

Comparison of the socio-economic value and welfare of working donkeys in rural and urban Ethiopia

M Geiger^{*†‡}, J Hockenull[†], H Buller[§], M Jemal Kedir[#], G Tefera Engida[¥], M Getachew[¶],
FA Burden[¶] and HR Whay^{†□}

[†] Animal Welfare and Behaviour, Bristol Veterinary School, University of Bristol, Langford, Bristol BS40 5DU, UK

[‡] Firoz Lalji Institute for Africa, London School of Economics and Political Science, London WC2A 2AE, UK

[§] Department of Geography, College of Life and Environmental Sciences, University of Exeter, Prince of Wales Road, Exeter EX4 4SB, UK

[#] Eshet Children and Youth Development Organization, Addis Ababa, Ethiopia

[¥] College of Veterinary Medicine, Addis Ababa University, PO Box 34, Bishoftu, Ethiopia

[¶] The Donkey Sanctuary, Slade House Farm, Sidmouth, Devon EX10 0NU, UK

[□] Office of the Vice President International, The National University of Ireland Galway, Galway, Ireland H91 TK33

* Contact for correspondence: M.Geiger@lse.ac.uk

Abstract

Donkeys (*Equus asinus*) are widely used throughout Ethiopia and play essential roles in a variety of everyday and income-generating tasks for the people that use them. The challenges faced by people and their working equids vary across communities and geographic locations. This may have implications for how donkeys are perceived by the people they work for, the roles they fulfil and ultimately their welfare. Two complementary methodological approaches were used in this study to explore the socio-economic value of donkeys for their owners and the welfare of the donkeys in rural and urban Ethiopia. Using a questionnaire, donkey owners were asked about their donkeys, their attitudes and beliefs related to donkey use and ownership, and the role donkeys played in their lives. Animal-based welfare assessments were also conducted on a sample of donkeys from different locations, with the overarching aim of the study to investigate differences in use, beliefs, and donkey welfare between rural and urban locations. In both rural and urban locations, working donkeys are critical for their owners' income-generating activity and therefore their livelihoods. The work they undertake differs substantially between locations, as does their welfare. Work in each setting presents its own challenges and these are reflected in the behaviour and physical health of the donkeys. Rural donkeys showed more apathetic behaviour, a higher ectoparasite burden and greater evidence of tethering/hobbling. Urban donkeys were more alert and had a wider range of body condition scores. The findings highlight marked differences in the role and welfare of donkeys between different areas within the same country, demonstrating the importance of understanding the context, both from the perspective of humans and working equids, prior to staging interventions intended to benefit either party.

Keywords: animal welfare, attitudes, behaviour, donkey, questionnaire, working equids

Introduction

Throughout the world, working equids provide a critical resource for some of the poorest and most marginalised people, enabling them to travel to access resources such as schools and healthcare, and to generate income to support themselves and their dependents. However, despite their importance, working equids are frequently overlooked in agricultural and economic initiatives (Pritchard *et al* 2018; Frohlich *et al* 2020) and little is done by policy-makers to safeguard working equids' welfare.

Donkeys are widely used in rural, urban and peri-urban regions of Ethiopia and play essential roles in a variety of everyday and income-generating tasks (Stringer *et al* 2011; Geiger *et al* 2020). While many of the people who are reliant on donkeys (*Equus asinus*) exist on very little income (Kubasiwicz *et al* 2020), people without access to a donkey

are economically even worse off (Stringer *et al* 2011). Despite their significant contribution to the livelihoods of many Ethiopian people, donkeys themselves are not perceived as high-status animals. They are often denied access to the kind of feed and healthcare that is made available to other animals and are considered one of the most neglected animals in the country (Martin Curran *et al* 2005; Mekuria & Abebe 2010; Stringer 2011; Usman *et al* 2015).

