working conditions were observed using a resource- and management-based protocol. Further, 22 donkey owners were interviewed regarding feeding, water and health care routines. The result showed that resources as water, feed and shade for the donkeys were lacking at markets and other work sites. Almost 30% of the working donkeys were apathetic and 23.8% were unresponsive. The majority of the donkeys were scored as thin with Body Condition Score (BCS) of 1 or as fair with BCS of 2. Bad coat and skin condition, lesions and eye abnormalities were the most prevalent health problems. Other welfare problems that had lower prevalence but probably caused pain for the donkeys were hoof problems, abnormal gait and back pain. In Ambo, it was common to treat sick and wounded donkeys with traditional remedies which could deteriorate the welfare of the donkeys. To improve the conditions for the working donkeys, it is important to enhance the knowledge of the owners and to improve the status for these animals.

Sammanfattning

I Etiopien är åsnor en mycket viktig resurs vid transport och åsnorna ägs ofta av människor som tillhör den fattigaste gruppen i samhället. Detta resulterar i att djuren måste arbeta hårt, ofta utan resurser som foder, vatten, veterinärvård, lämpliga seldon och annan utrustning som används under transport. Följaktligen leder detta till att åsnorna i Etiopien lider av ett flertal djurvälståndproblem. Syftet med denna studie var att utföra en djurvälståndsbedomning och analysera vilka hälso- och beteendeproblem som kan vara vanligast förekommande hos arbetande åsnor i Addis Ababa och Ambo i Etiopien. Ett djurvälståndsprotokoll i linje med Welfare Quality[®] användes för att bedöma 84 packåsnor. Åsnornas levnads- och arbetsförhållande observerades genom att använda ett resurs- och skötselbaserat protokoll. Totalt intervjuades 22 ägare till åsnorna angående deras rutiner kring utfodring, vatten och hälsovård till deras åsnor. Resultaten visade att resurser som foder, vatten och skugga till åsnorna var bristfällig på platser där åsnorna befann sig i väntan på att användas till transport. Apatiskt beteende observerades hos nästan 30% av åsnorna och 23.8% visade ingen respons på observatören. Majoriteten av åsnorna bedömdes som tunna eller med gott hull, med en hullbedömningspoäng mellan 1 och 2. Dålig päls- och hudkvalité, sår och ögonproblem var de mest förekommande hälsoproblemen. Andra hälsoproblem som inte observerades lika ofta, men som kan ha medfört smärta för åsnorna, var hovproblem, onormal gång och ryggömheter. I Ambo, var det mycket vanligt förekommande att använda traditionell medicinering av sjuka och skadade åsnor, vilket kan bidra till en försämrad djurvälstånd. För att förbättra situationen för arbetande åsnor i Etiopien är det framförallt viktigt att öka kunskapen om dessa djur hos ägarna och att höja åsnornas status.

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1 Introduction

Ethiopia has the largest donkey population in Africa (FAOSTAT, 2013) and for the resource-poor communities in the rural and urban areas, donkeys are of greatest importance (Agajie, 2000). Donkeys are commonly used to transport different products such as crops, vegetables, water, fuel wood and livestock feed (Pearson et al., 2000) and for many families the donkey is a very important source of the income (Starkey, 1998). In some areas, the roads are of low quality and motor vehicles are unsuitable for transportation, consequently people are highly depended upon equines to transport essential products such as firewood and water (Mengistu, 2003). In this report, ‘working equines’ refers to working donkeys, horses and mules.

Despite the donkeys’ invaluable contributions to the people in Ethiopia the donkey is the most neglected animal and has a very low status (Biffa & Woldemeskel, 2006). Many of the working donkeys are owned by poor people and the animals’ needs are often ignored. The donkeys are forced to work in harsh environments without sufficient resources (e.g. food, veterinary treatment and shelter) and appropriate equipment may not be prioritized (Pritchard et al., 2005). Studies have shown that working donkeys suffers from animal welfare problems such as gait abnormality, joint swelling, broken skin, deep lesions (Burn et al., 2010a) and dental problems (Kumar et al., 2014). When their health deteriorates and they are unable to work they are usually abandoned and left to die (Starkey, 1998). In Ethiopia, the human population has increased and is expected to increase even more in the near future (Worldometers, 2015). Due to the increasing population and the undeveloped infrastructure the demand of working donkeys will most likely increase. It will still take many years to develop the infrastructure in Ethiopia due to the characteristics of the terrain and the low economic status of the country (Mengistu, 2003). Because of this, it is very important to manage the health and welfare problems associated with working donkeys, not only for the welfare of the animals but also for the livelihood for the people who own them (Kumar et al., 2014).

2 Literature review

2.1 Background

Ethiopia is located in the Horn of Africa, bounded to the west by Sudan, to the north by Eritrea, to the south by Kenya and to the east by Somalia and Djibouti (FAO, 2006). Ethiopia is the second largest country in Africa in terms of population (BBC, 2015) and in 2014, the human population was estimated to 96.96 million (WorldBank, 2016). The country covers 1 120 000 square kilometres in nine regional states (FAO, 2006) and the climate varies a lot; in the central highland, it is mild, in the south it is dry and hot while in the west it is humid and hot (Briggs, 2012). The agricultural sector plays a central role in the social and economic life, and about 80-85% of the people are employed in the agricultural sector. Ethiopia also has the largest livestock population in Africa (FAO, 2006) and the country has enormous potential for agricultural development. However, only 25% of its arable land is cultivated, and the agriculture mostly consists of rain fed farming, few inputs and low productivity. The smallholder farmers form the largest group of poor people in Ethiopia and these people are extremely vulnerable to increasingly frequent drought, which can deplete their livestock and assets, in turn leading to severe poverty (IFAD, 2012). The country has suffered droughts and famines, (BBS, 2015) and the increasing population and frequent drought periods puts a high pressure on the poor people in Ethiopia (SIDA, 2014).

2.2 Donkeys, the backbone of rural transport

The donkey population has declined in most industrialized countries in America and Europe resulting in the assumption that the donkey population will decrease also in the emerging industrialized countries. But in Africa, the donkey is still very important in the rural areas and for transport in the urban areas (Starkey, 1998). During the last ten years the donkey population in Ethiopia has almost doubled from 3.9 million in 2004 to 7 million in 2013, and in the whole Africa the number of donkeys has increased from 15.6 million donkeys in 2004 to 19.3 million donkeys in 2013 (FAOSTAT, 2013).

Donkeys are mainly owned by small-scale farmers and are used to carry goods on their backs or pull carts loaded with goods as firewood, animal feed, grains, water and building material. Each day thousands of donkeys enter Addis Ababa and other urban cities in Ethiopia, carrying different products (Starkey, 1998). Farmers that can afford cart or pack animals get higher prices for their crops when transporting it by themselves to markets, because they avoid paying margins to traders (Anderson & Dennis, 1994). Compared to motor vehicles, animals are slower and do not have the same carrying capacity, but the animals have other advantages (Anderson & Dennis, 1994). Donkeys are very appreciated for their characteristics; they are cheap, hardy, suitable for

different terrain like dry areas and hills, resistant to diseases and easy to handle and train. In some parts of Ethiopia, the infrastructure is still not fully developed with low quality roads and in these areas people depend on their donkeys (Pearson et al., 1999). Donkeys are also used in agricultural operations, as ploughing (Pearson et al., 2003). The donkey is perceived as an unclean animal and due to this the meat is not eaten (personal communication, Duguma, 2016), consequently the risk of theft is reduced and the farmer can allow donkeys to wander unsupervised which is another advantage with owning donkeys (Starkey, 1998). If the donkeys get too sick or injured so they no longer can be used for work, the owners lose their livelihoods, either temporarily or permanently. To keep donkeys in good condition is not only important for the welfare of the animals but also for the livelihood for the people who own them (Kumar et al., 2014).

2.3 Management of working donkeys

2.3.1 Housing

In rural areas in Ethiopia, it is common to keep the donkeys together with other livestock, mostly cattle. At night, donkeys are confined either in stables, in a *kraal* (enclosure) or at the owner's home. If the donkeys are not used for work during the day, they are grazing loose or tethered. Donkeys can also be tethered without access to pasture; under trees, in houses or kraals during the day (Pearson et al., 2000).

2.3.2 Access to feed

Wild donkeys spend approximately 14-16 hours per day foraging and feeding (Duncanson, 2010) and therefore the ideal diet for an equine is a high-roughage diet that contains a large amount of structural carbohydrates. The issue with roughage is that it takes a long time to eat, and time is something that working donkeys usually do not have. In developing countries like Ethiopia, the grass is often of poor quality and areas are often overgrazed. Feed that is more suitable for working donkeys is a balanced diet containing large amounts of long fibres with structural carbohydrate, and with a supplement of short feed containing non-structural carbohydrates (Duncanson, 2010). For working donkeys in Ethiopia, the diet is based on grazing on grasslands and roadsides and feed supplements like crop by-products or concentrates is sometimes provided (Starkey, 1998). When donkeys are kept at home the most common feeding regime is grazing with supplement of straw and grain mixtures and sometimes household wastes can also be fed. At markets there is no access to pasture but some owners feed their donkeys with grain or straw there (Pearson et al., 2000). When equine handlers were interviewed in western Ethiopia, 20% answered that they provided some form of feed at markets or workings sites (Amante et al., 2014). Without good feed the donkeys do not grow properly, they get weak, cannot work as hard, get

more susceptible to diseases and do not reproduce (Starkey, 1998). However, the donkeys survive due to their capacity to utilize feed of low quality (Starkey, 1998) and compared to horses, donkeys can digest high fibre forage diets better (Pearson, 1999). The farmers are usually aware of how to improve the health and condition of their donkeys but it is the lack of resources (e.g. feed) that's constrains them (Starkey, 1998).

2.3.3. Access to water

Like for any animal, water is vital for donkeys and over 60% of an equine body consists of water (Duncanson, 2010). Donkeys are adapted to arid environments and can conserve body water in conditions of water deprivation (Yousef, 1991) and absorb any water that is available in the feed. Even though donkeys are more thirst tolerant than horses and will maintain their appetites in conditions of water deprivation, they have the same water requirements as horses (Duncanson, 2010). In a study in Ethiopia, where equine handlers were interviewed it was reported that 98.2% provided water at the home and 10.5% provided water to their donkeys at markets or working sites (Amante et al., 2014).

Even though donkeys are adapted to arid environments and are thirst tolerant (Duncanson, 2010), heat stress and dehydration can be a serious welfare problem (Pritchard et al., 2006). Signs of heat stress can be increased respiratory rate, increased respiratory depth, head nodding, apathy and flared nostrils (Pritchard et al., 2005). Pritchard et al. (2005) conducted a study in Afghanistan, Egypt, India, Jordan and Pakistan during the cooler months between December and April. The result reported that only 2.9% of the working donkeys showed signs of heat stress and dehydration, but in the summer months it is expected that the prevalence of heat stress signs would be much higher. Veterinarians have reported up to 80% prevalence of heat stress signs during the summer months (Pritchard et al., 2006). In horses, as little as 3% dehydration can reduce the performance capacity (Dahlborn et al., 1995) and therefore it is expected that dehydrated donkeys will have a decreased work capacity.

2.4 The hard life of a working donkey

2.4.1 Life expectancy

Donkeys can reach an age of 35 years if they are well managed, but the life expectancy of a working donkey in Ethiopia is merely 9-13 years (Starkey, 1998). In a study by Kumar et al. (2014), the average age was 7 years and only 4.4% were older than 15 years. The same study also showed that young donkeys worked with the same activities as older donkeys which can lead to poor health for the young donkeys. This result led to the researcher assuming

that people who use donkeys may only be interested in short term immediate gain, rather than a long term working life of their donkey (Kumar et al., 2014).