The challenges faced by individuals and their working equids vary across communities and geographic locations; consequently, a broad brush, one-size-fits-all approach to addressing welfare issues is unlikely to work even within the same country (Upjohn *et al* 2014). Recent research has identified a disparity in the perception of donkey welfare between rural and urban areas of Ethiopia; rural donkeys are perceived to have poorer welfare than their urban counter-

parts (Geiger *et al* 2020). In contrast, The Brooke (an NGO focusing on improving the welfare of working equids) identified the overloading of pack-donkeys in urban Ethiopia as an ongoing welfare issue where improvement was hard to achieve (Pritchard *et al* 2018). Rural and urban donkeys live in very different environments, with their own unique challenges, and may undertake different roles for those who own or use them. Consequently, it is likely that while there may be some similarities, the welfare of rural and urban working donkeys is affected in different ways. Demographic challenges in optimising the efficacy of welfare interventions are further compounded by the geographic distribution of the different welfare concerns; one region may have serious issues with lameness, while another may have high levels of wounds or lesions (Burn *et al* 2010a); inconsistencies among different indicators are often seen (Upjohn *et al* 2014).

The decisions made by donkey owners and users regarding donkey care and husbandry are increasingly recognised as highly complex, encompassing social conventions and beliefs, access to advice and resources, and individual economic constraints (Upjohn *et al* 2014; Watson *et al* 2020). Understanding these factors is important if NGO interventions are to be appropriately targeted, and ultimately effective in improving equine welfare (Pritchard *et al* 2018).

In this study, rural and urban donkey owners were asked about their donkeys, their attitudes and beliefs related to donkey use and ownership, and the role their donkeys played in their lives. Animal-based welfare assessments were also conducted on a sample of donkeys from different locations, with the overarching aim of investigating differences in use, beliefs, and donkey welfare between rural and urban locations.

Materials and methods

Ethical approval

This study was approved by the Faculty of Medical and Veterinary Science's Research Ethics Committee, University of Bristol (January 2015, ref: 16721). Additional ethical approval was granted for the welfare assessments by the University of Bristol Animal Welfare and Ethical Review Board (AWERB).

Study location

Data were collected from six case study sites during June and July 2015. These included three rural Ethiopian communities (Meti, Argeda and Dawe in the Rift Valley in the area of Arsi Negele in the Oromia regional state) and three urban sites in and around the capital, Addis Ababa (CMC North, Burayo, and Summit 30). The locations selected had not been previously exposed to any equine charity work; this criterion was used in order to limit, as far as possible, the effect of outside influences on participant responses.

Donkey owner questionnaires

Donkey owner questionnaires (see supplementary material to papers published in *Animal Welfare*: <https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material>) were conducted with working donkey owners in five out of the six case study sites visited. One of the urban areas, Burayo, did not have many donkey owners so questionnaires were not completed in this location. The purpose of the questionnaire was to yield further information regarding the types of income-generating tasks donkeys were used for and to find out more about people's beliefs related to donkeys.

The questionnaire took approximately 30 to 40 min to complete per person and participants were thanked for their time with an in-kind 1 kg bag of coffee (a customary gift in Ethiopian culture). Data from each questionnaire were entered into an Excel (Microsoft Office®) spreadsheet.

Welfare assessment

Donkey welfare assessments were conducted with donkeys in all six locations by two researchers (MG and MGt). Both researchers were trained in the welfare assessment protocol and MGt is a veterinarian with extensive donkey experience. The assessment consisted of animal-based measures (eg health and behaviour) rather than resource-based measures (eg provision of food and water, condition of harness) (Burn *et al* 2010b). The assessment was short in duration (10 to 15 min) as it was important not to take up too much of the owners' time when they could be working (Pritchard *et al* 2005; Burn *et al* 2010b).

Donkeys were recruited for welfare assessment through asking participants at a two-day workshop if the two observers could perform a welfare assessment of their donkeys for research purposes. The data were recorded onto printed welfare assessment sheets and transferred onto an Excel (Microsoft Office®) spreadsheet after each site visit (for welfare assessment recording sheet, see supplementary material to papers published in *Animal Welfare*: <https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material>).

The welfare assessment consisted of 24 observations of health, behaviour and owner handling, with measures derived from previous studies (Pritchard *et al* 2005; Burn *et al* 2010b). The assessment required only minimal touching of the donkey, with only the right foreleg picked up for examination (Pritchard *et al* 2005). The measures were categorised into general health parameters, body condition, limb disorders, and lesions of skin and/or deeper tissues. Observations had scores of severity where appropriate or were recorded as being present or absent. Skin lesions were classified on a scale between 0–3; 0 indicating no lesions present; 1 representing superficial or healed lesions with loss of hair, healed scars; 2 representing small lesions no larger than the tip of a cotton bud with skin and immediate subcutaneous layers broken; 3 representing deep lesions with subcutaneous layers broken and larger than the tip of a cotton bud. The welfare assessment was field tested for practicality prior to data collection in Ethiopia in March 2015.

Analysis

Raw data from the Excel spreadsheets were transferred to SPSS (IBM v 24 for Windows®) and recoded as necessary for analysis.

As the data were not normally distributed, non-parametric statistics were used to compare responses from participants in rural and urban areas. Mann-Whitney *U*, Chi-square and Fishers Exact tests were used as appropriate. Significance level was set at $P \leq 0.05$.

The welfare assessment data were predominantly categorical in nature and consequently also underwent non-parametric analysis using Chi-square or Fishers Exact tests. A *post hoc* Bonferroni correction was used to reduce the risk of Type I errors given the large number of tests conducted ($n = 34$). Consequently, significance was set at $P = 0.015$ for the analyses of the welfare assessment data.

Results

Donkey owner questionnaire

The questionnaire was completed by 28 donkey owners, 15 from rural locations and 13 from urban locations (Table 1). Participants from the two locations differed significantly in age distribution ($U = 140.50$; $P = 0.046$), whether they owned their own house ($\chi^2 = 17.28$; $P < 0.001$) and the number of dependents they had ($U = 21.50$; $P < 0.001$) with urban participants being older, less likely to own their house and having fewer dependents. There were no female participants from urban locations.

Participants in urban locations owned more donkeys (mean: 3.62; range: 1–7) than those in rural locations (mean: 2.93; range: 1–8), although this difference was not significant ($P > 0.05$).

Participation in various income-generating activities with and without a donkey varied between rural and urban locations (Figure 1[a],[b]). All of the income-generating activities in rural locations and nearly all of those in urban locations utilised donkeys, although the specific activity was highly dependent on location. Collection of rubbish and transportation of construction materials were only reported in urban locations.

In rural locations, the most money was spent on donkeys in the dry and rainy seasons (both 46.67%), with only one participant reporting spending the most on their donkey during harvesting (6.67%). In urban locations, 76.92% of participants reportedly spent the most money on their donkey in the dry season, and 15.38% in the rainy season. It is important to note here that there was no unified agreement between participants, within or between locations, as to whether there were two seasons (rainy and dry) or three (rainy, dry and harvesting).

Donkey use by men and women differed significantly between locations ($\chi^2 = 17.95$; $P \leq 0.001$), with men being the primary users in urban locations (76.92%) and woman the primary users in rural locations (100%). There was also a significant difference between the preferred gender of the donkey in each location ($\chi^2 = 6.62$; $P = 0.010$); male donkeys were preferred in urban settings (100%), while in rural

Table 1 Demographic information about the questionnaire participants in rural and urban locations.

Demographic information	Rural (%)	Urban (%)
<i>Age (years)</i>		
18–25	26.7	7.7
26–30	46.7	23.1
31–40	20.0	53.8
41–50	0.0	7.7
51–60	6.7	7.7
<i>Gender</i>		
Male	33.3	100.0
Female	66.7	0.0
<i>Participant owns their own house</i>		
Yes	93.3	15.4
No	6.7	84.6
<i>Number of dependents</i>		
0	0.0	23.1
1	0.0	23.1
2	6.7	23.1
3	13.3	7.7
4	26.7	15.4
5	13.3	7.7
6	13.3	0.0
7+	26.7	0.0

locations 60% of participants said that their community preferred male donkeys and 40% preferred females.