2.4.2 Health problems

Working donkeys suffers from animal welfare problems such as gait abnormalities, tendon and joint swellings, skin lesions, ectoparasites (Burn et al., 2010; Amante et al., 2014), lip lesions, tether and hobbling lesion (Mekuria & Abebe, 2010) and dental problems (Kumar et al., 2014). In a study that was conducted in northern Ethiopia, 30.2% of the donkeys suffered from skin lesions, 33.8% of parasites, 19.3% had eye problems and 16.2% had dental problems. Further on, 18.2% suffered from leg issues such as overgrown hooves, abnormal gait and lameness (Kumar et al., 2014). Another study conducted on working equines in Ethiopia, reported that 16.9% had broken skin or deep lesions, 37% ectoparasites, 99.2% gait abnormalities, 99.5% sole surface abnormalities, 99.6% tendon and joint swelling and 3.4% firing lesions (Burn et al., 2010a). Firing lesions is caused either by the owner burn-marking the animal or by traditional medical treatments (Burn et al., 2010a). The majority of working donkeys also suffers from low BCS (Burn et al., 2010a; Amante et al., 2014; Kumar et al., 2014).

The prevalence of health problems can differ between species, for example donkeys have significantly higher prevalence of gait and sole abnormalities than horses and mules. The result from studies on equine welfare not only differ between species but also between work-type as cart, pack or riding and between rural and urban areas (Burn et al., 2010a). Morgan (2008) reported that 10.1% of the donkeys were lame in urban areas and 2.4% in rural areas. The cause of lameness differed; in rural areas, wounds (mainly hyena or donkey bites) were the most common reason, whereas in urban areas it was road traffic accidents. Burn et al. (2010a) also studied the difference in equine welfare problems in urban and rural areas and found that skin lesions and displayed aggression was more common in urban areas. On the other hand, rural equines were thinner, mostly scored as three or less in BCS and had higher prevalence of ectoparasites, gait and sole abnormalities, faecal soiling and tendon and joint swelling.

Diseases are another problem for the donkeys and can also cause economic defeats for the owners. Biffa & Woldemeskel (2006) conducted a study in southern Ethiopia and reported that 5.5% of the donkeys suffered of injuries caused by infectious diseases. Diseases that are a problem for the donkeys are worms, external parasites, rabies, anthrax, skin tumours, pneumonia and hoof rot. Donkey owners have reported that euthanasia due to disease could have been decreased if they had access to veterinary service in their neighbourhood (Pearson et al., 2000).

2.4.3 Improper work equipment and overloading

Other common animal welfare problems are improper harnessing, overloading and overworking the donkeys (Kumar et al., 2014). In a study conducted in Ethiopia by Biffa and Woldemeskel (2006), 28.7% of the donkeys were overworked and overloaded and 26% of the donkeys suffered from external injuries due to improper harness and saddles (Biffa & Woldemeskel, 2006).

A properly designed harness allows the working donkey to pull the load to the best of its ability without risk of injuries. On the other hand, a poorly designed or ill-fitted harness will result in fatigue, discomfort or lesions on the donkey (Pearson et al., 2003). Ill fitted harnessing can lead to skin lesions at the withers, back region and underneath the base of the tail (Kumar et al., 2014). Harness lesions will not only be painful for the animal, it will also increase the risk of secondary infections which will reduce the work capacity and longevity of the donkey (Smith et al., 2014). Thin donkeys have less natural padding that protects them from friction, pressure and lesion caused by harnessing, and below score 3 in BCS is correlated with lesions of skin and deeper tissues (Pritchard et al., 2005).

Donkeys are often controlled by halters that can be made from rope, webbing, cotton or leather. Materials such as wire, chain or other materials that may chafe or cause skin lesions are unsuitable to use. A saddle can be used when loading products on the donkeys back and are usually made of wood consisting of two X-shaped pieces attached to two oval support pads. When using this form of saddle, it is important to use padding between the saddle and the animals' back, to protect the backbone. Materials that are recommended as padding are cotton, wool blankets and sheepskin. Plastic and synthetic material should be avoided because it will give the donkey lesions. It is also important that the load should be well balanced on both side of the back, otherwise the donkey will use more energy in carrying it and will get exhausted (Pearson et al., 2003).

To hobble donkeys i.e. tie two legs together with a short rope, is commonly performed to prevent the donkey from wandering off (Pearson et al., 2003). Hobbling the donkey in an unsuitable way can cause discomfort and wounds (Amante et al., 2014) and it is recommended that the hobbles should be made of soft materials to prevent chafing and wounds. Only the front legs should be hobbled, never the back legs together or one back leg to a front leg, and two animals should never be hobbled together (Pearson et al., 2003).

It is recommended that a donkey should not carry more than one third of its body weight (i.e. between 40-80 kg, Pearson et al., 2003) but studies in Ethiopia show that donkeys carry loads between 60-100 kg. In markets in Addis Ababa, it is not uncommon to find donkeys carrying packs of 100 kg

(Starkey, 1998) and in southern Ethiopia, donkeys have been observed traveling up to 70 km per day while carrying an average workload of 150 kg (Biffa & Woldemeskel, 2006).

2.4.4 Treatment of sick donkeys

When a donkey's health deteriorates, the owners use different treatment strategies. Studies in Ethiopia show similar results; most unhealthy donkeys do not receive any treatment but are instead forced to keep on working. Some owners take their donkeys to a nearby veterinary clinic or treat them traditionally (Biffa & Woldemeskel, 2006; Kumar et al., 2014). An example of traditional remedies that are used, by the owner or a local healer, is pouring plant juice or oil on the donkey. According to donkey owners, one constraints of donkeys is the absence of veterinary clinics. If the donkey is finally taken to a veterinarian it is usually in a progressed stage of illness and has usually been subjected to numerous traditional remedies (Kumar et al., 2014). Biffa and Woldemeskel (2006) reported from southern Ethiopia, that when the donkeys were sick, 58.8% of owners still used their donkeys continuously regardless of the severity of the injuries, 25.6% gave the donkeys short term relief and 9.7% gave the donkeys long term rest until it was recovered. It was also reported that when the donkeys' health deteriorates, 8.6% of owners left them by the road to fend for themselves (Biffa & Woldemeskel, 2006). Another study from Ethiopia, showed some different results; 10.6 % used traditional medicine, 88.2% took their equines to a veterinary clinic and only 0.5% left the animal untreated (Amante et al., 2014).

2.4.5 The physiological state of working donkeys

Many studies have reported behaviour problems such as unresponsiveness and apathy in working donkeys over different parts of the world (Burn et al., 2010; Amante et al., 2014; Kumar et al., 2014). A study by Amante et al. (2014) from Ethiopia showed that 23.1% of the donkeys were depressed. In a study by Pritchard et al. (2005) 11.5% of the donkeys were described as apathetic or severely depressed, and when the observer approached the donkeys, 44.3% avoided the observer or showed signs of aggression and 43.6% did not show any response at all. Burn et al. (2010b) reported similar results; 13.1% of the donkeys were apathetic/depressed, 64.6% did not response when they were approached by the observer and 25.9% avoided the observer. The results also showed that there was a correlation between apathy and lack of response to the observer. The authors' states that it appears that equines that are subjected to severe and numerous physical problems enter a state of behavioural unresponsiveness. When "prey animals" do not respond to a possible threat, this is an indication of that the animal is of the boarder of its survival. Apathy was most prevalent in older and thinner donkeys and is associated with others indicators of poor health like abnormal mucous membrane colour and faecal soiling (Burn et al., 2010a; Burn et al., 2010b).

Beating of working donkeys is widespread and the owners beat their donkeys when they perceive the animal as lazy. Beating a donkey does not only cause wounds and physical pain but it also induces fear and mental stress in the animal (Swann, 2006), which is shown in other animals as well. The animal's fear of humans can cause severe stress in the animal (Rushen et al., 1999). An apathetic or depressed donkey is more likely to get beaten which can lead to chronic fear and significantly decreased welfare (Swann, 2006).

Donkeys are very social animals and social interactions with peers are important to them. A study from India showed that even fatigued and dehydrated donkeys first priority was to socialize with other donkeys. After a long working day, 8-12 hours, the donkeys were released and the first thing they did was to gather together and interact, the second thing they did was seek water and drink together as a group. The same study showed that after 5-6 months of hard work some donkeys became permanently apathetic and failed to socialize (Swann, 2006).

2.5 Animal welfare assessment protocol

Animal welfare is a multidimensional concept comprising good health, comfort, expression of behaviour etc. (Botreau et al., 2007), therefore it is essential to include both health and behaviour when assessing animal welfare. Farm animal welfare has become a great concern of the European public, and for this reason the European Union initiated the Welfare Quality® (WQ®) project. The project's aim was to develop a system for on-farm monitoring of animal welfare and to provide advice on improvements of welfare (Miele et al., 2011). After the WQ project's termination, several protocols for horses have been developed in line with the approach (Viksten *et al.*, submitted; Wageningen UR, 2012). To improve welfare of the working donkeys, essential feedback to the owner is necessary, as stated in the WQ® project. Feedback along with practical advice and alternative strategies can help the farmer to improve the animal welfare through informed decisions (Blokhuis et al., 2010). This strategy can also be useful for improving animal welfare of working donkeys.

2.6 Aims

The main aim of this study was to perform an animal welfare assessment and to gain adequate knowledge of the management of working donkeys in Ethiopia.

Research questions that were investigated are:

- Which are the management routines for the working donkeys regarding feed, water, shelter, work equipment and health?
- What is the prevalence of different health and behavioural problems of the working donkeys in Addis Ababa and Ambo?

- Are there any differences between Addis Ababa and Ambo regarding management routines, BCS and general alertness?
- Are there any effects of sex, equipment lesions and general alertness on BCS?
- Is there any correlation between abnormal hooves and abnormal gait as well as between general alertness and observers approach?
- Is a welfare assessment protocol in line with Welfare Quality® (Viksten *et al.*, submitted) useable in the field?

The results of this report has the potential to contribute to an improvement of the animal welfare of working donkeys in Ethiopia and indirectly this will also help the poor people of Ethiopia.

3 Method and material

A literature review was conducted on working equines and the geographical study area. With help of previous research in the area and the supervisors, a welfare assessment protocol was designed along with a semi-structured questionnaire. To be able to perform BCS survey on donkeys the student practiced on approximately 60 horses in different stables around Uppsala. The student also practiced to score lesions according to Mejdell *et al.* (2010) injury scoring scheme and got access to a power point with photographs of injured horses that are used in lectures in veterinary education.

3.1 Study area and animals

The study was conducted between September and November 2015, in different locations in Addis Ababa and Ambo, Ethiopia. Addis Ababa is the capital of Ethiopia and is located in the middle of Ethiopia on latitude of 8°00 N and a longitude 38°00 E. Ambo is a small city located 112 km west of Addis Ababa (Ambo University, 2009), see Figure 1. Both Addis Ababa and Ambo is located in Oromia Region in the West Shewa zone (Embassy of Embassy of the Federal Democratic Republic of Ethiopia, 2016). During the observation period, it was spring and dry season with mostly clear sun and only partly cloudy, in the shadow average ambient temperature was estimated to 20-25°C.

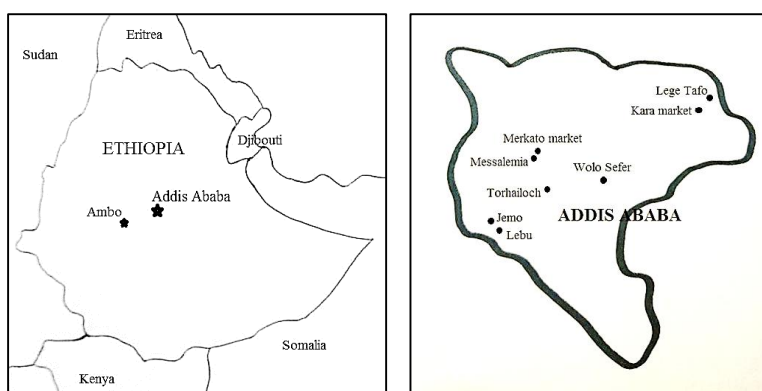


Figure 1. Left map: location of Addis Ababa and Ambo. Right map: Study locations in Addis Ababa.