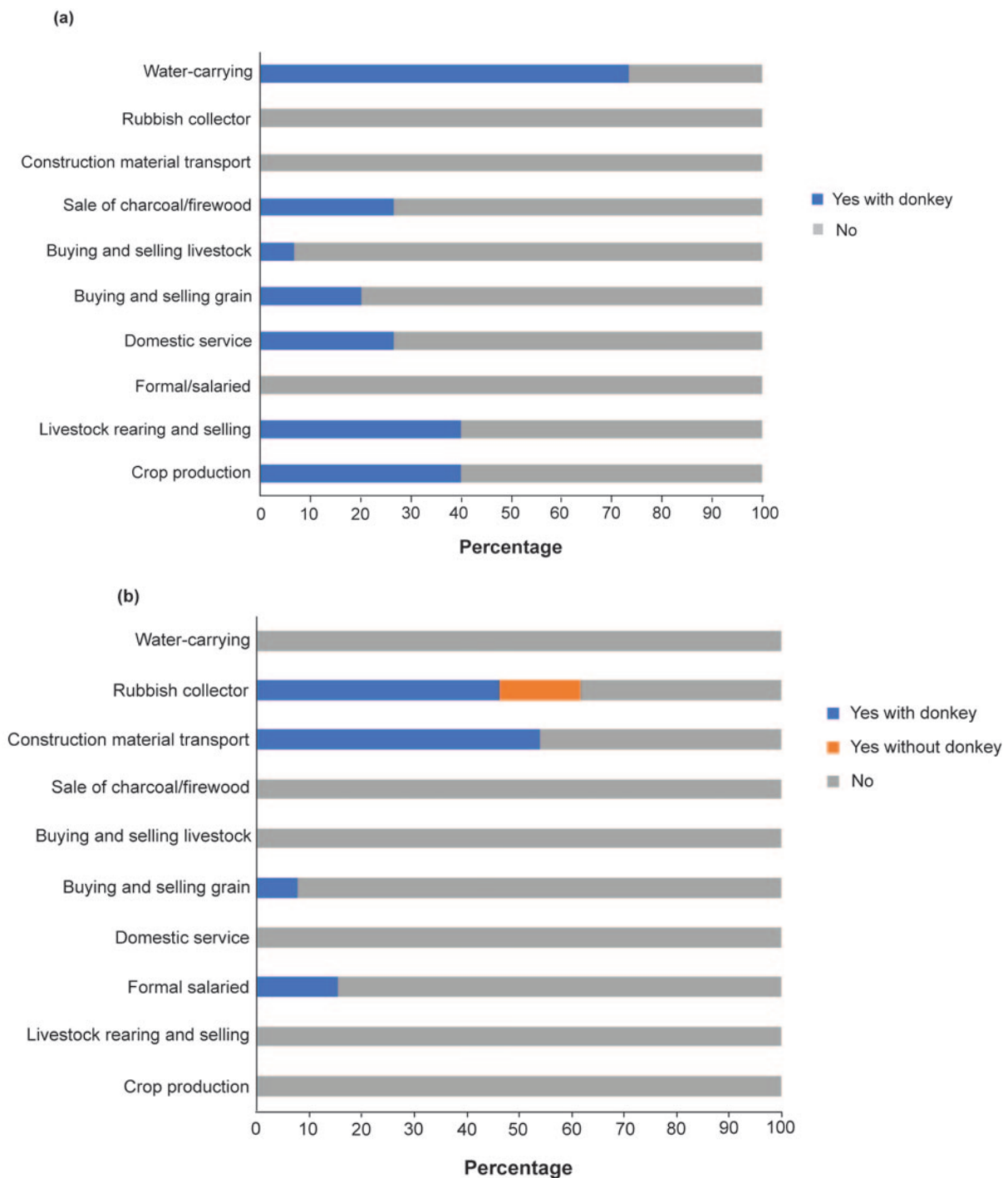
In both rural and urban communities, cows were reported as the animals that gave most social status to the owners while chickens gave the least.

There were no significant differences between whether rural and urban participants felt owners were justified in hitting their donkeys in the five scenarios presented ($P > 0.05$; Figure 2[a],[b]). Most participants from both locations felt justified in hitting a donkey that would not move forward.

Welfare assessment

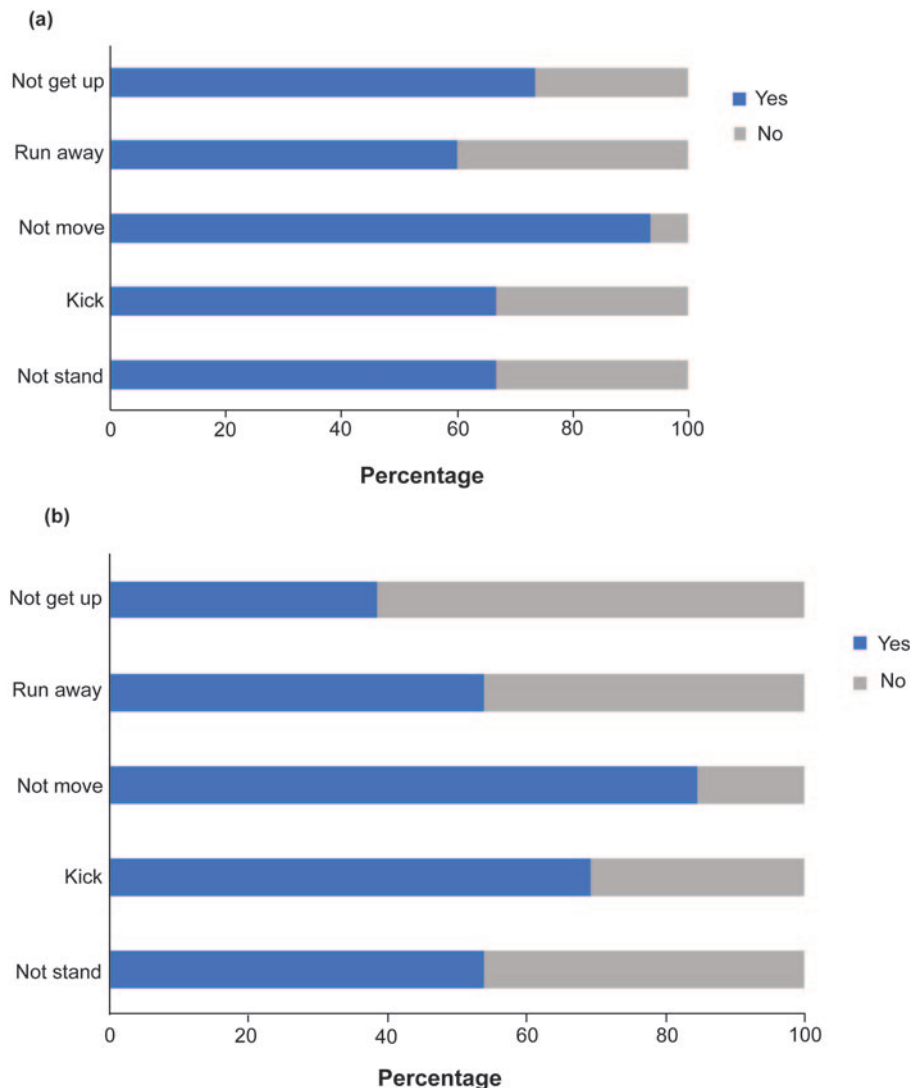
In total, 161 donkeys were assessed across the six study sites: ninety-three in rural locations and 68 in urban locations. The environmental conditions prevailing during the welfare assessment varied between locations. The weather was hot (21°C and above) in two of the three rural locations and mild in the remaining location (20–10°C). The weather in the urban locations was more variable, sometimes changing during an assessment, resulting in 29.4% hot, 60.3% mild, 4.4% cold and 5.9% wet weather at the time of the welfare assessment. Three of the six data

Figure 1



Participation in income-generating activities with and without donkeys in (a) rural and (b) urban locations. Water-carrying refers to transporting water in containers from nearby wells or rivers on the donkeys' back with or without a pack saddle or cart. Rubbish collection refers to collecting household rubbish from each home in a specific area using a donkey that pulls a cart with the collected rubbish. Transportation of construction material refers to transporting sand and/or concrete for building sites on the donkeys' back with or without a pack saddle. Sale of charcoal/firewood refers to transporting charcoal and/or firewood to market for sale on the donkeys' back with or without a pack saddle. Buying and selling livestock means herding and moving livestock to markets for sale or buying livestock at markets and taking them back to the respective homestead. A donkey would assist with herding the livestock. Buying and selling grains refers to the movement of grains from cultivation to market for sale and purchase on the donkeys' back with or without a pack saddle or donkey cart. Donkeys may support domestic service by transporting people and/or cleaning supplies to provide housekeeping for private homes and/or to provide care for children. Formal/salaried work refers to positions held within the formal sector where donkeys may be used as transport to and from work. Livestock rearing and selling refers to the husbandry of livestock animals such as chickens, goats, cows and selling them for consumption at livestock markets or to individual buyers privately from one's homestead. Crop production for sale refers to the growing and cultivation of crops for sale for the consumption by people and/or animals.