The field study was carried out by one animal science student. The sample of donkeys assessed in this study was not randomized; instead it was based on convenience sampling, i.e. mainly on geographical location and owners' attitude to participation in the study. In Addis Ababa, donkeys were studied in seven different locations, some in central Addis Ababa and some in the peripheries, see Figure 1.

The locations were:

Laga Tafo; located in the north-east of Addis Ababa, in the periphery. The donkeys that were observed were walking loose, grazing and resting.

Jamo; located in the south-west of Addis Ababa, in Nifas-Silk Lafto Subcity. The donkeys that were observed were walking loose, grazing and resting.

Markato market; the biggest market in central Addis Ababa, in Ketema subcity. The donkeys were transporting different material, such as grain. The welfare organization The Donkey Sanctuary has worked a lot with educating the donkey owners at this market.

Torhailoch; a grain station in the central south-west part of Addis Ababa. At this grain stations different grains were bought and sold and then transported by donkeys to other markets or locations.

Labu; located in the south-west of Addis Ababa in Mekanisa, Nefas Silk- Lafto Sub-city. The donkeys were observed at a water station, where donkey owners came to collect water to their own household or sell to people in the community.

Wallo Sefer; located in Bole sub city, in north-east of Addis Ababa. On a hill the donkeys were walking free on the fields allowed to graze and rest.

Messalemia; a grain station close to Merkato Market in Ketema Sub city in the central Addis Ababa.

Kara cattle market; in Yeka Sub-city, north-east of Addis Ababa. A cattle market where donkeys transported water and feed for the cattle, some donkeys also lived at the market.

Most of the data was collected in Addis Ababa, but data was collected twice in Ambo. In Ambo, the donkeys were studied at Ambo market and grain milling houses where the donkeys were used to transport milled grain between milling houses and Ambo market where the grain was sold.

In total, 84 donkeys were observed; 67 in Addis Ababa and 17 in Ambo. All donkeys that were studied were used as pack donkeys.

3.2 Data collection

In the beginning of September, a pilot study was carried out at Kara Market in Addis Ababa, subsequently the protocol and questionnaire were slightly modified to be more feasible in the field.

Four different local interpreters were used, three in Addis Ababa and one in Ambo, but only one interpreter was used at a time. Prior to the observation, the donkey owner gave permission for conducting the study. The assessment started by observing the donkey's behaviour from a distance, the donkey was then approached and its' welfare was assessed using a protocol (Appendix 9.3). The assessments were conducted where the donkeys were located and usually the animals were waiting to be used for work. The donkeys were either tied, restrained or loose during the assessment. When they were loose, a person generally held the donkey to enable conducting the welfare assessment. All donkeys were photographed for documentation of lesions and other health problems. Scoring one animal took approximately ten minutes and between four to ten donkeys were observed at each assessment occasion. After the welfare assessment, the donkey's owner was interviewed. At the end of the study, The Donkey Sanctuary's veterinary clinic in Addis Ababa was visited and veterinary Chala Chaburte was interviewed.

3.2.1 Observations

The donkeys' environment and living conditions were assessed through observations using a resource and management based protocol (Appendix 9.1). Parameters included were access to water, feed and shade. If they had access to water the cleanliness of the water was assessed and if the donkeys had access to feed, the type of feed was described. Other observations included were: if the donkeys had shoes, if they were tied and in that case how. If the donkeys were working during the observation, harness and equipment were assessed as the way of loading the donkeys. Weather, the estimated ambient temperature and the time of the day for the assessment were noted.

3.2.2 Interviews

A semi-structured interview was carried out directed to the donkeys' owner. A total of 22 donkey owners were interviewed; 12 in Addis Ababa and ten in Ambo. Questions that were included were feeding routines, travelling distance and the health care of the donkey (Appendix 9.2).

3.2.3 Welfare assessment protocol

During the welfare assessment the behavioural measures were conducted first followed by the health measures. The measures were carried out according to the order in Appendix 9.3.

The behaviour protocol included five behavioural observations. The parameters, grade, definition and description is summarized in Table 1 and the assessment was carried out in that following order. The general alertness test and the observer approach test was carried out according to Burn et al. (2010b). If the donkey attempted to bite, kick or avoid the assessor, the reaction was recorded during the entire welfare assessment.

Table 1. Behaviour assessment protocol on working donkeys, based on Burn et al., 2010b

Measure	Grade	Definition	Recording method
General alertness	0	Alert: Responding to surroundings, ears moving and often forward, eyes open, tail swishing, feet may be moving, head up unless sniffing or eating	Observation of the donkey from a distance of at least three meters and for up to ten seconds without disturbing the animal
	1	Apathetic: passive response to surroundings e.g. small ear movements, some tail swishing, feet may be moving, eyes may be half-closed, head may be lowered/unresponsive to surroundings, e.g. ears still and lowered, eyes closed or half-closed, no tail swishing or foot movement, head lowered	
Observer approach	0	No response	The observer approached the donkeys head from three meters away at an angle of about 20° and recorded the animals' response
	1	Friendly approach, animal turn head towards observer, ears forward	
	2	Avoidance: animal moves or attempt to move, turn head way	
	3	Aggression: ears held back or flattened, attempts to bite, kick, rear or strike with leg	
Biting attempts when being touched	Yes	The donkey turns its head against the observer and attempts to bite	Prevalence of behaviours was noted during the whole health assessment when the donkey was touched and handled by the observer
	No	No biting attempts	
Kicking attempts when being touched	Yes	Kicking with front or back legs	
	No	No kicking attempts	
Avoidance when being touched	Yes	The donkey moves away or tries to move away from the observer	
	No	Stands still	

The assessment of physical health in this welfare assessment of donkeys was based on a horse welfare assessment protocol (HWAP) by Viksten et al. (submitted) in line with the WQ[®] approach which was modified based on earlier work and studies that have been conducted on working equines in the field (The Donkey Sanctuary, unpublished; Burn et al., 2010b; Mejdell et al., 2010).

BCS was carried out according to Carroll and Huntington, 1988 and Wright et al. (1998) assessment on horses (Table 2) and the score reached from score zero (very thin) to five (very fat) and included half points. The assessment was performed both visually and by palpating the donkey in applicable areas.

Table 2. BCS protocol according to Carroll and Huntington, 1988 and Wright et al., 1998. Fat deposits on neck, withers, back and loin, ribs, tail head and hind quarter were assessed both visually and by palpation

Condition	Definition
0 Very thin	<i>Neck:</i> Bone structure easily felt. No muscle shelf where neck meets shoulder <i>Withers:</i> Bone structure easily felt <i>Back and Loin:</i> 3 points of vertebrae easily felt <i>Ribs:</i> Each rib can be easily felt <i>Hind Quarters:</i> Tail head and hip bones projecting
1 Thin	<i>Neck:</i> Can feel bone structure - slight shelf where neck meets shoulder <i>Withers:</i> Can feel bone structure <i>Back and Loin:</i> Spinous process can be easily felt – transverse processes have slight fat covering <i>Ribs:</i> Slight fat covering, but can still be felt <i>Hind Quarters:</i> Hip bones can be felt
2 Fair	<i>Neck:</i> Fat covering over bone structure <i>Withers:</i> Fat deposits over withers - depends on conformation <i>Back and Loin:</i> Fat over spinous process <i>Ribs:</i> Can't see ribs, but ribs can still be felt <i>Hind Quarters:</i> Hip bones covered with fat
3 Good	<i>Neck:</i> Neck flows smoothly into shoulder <i>Withers:</i> Neck rounds out withers <i>Back and Loin:</i> Back is level <i>Ribs:</i> Layer of fat over ribs <i>Hind Quarters:</i> Can't feel hipbone
4 Fat	<i>Neck:</i> Fat deposited along neck <i>Withers:</i> Fat padded around withers <i>Back and Loin:</i> Positive crease along back <i>Ribs:</i> Fat spongy over and between ribs <i>Hind Quarters:</i> Can't feel hipbone
5 Very fat	<i>Neck:</i> Bulging fat <i>Withers:</i> Bulging fat <i>Back and Loin:</i> Deep positive crease <i>Ribs:</i> Pockets of fat <i>Hind Quarters:</i> Pockets of fat

The health assessment protocol also included 15 potentially relevant welfare measurements and was assessed both visually and by palpating the donkeys. The measures, grade, definition and description are described in Table 3 and the assessment of lesions are described in Table 4.

The assessment of thermal comfort, coat condition, skin condition, nasal discharge, cough, hooves and pack pain was carried out according to Viksten et al. (submitted), a protocol designed for horses. Skin lesion (not caused by harnessing or equipment) was based on the injury scoring system for horses designed by Mejdell et al. (2010). See the parts of the donkeys where lesions were observed in Figure 2. Skin lesion on limbs were carried out according to The Donkey Sanctuary “Guidance Notes to Accompany Working Equine Welfare Assessment” (unpublished). Eyes, gait, firing lesions and equipment lesion was carried out according to Burn et al. (2010b), a protocol designed for

working horses, mules and donkeys. The original measurement “general lesion” from Burn et al. (2010b) was modified to “equipment lesions” and was only assessed on the donkey’s body where work equipment as harness, saddle or straps may fit. Also gait, firing lesion (Burn et al., 2010b) and hoof condition (Viksten et al., submitted) were modified to be feasible in this study.

Table 3. Health assessment protocol on working donkeys, based on Burn et al., 2010b and Viksten et al., submitted

Measure	Grade	Definition	Recording method
Thermal comfort	0	Normal, no sweating	Direct observation of the whole body
	1	Sweating	
Tail docked	Yes	Tail has been cut short, unable to remove flies	Direct observation
	No	Tail intact	
Coat condition	0	Normal shine, tightness, and length	Direct observation of the whole body
	1	Dull/long/lacklustre/abnormal tightness	
Skin condition	0	Normal, clean skin	Coat was separated with fingers
	1	Skin problems, crusts and dandruff on big parts of the body. Dirty skin.	
Eyes	0	No abnormalities	Direct observation on both eyes
	1	Abnormal, at least one eye with wet eyelashes, discharge, redness, swelling, opacity or injury	
Nasal discharge	0	Clear and no discharge	Direct observation of both nostrils
	1	Coloured or thick discharge	
Cough	No	No coughing	Observed during the whole health survey
	Yes	Coughing several times	
Hoof condition	0	Normal	Visually assessment on all four hooves
	1	Severely overgrown or severe cracks	
Gait	0	Normal and even	The gait was assessed when the donkey walked loose. If the donkey was tied, the observed tried to move the donkey and note if the donkey was reluctant to put weight on any of the legs
	1	Abnormal: Reluctant to put weight on a limb, short and uneven stride length	
Back pain	0	When palpating the back, no reaction or minor tension in back	Palpating along the spine, from withers to hip bones, on both sides of the back
	1	When palpating the back, tension, lower the back, walking away, biting, pulling ears back	

Table 4. Assessment of skin lesion on donkeys based on Burn et al., 2010b; Mejdell et al., 2010, The Donkey Sanctuary, unpublished

Measure	Grade	Definition	Recording method
Skin lesion (not caused by harnessing and working equipment)	0	No visible lesion	Direct observation of the whole body, except where equipment, harness or straps can fit
	1	Lesion involving hair loss only	
	2	Lesion involving a moderately sized contusion (bruise) with or without hair loss and/or an abrasion (scrape) in the skin	
	3	Lesion involving a minor laceration (cut) and/or a larger contusion (bruise) with obviously swollen parts with or without hair loss	
	4	Laceration involving injury to deeper tissues (e.g. muscle, tendon) or a laceration without visible damage to underlying tissues but of a size that normally requires surgery	
Skin lesions on limbs	0	No visible lesion	Direct observation of the limbs on all four legs
	1	Superficial or healed: Tether/ hobble lesions or scars are present and may include areas of hairless skin, but the skin is unbroken, partially broken (pale pink) or scabbed. Scars may be healed with hairless skin or white hairs	
	2	Skin and immediate subcutaneous layers broken. Lesions show visible redness. This score also includes granulation tissue	
	3	Deep lesion. Tether or hobble lesions of a depth that makes muscle/tendon/bone visible	
Equipment chafing	0	No chafing	Direct observation of areas on donkey where equipment, straps or harness may fit
	1	Superficial, fur scrubbed of	
	2	Broken skin	
	3	Lesion of deeper tissue	
Location of skin lesion		Abdomen	
		Axilla	
		Groin	
		Spine	
		Withers	
		Around tail head	
		Hipbone	
Firing lesion	No	No signs of firing lesion	Signs of firing lesions was noted everywhere on the donkey
	Yes	Superficial/healed, broken skin or deep lesion	

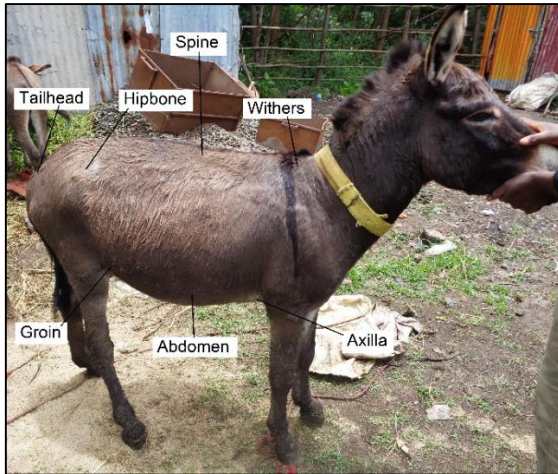


Figure 2. Parts of the donkey where equipment chafings were observed; spine, hipbone, tailhead, groin, abdomen, axilla and withers.

3.3 Statistical Analyses

All collected data was summarized in Excel. The data was analysed using Minitab version 17 Statistical Software. The prevalence of all health and behaviour parameters was summarized in a frequency table. To determine if there was any statistical dependence between variables a Chi-Square test was used. If there was a dependence between two variables where one was ordinal, Kendall's tau was used. This test was used to determine how strong this correlation was and to interpret how these two variables were correlated to each other. Chi-Square test and Kendall's tau tests are suitable when analysing categorical data.

Some variables could not be analysed through the Chi-Square Test because some expected counts were less than 1, these variables were encoded (classes were added together).

Three variables were encoded:

Skin lesion - scoring 0 and 1 were encoded as 1 and scoring 2 and 3 were encoded as 2.

BCS – scoring 0 to 1 were encoded as 0.5 and scoring 2.5 to 3.5 were encoded as 3. Scoring 1.5 and 2 were left unchanged.

Observer approach: 0 and 1 were left unchanged. 1 and 2 were encoded as 2.

Kendall's tau can only analyse the data if both variables are ordinal or if one variable only has two categories. To adjust for this when testing for sex, gelding was first excluded and mares and stallions were compared. In the next test mares were excluded to be able to compare geldings and stallions. Geldings and mares could not be compared, because of too few observations.

4 Results

Both female and male donkeys were observed but the age of the donkeys could not be estimated. In total, 61 stallions, 14 mares and 9 geldings were assessed, all mares were assessed in Ambo. All donkeys were owned by the person that was using them. The owners earned their income by working as farmers or transporting and selling grain, water or other products. The donkeys that were working during the observation were transporting water, grain or cut grass.

4.1 Resources and management, based on observations

During the welfare assessment the donkeys' working conditions and environment were observed. Donkeys were sometimes observed walking loose when they were allowed to graze while other were studied at work and markets sites, loose or tied. The prevalence of feed, water, shade and grazing that were observed in Addis Ababa and Ambo is summarized in Figure 3. In Addis Ababa, some donkeys got access to clean water in buckets. Of the donkeys that were provided with feed at work sites, 87.5% got access to grain, the other was fed with hay, straw or cut grass. In Ambo, the donkeys that got access to feed were provided with cut grass or hay.

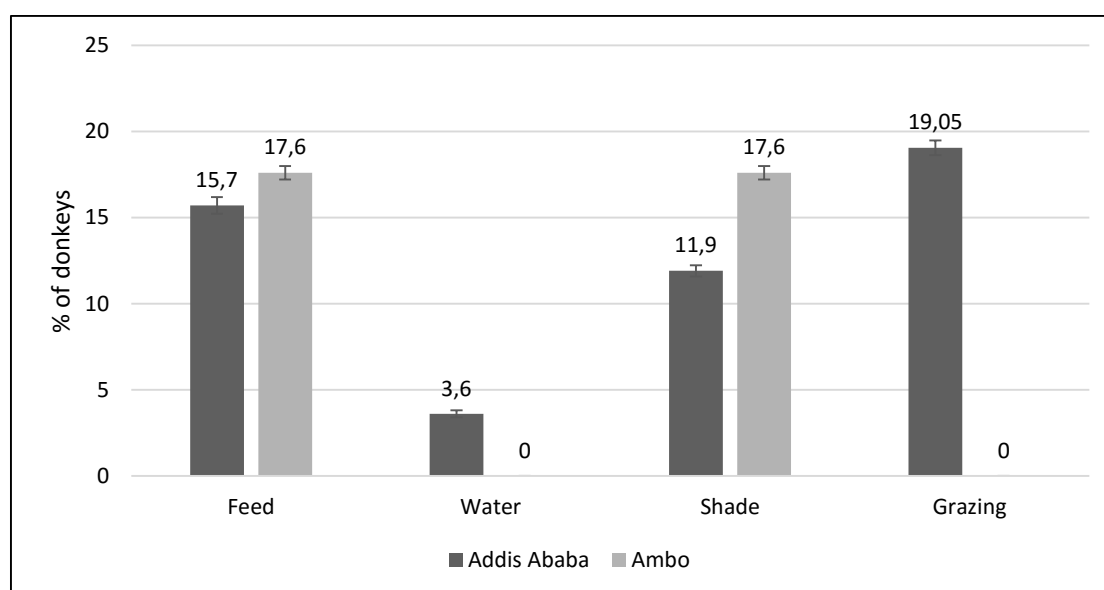


Figure 3. Percentage and STDEV of resources of feed, water, shade and grazing provided to working donkeys in Addis Ababa and Ambo.

None of the donkeys had shoes and none of the donkeys had their tail docked. Of all assessed donkeys, 32.1% were tied or hobbled in different ways, see Figure 4. The donkeys that were tied to a “firm object” was tied to a pole or stone that was fixated in the ground. Over 90% of the harnesses were made out of rope, other materials that were observed were leather and plastic. Of the working donkeys were 25% provided with harness that was padded under the tail. Out of the 31 donkeys that were observed when they were working, 77.4% were provided with some form of protective padding on the back. All of the

donkeys that carried water in an x-shaped wooden construction were padded, see Figure 5. The padding materials that was observed were plastic sack, soft cotton blankets, old clothes and leather.

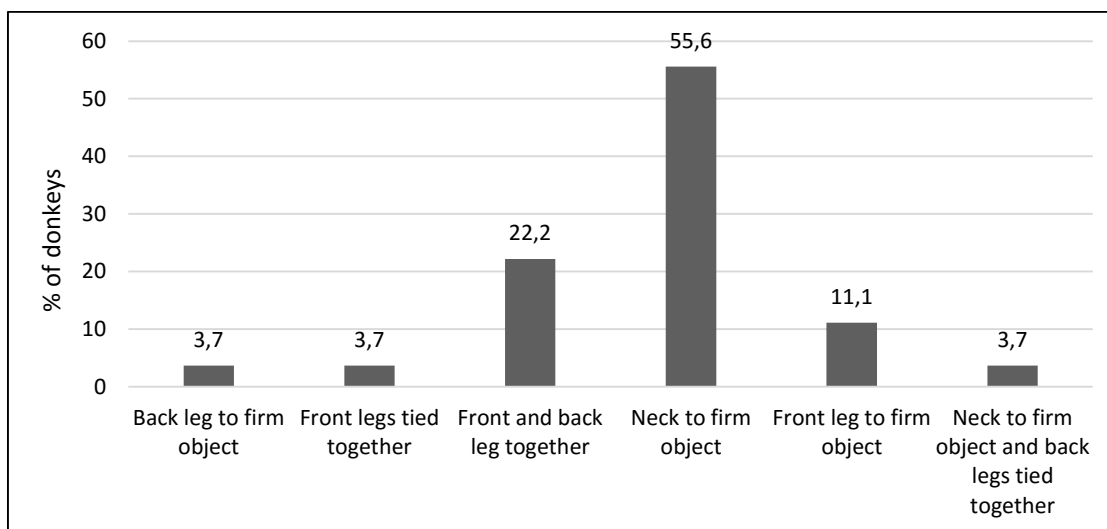


Figure 4. Distribution in percentage of how many working donkeys that were tied or hobbled in each different way in markets or other work sites in Addis Ababa and Ambo.



Figure 5. Donkeys carrying packs straight on their backs versus donkeys with an x-shaped construction with padding material underneath.

4.2 Management routines

The questions and answers from the interview directed to donkey owners regarding feed, water and shelter are summarized in Table 5. All of the 12 owners that were interviewed in Addis Ababa tried to provide their donkeys with additional feed. The donkeys that lived in central Addis Ababa or at the Kara cattle market did not get access to pasture on regular basis, however the owner occasionally took them to locations with pastures. Most of the owners who provided additional feed to the donkeys in Ambo gave it after the donkeys had been used for work.

All owners provided their donkeys with water during the day. Either they lived close to a river or they provided the water in buckets or troughs. 40% of the owners provided their donkeys with water only once per day.

All owners provided some form of shelter for the donkeys at night; inside a fence or in some form of shed, sometimes together with cattle. However, information collected during the observations showed that donkeys kept at the Kara cattle market had no proper shelter from bad weather or sun, but they were protected from predators. 45% of the owners used their donkey for transport every day all year around, but some let their donkey rest on Sundays. 45.5%, owned between 2 and 3 donkeys, however 36.4 % owned only one donkey and 13.6% owned more than 5 donkeys.

Table 5. Questions and answers in percentage directed to donkey owners, regarding feed, water and shelter management of working donkeys in Addis Ababa and Ambo

Question	City	Yes (%)	No (%)	
<i>Do you provide the donkey with additional feed?</i>	Addis Ababa	100	0	If yes: with grain, residues from grain, cut grass, injera (Ethiopian bread made out of the grain teff), frushka (wheat bran)
	Ambo	60	40	If yes: with cut grass, barley, wheat and grain
<i>Do you provide your donkey with water during the day?</i>	Addis Ababa	100	0	
	Ambo	100	0	
<i>Do the donkey have shelter at night?</i>	Addis Ababa	100	0	
	Ambo	100	0	
	Ambo	100	0	

4.2.1 Management of sick donkeys

The interview also covered question on how the owners managed the health of their working donkeys, see the answers in Table 6. None of the owners trimmed the hooves on their donkeys on regular bases, instead a few did when the hooves were overgrown. In Addis Ababa, The Donkey Sanctuary vaccinate donkeys for Anthrax and deworm donkeys twice a year. According to veterinary Chala Chaburte, who work at the animal welfare organization The Donkey Sanctuary in Addis Ababa, common welfare problems are lameness, rabies (due to bites from stray dogs), different parasites (e.g. Ascaris), Anthrax, Tetanus, Strangles, tumours, colic, hyena attacks, ocular problems (due to whipping by people) and foreign body caught in the gastrointestinal tract. The most common causes of death are colic caused by foreign bodies caught in the gastrointestinal tract, enteroliths and serious car accidents. Common causes of euthanasia are car accidents and rabies (personal communication, Chaburte, 2015, 2016).