Figure 2



Showing (a) rural and (b) urban participants' responses to when it is and is not justified to hit a donkey. The five scenarios given to participants to state whether or not it was justified to hit a donkey were: if the donkey will not get up from resting; if the donkey runs away from being caught for work; if the donkey refuses to move fast; if the donkey kicks out; and if the donkey will not stand for loading.

collection sites were based in northern Addis Ababa that is located at high altitude making the temperature more moderate all year around with the northern areas of the city built on the Entoto Hills colder and wetter (10°C and below) than the southern parts. South of Addis Ababa in the Rift Valley near city Arsi Negele was where the rural villages were located where the temperatures were hotter with less rainfall and more humidity.

Prior to the start of the assessment, all the rural donkeys had been resting. The majority of those in urban locations were carrying a pack saddle (73.5%) and others were resting (17.6%) or pulling carts (8.8%).

All of the donkeys assessed in the urban environments were entire males (stallions); in rural settings 46.2% were entire males and 53.8% were female. None of the donkeys assessed in either location were geldings (castrated males). The age of the donkeys assessed in each location

did not differ significantly; 26.9 or 20.6% were under five years of age, 55.9 or 48.5% were aged between 5–15 years and 17.2 or 26.5% were aged 16 or over for rural and urban settings, respectively.

The behaviour of the donkeys and their interaction with their owners differed significantly between rural and urban locations, with the exception of how the donkeys responded to the assessor touching their chin (Tables 2 and 3; see supplementary material <https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material>). More of the urban donkeys were alert in their demeanour but did not move away or show interest in the assessor.

The body condition score (BCS) of the donkeys differed significantly between locations ($F = 45.91$; $P \leq 0.001$), with a greater range in scores seen in urban settings. In rural locations, 1.1% had a BCS score of 1, 44.1% were scored 1.5, 49.5% scored 2 and 5.4% scored 2.5. In urban settings,

Table 2 The behaviour of the assessed donkeys and their owners in rural and urban locations.

Factor	Rural (%)	Urban (%)	Significance
<i>Donkey demeanour</i>			$F = 25.03$; $P \leq 0.001$
Alert	19.4	57.4	
Apathetic	79.6	42.6	
Severely depressed	1.1	0.0	
<i>Donkey response to assessor approach</i>			$F = 32.66$; $P \leq 0.001$
Moves away	3.2	10.3	
Turns head away	7.5	17.6	
Does not move	16.1	44.1	
Turns head towards observer	65.6	25.0	
Aggressive	7.5	2.9	
<i>Donkey response to assessor walking down their side</i>			$F = 37.92$; $P \leq 0.001$
No interest	0.0	17.6	
Follows with one ear	37.6	57.4	
Turns head or body to look at observer	40.9	8.8	
Attempts to move away	21.5	16.2	
<i>Donkey response to assessor making chin contact</i>			ns
Accepts	52.7	45.6	
Avoids	47.3	54.4	
Tail tuck			ns
Yes	7.5	4.4	
No	92.5	95.6	
<i>Owner interaction with donkey</i>			$F = 39.67$; $P \leq 0.001$
Stroking	5.4	5.9	
Light touch	44.1	55.9	
Resting against	14.0	33.8	
Slapping	1.1	1.5	
Hitting	35.5	2.9	

1.5% scored 1 (there is no 0 BCS), 8.9% scored 1.5, 36.8% scored 2, 36.8% scored 2.5, 14.7% scored 3, 1.5% scored 3.5 and 1.5% had a BCS of 4.

The common ectoparasites observed during our assessment were lice, ticks, and bot eggs. Dermatophilosis, mange mites and habronema-associated lesions were also common.

These ectoparasites were significantly more common in rural donkeys ($F = 35.68$; $P \leq 0.001$). The majority of urban donkeys were free from ectoparasites (94.1%), while 4.4%

had mild and 1.5% moderate ectoparasite burdens. Only 51.6% of rural donkeys were free from ectoparasites, 25.8% had mild burdens, 16.1% had moderate burdens and 6.5% had severe ectoparasite burdens. Severe ectoparasite burdens were characterised as highly visible infestations with many more than ten visible parasites. Moderate burdens were characterised by having ten to five visible parasites and mild burdens were one to five.