Table 6. Questions and answers in percentage from the interview, regarding health management, directed to the working donkeys' owners in Addis Ababa and Ambo

Question	Yes (%)	No (%)
<i>Do you trim the hooves of the donkey?</i>	22.2	77.8
<i>Is the donkey vaccinated?</i>	50.0	50.0
<i>Do you let the donkey rest when it is sick?</i>	89.0	11.0
<i>Do you think that a donkey can feel pain?</i>	94.2	5.8

In total, it was most common to take a sick donkey to a veterinary clinic, the second most common treatment was traditional remedies, see the percentage in Figure 6. The answers however did differ between Ambo and Addis Ababa. All owners that were interviewed in Ambo always used traditional treatment. Six owners stated that if it was a common disease they initially treated it with traditional medicine, if that did not work they took the donkey to a veterinarian. The most common traditional treatment when the donkeys stopped grazing was to burn the donkey with hot iron in the mouth, under the lip or tongue, or behind the ear or on the cheek. Other treatments that were used was to burn grain or other special materials and then let the donkey breath in the smoke. Blood-letting from a vessel under the tongue was also a way of treating sick animals. In Addis Ababa, it was more common to take sick donkeys to a veterinary clinic than in Ambo. The owners who did not do anything if their donkey got sick tried to sell the sick donkey or abandoned it. Most of the owners let the donkey rest when it was sick, and the majority let them rest until fully recovered. All owners except one, knew that donkeys could feel pain, which was the reason why they hit the donkeys when they did not work.

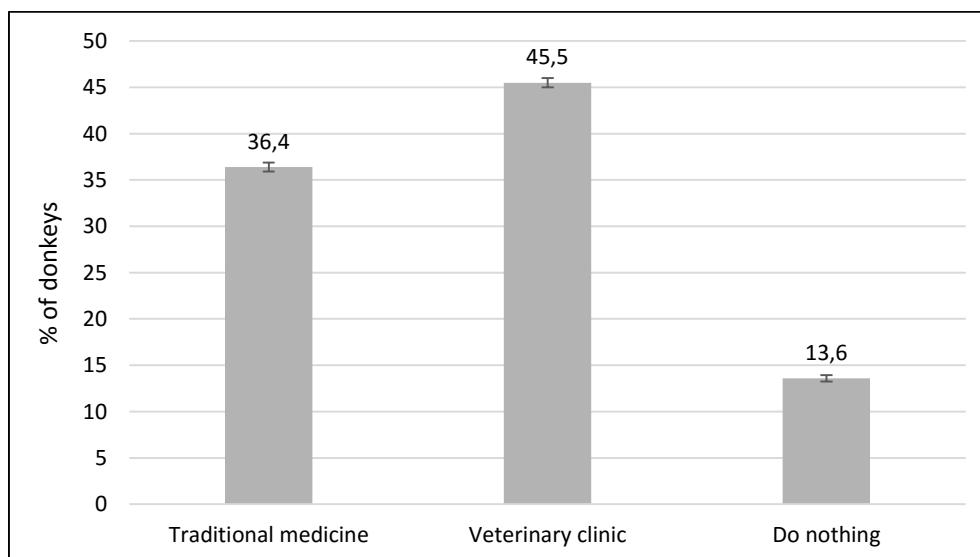


Figure 6. Management of sick working donkeys in Addis Ababa and Ambo. The data is collected through interviews with donkey owners and is presented in percentage with STDEV.

4.3 Behaviour and health

4.3.1 Behavioural problems

The results of the general alertness test, observer approach test and behaviour response when the donkey was touched by the observer is presented in Table 7. In total, 57.2% of the 84 donkeys showed behaviours that could be a sign of discomfort when they were touched and some donkeys performed more than one of these behaviours. Body posture and appearance of an alert and an apathetic donkey is presented in Figure 7.

Table 7. Percentage of donkeys that showed different behaviours in the general alertness test, observer approach test and the response during the welfare assessment

Measure	%
<i>General alertness</i>	
Alert	70.2
Apathetic	29.8
<i>Observer approach</i>	
No response	23.8
Friendly	36.9
Avoidance	36.9
Aggressive	2.4
<i>Behaviour response when touched by the observer</i>	
Biting attempt	3.6
Kicking attempt	13.1
Avoidance	40.5



Figure 7. Left: clear signs of an apathetic donkey; lowered head, no ear movements, unresponsive and half closed eyes. Right: alert donkey; responsive to surroundings, head and ears up with open eyes

4.3.2 Health status

Out of the 78 donkeys assessed for their BCS, 2.6% were scored as very thin, 43% were scored as thin, 46.2% were scored as fair and 8.9% was scored as good. No donkey got higher BCS than 3.5. The mean BCS of all the donkeys was 1.8 and the STDEV was 0.68. A graph over the distribution of BCS is presented in Figure 8.

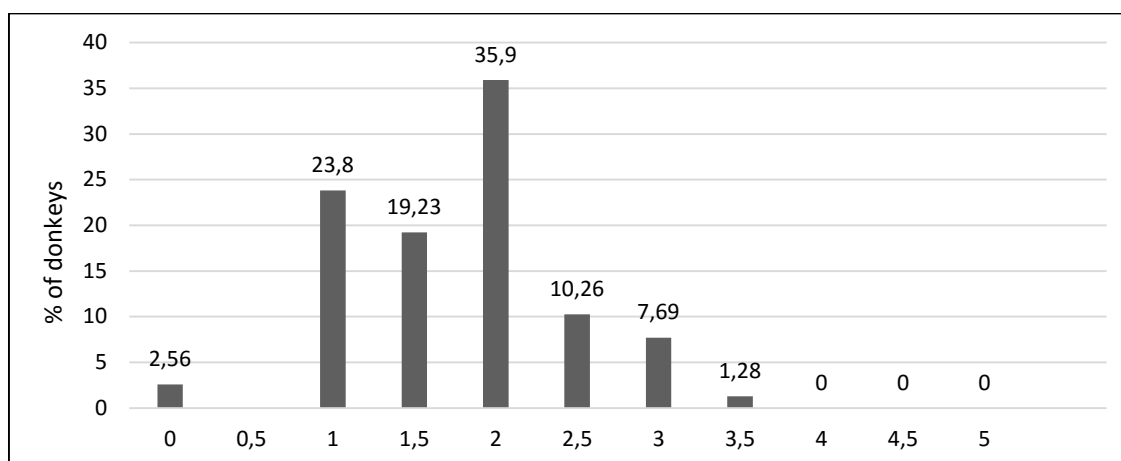


Figure 8. Percentage of working donkeys with different Body Condition Score (BCS) when assessed on markets and other work sites in Addis Ababa and Ambo (n=78).

Many donkeys had some form of health problem, and the observations shown in Table 8 are expressed as the percentage of animals showing the observed health measures. Bad coat and skin condition, lesions and eye abnormalities were the most prevalent problems over all. Almost 100% of the donkeys had bad coat and skin condition. The coat was extremely dirty, lacklustre with small hairless spots. Donkeys with eye abnormalities had wet eyelashes and discharges from one or both eyes. Two donkeys were blind on one eye. Donkeys with hoof problems had overgrown or cracked hooves and three of the donkeys that showed abnormal gait had been in a car accident.

Table 8. Percentage of working donkeys and number of scored animals for different health problems when assessed on markets and other work sites in Addis Ababa and Ambo

Measure	Prevalence (%)	Number of scored animals
Bad coat condition	95.2	84
Bad skin condition	96.4	84
Sweating	0	84
Firing lesion	0	78
Eye abnormality	82.1	84
Nasal discharge	23.8	80
Cough	0	84
Severe hoof problems	31.0	84
Abnormal gait	15.3	72
Back pain	47.5	59

A wide range of skin lesion was scored on the working donkeys, see Table 9. Lesions on the limbs were common, however most of these lesions were superficial or healed lesions with white hair. The majority of the donkeys had lesions that were not caused of equipment and harnessing, but in most cases these observations only involved loss of hair. Most of these lesions were located on the legs and around the face and ears of the donkeys.

Lesion and chafing caused by harnessing and equipment was also commonly observed on the donkeys, 73.2%, see scoring of different lesions in Figure 9. Equipment chafing/lesion were most common around the tail head and on the spine, see the distribution of lesions on the body in Figure 10. In cases when the donkeys had lesions scored as 3 the location of the lesion was in 83% of the cases on the spine.

Table 9. Percentage of different lesions scored on working donkeys in Addis Ababa and Ambo

Measure	Scoring				Number of scored animals
	0	1	2	3	
Skin lesion on limbs	18.9	73.4	7.6	-*	79
Skin lesion (not from harnessing or equipment)	9.6	68.7	16.9	4.8	83
Equipment chafing	26.8	40.2	25.6	7.3	82

*Skin lesion on limbs did not include score 3



Figure 9. Equipment lesions. To the left; superficial with only the fur chafed of around the tail base, no lesion of the skin, scoring 1. Middle; superficial lesion of the skin on the hipbone, scoring 2. To the right, lesion on the spine of deeper tissue, scoring 3.

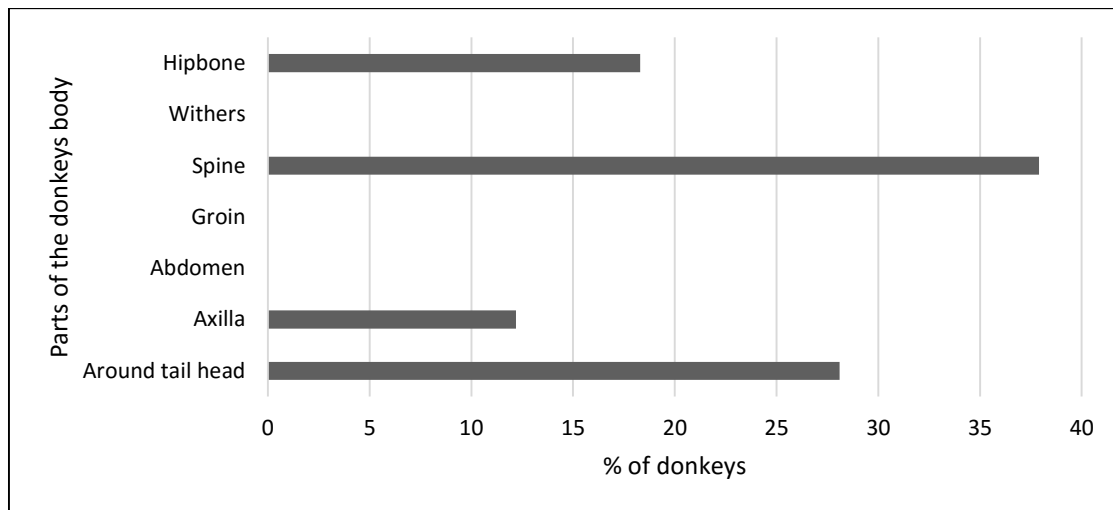


Figure 10. Distribution in percentage of equipment chafing on different parts of the donkey's body, observed on working donkeys in Addis Ababa and Ambo.

4.4 Dependence and correlations between measures

The results from the Chi-Square test shows dependence between some health and behavioural measures and that there were differences between Addis Ababa and Ambo regarding BCS and general alertness, the results are presented in Table 10.

Table 10. Dependence between measures scored on working donkeys in Addis Ababa and Ambo. The dependence has been tested using a Chi-Square test

Variables		Chi2 test
Addis Ababa and Ambo	BCS ¹	<0.001*
Addis Ababa and Ambo	General alertness	0.081 [‡]
BCS ¹	Sex	0.018*
BCS ¹	Equipment lesion	0.507
BCS ¹	General alertness	0.015*
General alertness	Observers approach ¹	<0.001*
Abnormal hooves	Abnormal gait	0.003*

¹ The data has been encoded in Minitab

* Statistically significant $P < 0.05$

[‡] Tendency of dependence $P < 0.10$

The results from The Kendall's Tau test are presented in Table 11. The results indicate that donkeys in Ambo were significantly thinner ($BCS \leq 2$) than in Addis Ababa. There was a weak correlation indicating that donkeys were more prevalent of being apathetic in Ambo than donkeys in Addis Ababa.

The Kendall's Tau test also show that mares were thinner and had a lower BCS ($BCS \leq 2$), compared to stallions. Further on, there was a weak correlation between very low BCS ($BCS \leq 1$) and apathetic behaviour. There was also a correlation between observer approach and general alertness. Donkeys that

were unresponsive were more apathetic, and donkeys that were alert showed more friendly, avoidant or aggressive behaviour. Abnormal hooves were significantly correlated with abnormal gait.

Table 11. Correlations between different measures scored at working donkeys in Addis Ababa and Ambo. The Kendall's Tau-b values show how the variables are correlated to each other and how strong the correlation is

Variables		Kendall's Tau-b	P-Value Kendall's Tau-b
Ambo	BCS ¹	0.426	0.00*
Ambo	Apathetic	0.190	0.040*
Mares	BCS ¹	0.362	0.0005*
BCS ¹	Apathetic	-0.204	0.025*
Observer approach ¹	General alertness	-0.328	0.000*
Abnormal hooves	Abnormal gait	0.355	0.001*

¹ The data has been encoded in Minitab

* Statistically significant $P < 0.05$

5 Discussion

Donkeys are of great importance for the community in Ethiopia and many people are dependent on their donkeys to earn their livelihood. Due to the economic situation of the country it will still take many years before donkeys will be replaced by motorized options. For this reason, it is of utmost importance that the welfare of these animals is improved. Previous studies have documented serious welfare problems in working donkeys and it is challenging to improve the situation for these animals. Therefore, the overall aim of this study was to investigate the prevalence of different health and behavioural problems and to get further knowledge of the management of the working donkeys.

5.1 Management of working donkeys

In working sites both in Addis Ababa and Ambo, resources as water, feed and shade were lacking. The lack of water in these high ambient temperatures could lead to dehydration which is a serious welfare problem (Pritchard et al., 2006). All of the owners provided their donkeys with water every day, however donkeys that were offered water in buckets or trough, may not be provided with enough water to meet the donkeys demand. Some donkey owners provided their donkeys with water only once per day, which could be suspected as too seldom. However, if these donkeys were taken to a river where they could drink ad libitum and rest a part of the day, there may not be any problem. On the other hand, if these owners provided water in buckets, the donkeys did not probably get the chance to drink ad libitum. The routines of providing clean water on regular bases to the donkeys are determined for the health and welfare of the working donkeys.



Figure 11. Donkeys' provided with water in buckets in Lebu, Addis Ababa.

Ways to check if donkeys are dehydrated is to do a skin tent test (Pritchard et al., 2007) or to check the mucous membrane dryness (Pritchard et al., 2008). However, there is no statistical association between these tests and electrolytes and osmolality in the blood, resulting in that they are not valid or repeatable indicators of dehydration (Pritchard et al., 2008) and therefore excluded in this study. Signs of heat stress could be increased respiratory rate, increased respiratory depth, head nodding, apathy and flared nostrils (Pritchard et al., 2005). Flared nostrils was not a measure in the protocol, but it was observed in some of the donkeys, which could be an indication of that they were suffering from heat stress. Also apathy was observed in almost 30% of the donkeys. Only 13.1% of the donkeys had access to shade. Even during the very hot days, the donkeys could be tied directly in the sun, without water and with no chance to seek shade. Consequently, heat stress and dehydration can be an animal welfare problem in Ethiopia.

As earlier studies have reported (Pearson et al., 2000; Kumar et al., 2014), feed shortage is one big constraint for the owners and this study verifies this, especially in markets and working sites. 40% of the owners in Ambo did not provide any additional feed at all. If the donkeys are used for work all day and are not provided with sufficient amount of feed and water this will affect the health and work capacity of the donkeys (Starkey, 1998).

It was rather common to see donkeys that were tied or hobbled, but most of the donkeys were tied in an acceptable way. However, some donkeys were hobbled with their back and front legs together and this should be avoided due to the increased risk of injuries, see Figure 12. When looking at lesions due to hobbling, most of the donkeys had superficial damages with no broken skin. Nevertheless, the fact that many donkeys were observed with white growing hair indicates that the donkey's skin had been broken once (The Donkey Sanctuary, unpublished). The high prevalence of immediate or healed lesions is a sign of that donkeys are hobbled frequently, maybe with improper material or with too tight straps.



Figure 12. To the left: a donkey has been tied by the neck but also the back and front leg has been hobbled together. To the right: a donkey with white growing hair that is an indication of that it has been hobbled frequently and in an improper way.

Of the donkeys that were used for work, many had some form of protective padding on their back. The material of the padding was sometimes difficult to determine, and layers of different material could have been used as padding. Plastic as padding was observed and this should be avoided close to the skin, plastic does not breathe and it is a risk that it indirectly causes lesions on the back of the donkey. Some owners prevented lesions by padding the harness, especially around the tail base. However, in some cases lesions had emerged when rope had scuffed into the skin which could result in secondary infections.

None of the owners trimmed the hooves on their donkeys on regular bases, instead a few did when the hooves were overgrown. This is probably one cause of the high prevalence of hoof problems and abnormal gait.

Ways of treating sick donkeys varied a lot in Addis Ababa and Ambo. In Ambo, it was more common to treat the donkey with traditional remedies. The reason for this could be that the owners did not have any other choice than to treat traditionally because they had a long traveling distance to a veterinary clinic compared to the owners in Addis Ababa. Other reasons why they used traditional remedies could be lack of knowledge, education and lack of financial means, and that they did not think it was worth the effort to take the donkey to a veterinary clinic. The risk of using traditional treatment could be that it causes more pain and sickness than actually healing the donkey. A treatment such as burning the donkey in the mouth or blood-letting is probably extremely painful for the donkey, and it can lead to wounds and infections.

Another serious animal welfare problem is that donkeys sometimes are abandoned when their health impairs and they no longer can be used for work (Starkey, 1998). Abandoned donkeys will probably be subjected to a long suffering until they die from sickness or starvation, are killed in a car accident or killed by a predator. According to Dr Bojia Duguma, Country Manager for The Donkey Sanctuary Ethiopia organization it is often difficult to euthanize

abandoned donkeys. The culture of euthanasia is not common and owners do not believe in killing their animals, and to get the owner's consent is not easy. The owners or other locale village people ask for compensation if The Donkey Sanctuary wants to euthanize the sick donkey, even if the donkey is not used for work anymore (personal communication, Duguma, 2015). This conflict and cultural beliefs leads to a prolonged suffering for the donkeys.

5.2 Behaviour of the working donkeys

After the pilot study three parameters were added to the protocol, the reason for this was that it was noticed that the donkeys sometimes had strong reaction to being touched by a human. This could be an indication of that the donkeys were uncomfortable, in pain or even frightened when they were touched. Beating of donkeys induces fear in the animal (Swann, 2006) that may result in aggression and attempts to avoid people who try to touch them. When touching them, avoidance was the most common response, but some donkeys also kicked when they were touched. The kicking was not always perceived as an aggressive behaviour, rather a sign of that the donkey was annoyed and wanted to be left alone. Working donkeys don't usually show aggressive behaviour towards people (Burn et al., 2010) and in this study only two donkeys out of 84, performed biting attempts towards the observer, and in the observer approach test aggression was very uncommon. Animals that are showing fear behaviour are often exposed to even more adverse handling because they act inappropriately according to the handler (Rousing et al., 2001). This may be the reason why the donkeys rather avoided the observer than acted aggressive, they had learned that biting and kicking will only result in more beating and pain.

In the observer approach test, the most prevalent behaviour was avoidance and friendly, however 'no response' was observed in 23.8% of the donkeys. Unresponsiveness can be an effect of exhaustion, diseases, to avoid harsh handling or over-stimulation by a crowded and noisy city environment (Rousing et al., 2001). Burn et al. (2010b) wrote that equines with severe and numerous physical problems enter a state of behavioural unresponsiveness. Therefore, it is more likely that the unresponsiveness is a result of fatigue and unhealthy donkeys, than that they are unresponsive due to a positive state as resting and relaxing. No response to an observer's approach could also be an indication of apathy, depression, malaise or chronic pain. In this study, observers approach had a weak correlation with general alertness which could be an indication of that unresponsive donkeys were more prone to be apathetic, and this corresponds with former research (Burn et al., 2010b). Apathy and aggression is a serious sign of bad animal welfare. It does not only affect the welfare of the donkeys, but they may not be able to work as hard as an alert donkey, which will lead to reduced work capacity. The people are highly dependent on their donkeys to keep up with the heavy work, and therefore it

should be in the owners' interest to keep their donkey in good condition so they don't reach an apathetic state.

5.3 Health of working donkeys

The results of the BCS agree with earlier studies. Most of the donkeys were scored as fair (BCS 2) or thin (BCS 1) and only a few donkeys were scored as good (BCS 3). Only two donkeys were scored as very thin (BCS 0) and one of these donkeys was a very young donkey. A study conducted by Burn et al. (2010a) scored the mean BCS of the equines as thin (BCS 2.5) in Ethiopia. Another study that was carried out in the north of Ethiopia showed that out of 384 donkeys, 37.2% were scored between very thin and thin (BCS 1-2), 46.9% was scored between thin and medium (BCS 2-3) and 15.9% was scored between medium and fat (BCS 3-4) (Kumar et al., 2014). Amante et al. (2014), performed BCS assessment in the west of Ethiopia and scored 29.2% of the donkeys as very thin (BCS 1).

BCS was correlated with apathetic behaviour, indicating that donkeys with very low BCS (1 or below) may suffer from apathetic behaviour. The reasons that donkeys have low BCS are multifactorial, such as diseases, parasites, overworked and shortage of feed and supplementary diets. Apathetic animals may also have reduced appetite and are more prone to get sick which will result in even more reduced BCS (Burn et al., 2010b). The results from Burn et al. (2010a) showed that BCS also could be a good indicator of other welfare problems. "Thinner" animals had often higher prevalence of skin lesions, gait problems, sole abnormalities, firing lesions, ectoparasites and faecal soiling.

The health problems with highest prevalence were bad coat and skin condition, skin lesions not caused by equipment or harnessing, eye abnormalities, lesions of hobbling and equipment chafing. Some of these measurements had high prevalence, but the scoring was usually low. For instance, severe eye abnormalities were uncommon; instead most of the donkeys had wet discharges from the eyes. A study that was conducted on working horses in Honduras, stated that pain was present in a majority of the ocular diseases and that ocular disease is serious a welfare problem. The study showed that owners have a lack of knowledge and awareness of this problem. There was also an increased risk of ocular disease if a whip was used on the horse (Starkey et al., 2014). In Ethiopia use of a whip or other tools to correct the donkeys was commonly observed and many small lesions probably due to whipping were observed in the face of the donkeys. Another cause of these eye problems could be dehydration. Dehydration is known to be associated with dry eye syndrome, cataract and other eye problems (Sherwin et al., 2015). By preventing dehydration, it may also improve the donkeys eye conditions. However, the high prevalence of eye abnormalities is a highly significant reason to conduct more research in this area. It needs to be investigated what

kind of eye diseases and abnormalities that are common in Ethiopia, state if it is a serious animal welfare problem and which measures that can be carried out to decrease the problem.