All areas of the donkey were assessed for the presence and severity of lesions (Table 3; <https://www.ufaw.org.uk/the-ufaw-journal/supplementary-material>). While donkeys in each location did not differ significantly in mean lesion score, significant differences in lesion site and severity were found between locations. Rural donkeys were more often observed to have no lesions at different body sites compared with urban donkeys with the exception of the tail and tail base.

There were significant differences in signs of tethering or hobbling donkeys between locations ($F = 58.29$; $P \leq 0.001$); no signs of tethering or hobbling were seen in 11.8% of rural donkeys and 69.1% of urban donkeys. Superficial or healed lesions relating to tethering or hobbling were observed in 86.0% of rural donkeys and 29.4% of urban donkeys. Broken skin and/or immediate subcutaneous layers were apparent in 2.2% of rural donkeys and 1.5% of urban donkeys. No deep lesions relating to these methods of restraint were observed in any of the donkeys sampled.

The quality of mucous membranes did not differ significantly between settings with 90.3% of rural donkeys and 91.2% of urban donkeys observed as having normal membranes. The amount of eye discharge observed varied significantly between locations ($F = 45.91$; $P \leq 0.001$); 87.1% of rural donkeys had no discharge and 12.9% had a small amount. A greater range was observed in urban donkeys where 36.8% had no eye discharge, 54.4% had a small amount, 7.4% had a moderate amount and 1.5% a severe amount.

Signs of heat stress were observed in 50.5% of rural donkeys and 5.9% of urban donkeys ($\chi^2 = 17.95$; $P \leq 0.001$). Signs of heat stress observed were apathy, flared nostrils and head nodding. Evidence of faecal soiling on the hindquarters did not differ significantly between locations, being observed on 62.4% of rural donkeys and 69.1% of urban donkeys.

Hoof shape, horn quality and gait did not differ between donkeys from different locations, although significant differences were observed in sole shape and structure (Table 4).

Discussion

The two complementary data collection methodologies employed in this study, the donkey owner questionnaire and the donkey welfare assessments, enable the lives and welfare of donkeys in rural and urban Ethiopia to be compared. The findings highlight marked differences in the role and welfare of donkeys between different areas within the same country, demonstrating the importance of understanding the context from both the human and working equid's perspective before staging interventions intended to benefit either party.

Donkeys in urban locations were typically owned by older people with no home of their own. In contrast to previous

research in Ethiopia (Geiger *et al* 2020), urban donkey owners reported having fewer dependents than rural donkey owners. The absence of female donkey owners in urban locations contrasts with rural settings where women are the primary users of donkeys. The contribution rural donkeys make through their assistance to women throughout their work is widely recognised (Stringer *et al* 2011; Geiger *et al* 2020). There were also differences between locations in the gender preferences reported for their donkey, with male donkeys being preferred by 60% of rural donkey owners and 100% of the donkey owner participants in urban settings. This preference was reflected in the donkeys that underwent the welfare assessment; all urban donkeys that were assessed, and 46% of rural donkeys, were male. Most owners think that males have more working capacity and endurance or strength than females. In Geiger *et al* (2020), donkey owners explained that male donkeys typically cost more to purchase at market which could be a reason why only 46% of rural donkeys were male.

Working donkeys are typically utilised for a number of roles unlike other working equids and are consequently seen as more ‘multipurpose’ animals (Usman *et al* 2015). The variety of roles donkeys assist in is much wider in rural communities where donkeys form an integral part of all income-generating activities including those related to agriculture, livestock, domestic service, the sale of charcoal and wood, and carrying water. The critical role that donkeys fulfil in rural locations serves to emphasise their value to these communities and the benefits they bring, and dispels the perception that rural donkeys work less than those in urban areas that was reported by urban participants in previous research (Geiger *et al* 2020).