Equipment chafing was commonly observed in 73.2% of the donkeys, however, most of them were scored as superficial with only the fur scrubbed off. This is a good sign of that the owners try to avoid deeper lesions by padding the harness, using soft materials and tightening the harness in a correct way. Animals with lesion of deeper tissues, and with skin and immediate subcutaneous layers broken tissue were still used for work and had to carry heavy loads on their backs. Lesion of this kind is probably very painful and without sufficient treatment it is unlikely that the donkey will recover. One of the owner said that she took the wounded donkey to a veterinarian, but that the treatment was not successful, therefore she now put ash from the fire on the wound to reduce the smell. Even if she only owned this donkey, and she was highly dependent on it, she never cleaned the wound or tried to treat it in other ways.

Results from this study show signs of back pain being prevalent in working donkeys. Back problem and chronic pain in horses is a well-known problem (Fureix et al., 2010) but the cause of this problem can be many. It is often challenging for the veterinarian to conclude if the pain is caused by pain in the back, back pain that is secondary to lameness or that the horse has training or behavioural problems (Findley & Singer, 2015). Further studies should be conducted studying how much of a welfare problem back pain is in working donkeys. Maybe it is a challenge to treat or prevent the chronic back pain, but the problem should not be neglected. It is a risk that back pain causes a lot of suffering for working donkeys and this should be prevented if it is possible.

Abnormal gait was observed in 15.3% of the donkeys and abnormal hooves in 31% of the donkeys. Only the donkeys with severely abnormal hooves such as overgrown or cracked hooves were scored as 1, smaller changes and abnormalities on the hooves were not noted. Abnormal hooves were correlated with abnormal gait and the donkeys with abnormal gait were often suffering of lameness and were very reluctant to put weight on one leg, three of these donkeys had been in car accidents. Results of gait, hooves and lameness varied a lot between earlier studies in Ethiopia, so to make comparisons is difficult. Kumar et al. (2014) found that only 2.3% of the donkeys had overgrown hooves, 6% had abnormal gait and 9% were lame. Amante et al. (2014) found that 12.4% of the donkeys suffered from lameness. Burn et al. (2010a) reported that 99.2% of the equines had abnormal gait. Also Pritchard et al. (2005) reported a high prevalence of abnormal gait in donkeys: 94.7%. The common factor is that it seems to be a recurring problem for working donkeys. Gait abnormalities are often a severe welfare problem that is associated with pain in the animal (Broster et al., 2009) therefore it is highly thinkable that the

donkeys that have gait abnormalities probably suffer from pain throughout the whole day.

5.4 Differences between Ambo and Addis Ababa

It may result in a bias to compare Addis Ababa with Ambo as a rural versus an urban area. Ambo is a small rural village compared to Addis Ababa, but some observation sites in Addis Ababa were semi urban. The management of the donkeys did though differ in some aspect between the two cities, therefore some parameters could be compared. The result showed indication of that the donkeys were thinner (BCS 2 or lower) in Ambo compared to Addis Ababa. The reason for this result is probably because all females were assessed in Ambo, and mares had lower BCS than stallions, and not many geldings were included in the study. If it was an occasion that only female donkeys were assessed in Ambo or that female donkeys are actually more used and preferred in Ambo compared to Addis Ababa is unknown. It would be interesting to investigate if some genders are preferred in some locations, and in that case why?

The results also indicate that more donkeys in Ambo were apathetic compared to the donkeys in Addis Ababa. This is probably also because of that all mares were assessed in Ambo, and mares had lower BCS than stallions, and BCS is correlated with apathetic behaviour (Burn et al., 2010b). This could be one explanation that the donkeys were more apathetic in Ambo. During the observation period it was also warmer in Ambo compared to Addis Ababa, this could have influenced the apathetic behaviour of the donkeys in Ambo. The owners in Addis Ababa may have more knowledge on how to prevent wounded and fatigue donkeys, consulting a veterinarian more frequently compared to Ambo where traditional remedies were mainly used. In Addis Ababa, the owners also gave more supplementary feed, which may give stronger and healthier donkeys. This could be contributing causes why the donkeys in Ambo may have been in impaired state of health compared to Addis Ababa.

5.5 Challenges and suggestions of improvements

There are many challenges with improving the welfare of working donkeys in Ethiopia. One constraint is that the donkeys are Ethiopia's most neglected animals with a very low status (Biffa & Woldemeskel, 2006) and results from this study verifies this. The donkeys are often overworked and whipped even though the owners know that they feel pain. This is a sign of that lack of knowledge may not be the only problem, but maybe that it is more of an attitude problem from the owners towards the donkeys. The donkeys are expected to work hard without sufficient inputs as feed, water and veterinary treatment. This of course results in that donkeys suffer from health and behavioural problems. To make the owners realize that by taking better care of their donkeys and decrease animal welfare problems this will also benefit

themselves. A healthy donkey will probably be able to work harder and live longer.

Reasons for the donkeys' low status could be that it only has a single purpose compared to cattle that provide milk, drought power and meat (Mengistu, 2003). To make the owners aware of the donkeys needs and to improve the status, education is one solution. Education programs in school is one strategy and this is something that The Donkey Sanctuary, Ethiopia has started to implement (Duguma, personal communication, 2015). Teaching and affecting the younger generation could in the longer-term change the society's opinions and way of thinking about working donkeys (Pearson & Krecek, 2006) and hopefully improve the management and improve the status of the donkeys. To improve the welfare of donkeys in the whole Ethiopia these actions must also reach the rural areas.

Another constraint is that the owners often lack financial means to provide their donkeys with proper care (Pearson & Krecek, 2006). The majority of the owners try to treat sick donkeys; with veterinarian consultation or traditional remedies and they also let the donkey rest when it is sick. This indicates that the owners' tries to take care of their donkeys after their best ability, but the lack of financial means is a constraint. However, some improvements that can be implemented may not cost anything, for instance, grooming the donkeys on regular bases. This would make it possible to spot lesions at an early stage and then preventing deep skin lesions. The majority of the donkeys were extremely dirty, and by grooming them the skin and fur condition might be improved. Checking the hooves on the donkeys on regular bases might decrease the prevalence of abnormal hooves and gait abnormalities.

One suggestion that could make changes for the working donkeys, is to reduce the risk of heat stress. Many donkeys did not have access to shade at markets and working sites. If there are no shaded areas, the owners can cooperate and together finance tarpaulins that could provide shade for the donkeys, this was observed in sheep markets in Addis Ababa. According to Duncanson (2010) donkeys should preferable be worked during the cooler parts of the day and also be provided shaded rest during the day when the temperature is high. To replace water losses donkeys should have access to clean water regularly when they are working and ad libitum once work has finished. The challenge is to make the owners realize the importance of providing water and shade to their animals and here again it is about changing the peoples' attitude towards their animals.

One constraint in keeping donkeys is disease and lack of veterinary service (Kumar et al., 2014) and by offering the donkey owners a trained animal health worker it would make a big positive change for both the animals and people. In some countries in Africa, farmers have been selected by the

communities to be trained to provide a basic animal health service at village level. These animal health workers are trained to support the veterinarians, especially in the rural areas (Pearson & Krecek, 2009). This would create job opportunities for the people and probably improve the welfare of the working equines. Mobile veterinary services are a costly solution, but would help many donkeys in the rural areas. Also organizing free vaccination program would benefit the donkeys. The donkeys would not only be vaccinated on regular bases they would also be examined by a veterinarian at the same time. Health problems that otherwise would have been neglected or not noticed can be prevented and treated. This could also decrease the use of traditional treatments.

Breeding on healthier and bigger donkeys would be desirable, but this demands well organized mapping, follow-ups and a developed infrastructure. Overall the donkeys that were observed were perceived as very small. Owners who owned big male donkeys wished to breed on these individuals but there were no female donkeys in the close area. In an interview conducted by Pearson et al. (2000) owners said that they selected breeding males according to size and then colour. Hardiness was not something they selected for.

Another constraint in improving the welfare of working donkeys is the lack of animal welfare legislation in Ethiopia. Hopefully there will be a change in this in the near future. Currently the animal welfare legislation is under review and will hopefully be accepted in 2016 (Duguma, personal communication, 2015).

5.6 Methodological reflections

5.6.1 *Collecting data*

To be able to compare the animal welfare between the two cities, more donkeys should have been assessed in Ambo. Furthermore, a more even sex distribution should have been assessed to enable a comparison of the BCS between Addis Ababa and Ambo.

Donkeys can be spotted everywhere in Addis Ababa, but they are usually used for work and the owners do not want to be disturbed. To perform the study, groups of donkeys had to be located, donkeys could then be observed when they were standing and waiting to be used for work. In this way, the study did not interfere or slowed down the donkey owners' work. However, it was a challenge in assessing the donkeys at markets and work locations, sometimes the health and/or behavioural assessment had to be disrupted due to different reasons: the owner suddenly wanted to use the donkey for work, or some random person came and disrupted the study. The study was also sometimes interrupted because the animal was aggressive, kicking or biting. The assessment would be easier to conduct if it was performed at an equine veterinary clinic or in an enclosure instead of out on the markets. The donkeys could then be restrained and blankets and other work equipment could have

been removed. Skin lesions and back pain was sometimes difficult to assess due to the blankets and work equipment. The positive aspect of assessing the donkeys on markets and in their natural environment was that all donkeys could be included in the study, sick and healthy. Of course, owners could have “hidden” sick donkeys, and this may have caused misleading results.

In this study only donkeys that were owned were included. It might have been other results if also hired donkeys were observed. Owners are often more dependent on their donkeys and value them higher compared to the people who hires them, this probably reflects in how they are treating the donkeys. Further on, there may be a difference between two categories of owners; farmers and traders. It would be interesting to compare these two groups, to investigate if the donkeys are treated and managed in different ways depending on if the owner is a farmer or trader. Traders use the donkeys for a more commercial purpose while the farmers consider their donkeys as more as a pet which they are highly dependent on to make a living.

5.6.2 The welfare assessment

The welfare assessment protocol of Viksten et al. (submitted) developed in line with WQ[®] was most of the time easy to use in the field. Sometimes it was difficult to score lesions and back pain if the donkeys had blankets or work equipment on their back. In these situations, lesions were assessed on the free parts of the donkey’s body. The majority of the donkeys were easy to handle and feasible to palpate if necessary. Gait was occasionally problematic to assess if the donkeys were hobbled or tied. During these situations it was observed if the donkey was reluctant to put weight on any of the legs. Only 59 donkeys could be examined for their back pain due to different reasons; they had sacks or saddles on their back or they had big lesions on their back which made it difficult to touch them.

BCS assessments that have been used in other studies have similar grading as Wright et al. (1998). Studies usually score the equines from very thin to very fat but the difference is that in most studies the assessment is only performed visually without touching the animal. In this study it would have been impossible to assess the donkeys’ BCS without touching and palpating them. The donkeys where often used for work during the observations and therefore they were sometimes covered with blankets or carrying an x-shaped wooden saddle. By using Wright et al. (1988) BCS assessment it was possible to palpate the donkey underneath the blanket and therefore make a fair judgement of the BCS.

However, it would be preferable if a BCS for donkeys and not horses were used in this study to make the results more reliable. The Donkey Sanctuary has designed a BCS protocol that seems to be very practical to use (The Donkey Sanctuary, 2014), unfortunately, this BCS was not found until after the field

study had already started, and by then it was too late to switch protocol. However, the best solution at that time would be to use both BCS assessments; Wright et al. (1998) and The Donkey Sanctuary (2014), then a comparison between the two scales could have been carried out. The scale and definitions in these two assessments are very similar, they assess the same area of the equines' body; neck, withers, ribs, back and loins and hindquarters. The difference is that Wright et al. (1998) has a six graded scale while The Donkey Sanctuary has a five graded scale. The Donkey Sanctuary has also included the belly in the assessment, if it is tucked up, flattish or over developed.

Due to the mistake of using a BCS for horses there might be a bias in the results of the BCS assessment in this study. However, the scale that was used is very similar to the BCS scale for donkeys, so the results might not have differed too much even if a BCS scale for donkeys was used.

Three types of lesions were assessed individually; equipment chafing, lesions not caused by harnessing and work equipment and lesions caused by hobbling. The student chose to separate these three parameters to be able to trace the source and reasons of the different lesions.

5.6.3 Interviews

It was not always that the owner approved of an interview, however, at least one interview was carried out at each study location. The interview was kept rather short, not to disturb the owners.

When the questions and answers had to be transferred through an interpreter, important information may have been lost on the way. The four different interpreters had also very different backgrounds and knowledge in the area of animal science and the question may not have been asked and translated correctly, this may have resulted in misunderstandings and a bias during the interviews. The truth-value from the donkey owners can also be questionable and have to be considered as a potential bias.

Some questions were not always formulated in a way that gave easy answers. Questions asked about traveling distance and working hours, for instance "how far do you travel to come to this market or location?" gave very different answers that were not analysable. If this study is repeated in the future, the interview should be revised.

5.7 Suggested welfare assessment measures in future research

To be able to improve the situation for working donkeys a well-designed welfare assessment protocol is of biggest importance. There are some measures that were excluded in this study that could be included in future research. Heat stress and dehydration could be a welfare problem for working donkeys, so it is desirable to include valid measures of this problem. Indications of heat

stress can be head nodding, apathy and flared nostrils (Pritchard et al., 2005) and to look at the drinking behaviour if possible (Pritchard et al., 2008).

Whipping and beating of donkeys was observed, one proposed behavioural marker for beating is “tail tucking”. When the observer is walking down along the side of the donkey the donkey might tuck in its tail, and this could be an indication of that the donkey is afraid of being beaten (Pritchard et al., 2005). This is an observation that easily can be included in a behavioural assessment of working donkeys and that could be an important welfare measure.

Previous studies on working donkeys in Ethiopia have not included back pain in their assessments. Nevertheless, it is highly thinkable that working donkeys suffers from back pain when they are carrying heavy loads every day on their backs and therefore it should be included in a welfare protocol.

6 Conclusions

The study showed that resources of feed, water and shade were lacking for the donkeys both in Addis Ababa and Ambo. The owners in Ambo provided less supplementary feed and used more traditional remedies when treating sick donkeys compared to owners in Addis Ababa. Many donkeys showed an apathetic, unresponsiveness or avoiding behaviour. The result indicates that unresponsive donkeys are more apathetic, and donkeys that are alert show more friendly, avoidant or aggressive behaviour. The majority of the donkeys had low BCS and were scored as thin (BCS of 1) or fair (BCS of 2). Mares had lower BCS than stallions. Very low BCS ($BCS \leq 1$) was significantly correlated with apathetic behaviour. Other health problems with high prevalence among the donkeys were bad coat and skin condition, skin lesions and eye abnormalities. Back pain, abnormal gait and hooves had lower prevalence but could be a considerable problem for the donkeys because it may inflict a lot of pain. Abnormal hooves were significantly correlated with abnormal gait. This study shows that it is feasible to assess the welfare of donkeys in the field using the WQ approach, but some modifications in this protocol needs to be carried out. The results could be given to owners in feedback and along with educational programmes this can lead to welfare improvements for the donkeys and can help to improve their status. To change the attitude of the owners is of utmost importance. Persuading the owners that by taking better care of their donkeys will not only benefit the donkeys but it will also benefit themselves; a healthy donkey is a more hardworking donkey. To investigate what actions that would make an actual difference for the working donkeys is important and therefore further research in this area is needed.

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Personal communication

Chala Chaburte, The Donkey Sanctuary. 2015-11-09, 2016-01-06 and 2016-02-17

Dr Boija Duguma, The Donkey Sanctuary. 2015-09-16 and 2016-02-23

9 Appendix

9.1 Observations- resource and management based parameters

Date: Time: Location:

Individual number:

Weather:

Sex of the donkey

☐ Mare ☐ Stallion ☐ Gelding

Work type ☐ Cart ☐ Pack

Access to water ☐ Yes ☐ No

If yes, is the water clean (transparent) or dirty (brown, mucously)?

Access to feed ☐ Yes ☐ No

If yes, what kind of feed?

Access to shade ☐ Yes ☐ No

What kind of goods have they been transported?

Is the donkey tied ☐ Yes ☐ No

If yes, how is the donkey tied

☐ Front legs together ☐ Back legs together ☐ Back leg together with front leg

☐ Leg to firm object ☐ Neck to firm object

How are the products packed onto the donkey?

☐ On the top of the back ☐ Hanging on the sides of the back

Estimation of weigh of pack:

What are the products or equipment tied with?

☐ Rope ☐ Leather ☐ Plastic rope ☐ Other

Has the animal a padded blanket/saddle to protect it from sores?

☐ Yes ☐ No

Is the rope padded somewhere on the donkey's body to protect is from sores?

☐ Yes ☐ No

Have the donkey shoes? ☐ Yes ☐ No

9.2 Interview

Date:

Time:

Location:

Interview number:

Questions:

1. Do you own or hire the donkey? ☐ Owned ☐ Hired
2. What is your profession? ☐ Farmer ☐ Other
(Other can be transporting and selling water other products)
3. Age of the donkey?
☐ Less than 5 ☐ 5-15 ☐ Over 15
4. Sex of the donkey?
☐ Mare ☐ Stallion ☐ Gelding
5. If the donkey is a female, is she pregnant? ☐ Yes ☐ No
6. How far do you travel to come to this market or location?
7. What time today did you start to work with the donkey?
8. When will you stop to work with the donkey today?
9. What do you use the donkey for?
10. How often is the donkey used for transporting goods?
 1. Everyday
 2. 4-5 days/week
 3. 1-2 times/week
 4. Once every second week
 5. Once/month
11. Is the animal used all year around for transport?
☐ Yes ☐ No
12. How many donkeys do you own?
13. Do you provide the donkey with additional feed during the day?
What kind of feed?

14. How many times per day do you provide the donkey with water?
How do you provide the water? Is it from a river or a bucket?

15. Does the donkey have shelter at night?
What kind of shelter?

16. Do you trim the hooves of the donkey? How often?

17. Is the donkey vaccinated? Against what diseases and when?

18. What do you do if your animal gets sick?
☐ Take the animal to a veterinary clinic
☐ Traditional medicine
☐ Do nothing

If the answer is traditional medicine:

What kind of traditional medicine?

What are the symptoms when treating with traditional medicine?

19. Do you let the donkey rest when it is sick?

☐ Yes ☐ No

If yes, for how long?

20. Do you think that a donkey can feel pain?

☐ Yes ☐ No

9.3 Welfare assessment protocol used in field

Measure	Grade	Definition	Description
Body Condition Score (BCS)	0	<i>Very thin</i> Neck: Bone structure easily felt. No muscle shelf where neck meets shoulder Withers: Bone structure easily felt Back and Loin: 3 points of vertebrae easily felt Ribs: Each rib can be easily felt Hind Quarters: Tail head and hip bones projecting	Fat deposits on neck, withers, back and loin, ribs, tail head and hind quarter assessed both visually and by palpation
	1	<i>Thin</i> Neck: Can feel bone structure - slight shelf where neck meets shoulder Withers: Can feel bone structure Back and Loin: Spinous process can be easily felt – transverse processes have slight fat covering Ribs: Slight fat covering, but can still be felt Hind Quarters: Hip bones can be felt	
	2	<i>Fair</i> Neck: Fat covering over bone structure Withers: Fat deposits over withers - depends on conformation Back and Loin: Fat over spinous process Ribs: Can't see ribs, but ribs can still be felt Hind Quarters: Hip bones covered with fat	
	3	<i>Good</i> Neck: Neck flows smoothly into shoulder Withers: Neck rounds out withers Back and Loin: Back is level Ribs: Layer of fat over ribs Hind Quarters: Can't feel hipbone	
	4	<i>Fat</i> Neck: Fat deposited along neck Withers: Fat padded around withers Back and Loin: Positive crease along back Ribs: Fat spongy over and between ribs Hind Quarters: Can't feel hipbone	
	5	<i>Very Fat</i> Neck: Bulging fat Withers: Bulging fat Back and Loin: Deep positive crease Ribs: Pockets of fat Hind Quarters: Pockets of fat	
	0	Normal, no sweating	Direct observation of the whole body
	1	Sweating	
Skin lesion (not caused by harnessing and working equipment)	0	No visible lesion	Direct observation of the whole body, except where equipment, harness or straps can fit
	1	Lesion involving hair loss only	
	2	Lesion involving a moderately sized contusion (bruise) with or without hair	

		loss and/or an abrasion (scrape) in the skin	
	3	Lesion involving a minor laceration (cut) and/or a larger contusion (bruise) with obviously swollen parts with or without hair loss	
	4	Laceration involving injury to deeper tissues (e.g. muscle, tendon) or a laceration without visible damage to underlying tissues but of a size that normally requires surgery	
Skin lesions on limbs Donkey	0	No visible lesion	Direct observation of the limbs on all four legs
	1	Superficial or healed: Tether/ hobble lesions or scars are present and may include areas of hairless skin, but the skin is unbroken, partially broken (pale pink) or scabbed. Scars may be healed with hairless skin or white hairs	
	2	Skin and immediate subcutaneous layers broken. Lesions show visible redness. This score also includes granulation tissue	
	3	Deep lesion. Tether or hobble lesions of a depth that makes muscle/tendon/bone visible	
Equipment chafing	0	No chafing	Direct observation of areas on donkey where equipment, straps or harness may fit.
	1	Superficial, fur scrubbed of	
	2	Lesion of skin	
	3	Lesion of deeper tissue	
Location of skin lesion		Abdomen	
		Axilla	
		Groin	
		Spine	
		Withers	
		Around tail head	
		Hipbone	
Tail cut short	Yes	Tail has been cut short, unable to remove flies.	Direct observation
	No	Tail intact	
Coat condition	0	Normal shine, tightness, and length	Direct observation of the whole body
	1	Dull/long/lacklustre/abnormal tightness	
Skin condition	0	Normal, clean skin	Coat was separated with fingers
	1	Skin problems, crusts and dandruff on big parts of the body. Dirty skin.	
Firing lesion	No	No signs of firing lesion	Signs of firing lesions was noted everywhere on the donkey.
	Yes	Superficial/healed, broken skin or deep lesion	
Eyes	0	No abnormalities	Direct observation on both eyes
	1	Abnormal, at least one eye with wet eyelashes, discharge, redness, swelling, opacity or injury.	

Nasal discharge	0	Clear and no discharge	Direct observation of both nostrils
	1	Coloured or thick discharge	
Cough	No	No coughing	Observed during the whole health survey
	Yes	Coughing several times	
Hoof condition	0	Normal	Visually assessment on all four hooves
	1	Severely overgrown or severe cracks	
Back pain	0	When palpating the back, no reaction or minor tension in back	Palpating along the spine, from hip bones to weathers, on both sides of the back
	1	When palpating the back, tension, lower the back, walking away, biting, pulling ears back	
Gait	0	Normal and even	The gait was assessed at the when the donkey was walking away from the observer. If the donkey was tied and the gait could not be assessed correctly, the observed tried to move the donkey and note if the donkey was reluctant to put weight on any of the legs
	1	Abnormal: Reluctant to put weight on a limb, short and uneven stride length	

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