Wounds are commonly found on working donkeys and the majority, if not all, are typically inflicted by humans (Stringer *et al* 2011). The lesions observed in the donkeys at both locations were likely to reflect the different work they undertook and the equipment associated with those roles as found in previous studies (Pritchard *et al* 2005; Burn *et al* 2010a; Mekuria & Abebe 2010; Usman *et al* 2015). Fröhlich *et al* (2020) found an association between the number of dependents the owner supported and wound prevalence in working horses in Fiji, speculating that this may be due to the increased work demands placed on the equine to generate enough income to support a higher number of people. However, there was no significant difference between urban and rural donkeys when total lesion scores were compared in this study, despite the difference in the number of dependents supported by the donkeys in each area. The high occurrence of ectoparasites in rural donkeys is likely a reflection of their different role in rural settings and their exposure, particularly their close contact with other animals, and this difference in parasite load has also been found previously (Burn *et al* 2010a).

While owner attitudes towards hitting donkeys did not significantly differ between locations, there was a significant difference between the amount of hitting observed prior to the donkeys undergoing welfare assessment, with over one-third of rural donkey owners observed hitting their donkey compared with 3% of urban donkey owners. This may reflect

Table 4 Hoof quality and gait of the assessed donkeys in rural and urban locations.

Factor	Rural (%)	Urban (%)	Significance
<i>Hoof shape</i>			ns
Normal	6.5	13.2	
Mild deviation	54.8	54.4	
Moderate deviation	35.5	30.9	
Severe deviation	3.2	1.5	
<i>Hoof horn quality</i>		(1.5 unknown)	ns
Normal	1.1	5.9	
Mild deviation	73.1	67.6	
Moderate deviation	25.8	23.5	
Severe deviation	0.0	1.5	
<i>Sole shape and structure</i>		(1.5 unknown)	$F = 16.06;$ $P = 0.001$
Normal	8.6	20.6	
Mild deviation	84.9	57.4	
Moderate deviation	6.5	17.6	
Severe deviation	0.0	2.9	
Closed shoe	0.0	0.0	
<i>Gait (observation of six paces)</i>			ns
Normal	39.8	41.2	
Mild deviation	51.6	35.3	
Moderate deviation	7.8	14.7	
Severe deviation	1.1	8.8	

contextual differences between rural and urban locations at the point the donkeys were identified for welfare assessment. However, it could also relate to differences in the empathy shown towards donkeys between regions which would have implications for the care and treatment the donkeys receive (Lanas *et al* 2018; Luna & Tadich 2019).

Including behavioural indices alongside physical indices in the welfare assessment is a valuable means of investigating the impact of the treatment they receive on donkey mental well-being (Haddy *et al* 2020). The behaviour of the donkeys toward the assessor differed significantly between locations. Urban donkeys were more alert and less apathetic than rural donkeys. Urban donkeys stood still when the assessor approached, in contrast to the rural donkeys which turned toward the assessor. Only a small proportion of the donkeys assessed in both locations responded aggressively towards the assessor when they approached. In contrast to previous studies, rural donkeys exhibited more aggressive behaviour than urban donkeys (Burn *et al* 2010a). Comparing how the donkeys reacted to the approach of their owner with their response to an unfamiliar assessor, as

has been done in other studies (Popescu & Diugan 2013), would be useful to the welfare assessment, enabling the specificity of this response to be teased out.

Apathy is considered a key welfare indicator for working equids because of its association with numerous physical welfare concerns (Burn *et al* 2010b; Popescu *et al* 2014; Usman *et al* 2015; Fröhlich *et al* 2020; Haddy *et al* 2020). Given this association, the fact that 80% of rural donkeys in this study exhibited signs of apathy is a significant welfare concern. The higher level of alertness observed in the urban donkeys suggests that, contrary to perception (Geiger *et al* 2020), urban donkeys may have a higher standard of welfare than their rural counterparts. There is the possibility that the apathy reported may be a consequence of study design. Other researchers have expressed concerns that unless donkeys are interrupted from their work to be assessed, resting behaviour may be confused with apathy (Popescu & Diugan 2013). All of the rural donkeys and 18% of the urban donkeys assessed in our study were observed at rest prior to undertaking the welfare assessment. Deepening our understanding of apathy in animals, particularly working equids, would help us differentiate between apathy as an indicator of negative physical and/or mental welfare, learned helplessness and exhaustion through inadequate nutrition, or excessive work (Pritchard *et al* 2005; Fröhlich *et al* 2020) or potentially an energy conservation strategy. Recognising true apathy in working equids is of paramount importance.

There was no significant difference between locations in the age of the donkeys assessed, and it was positive to note that 17% of rural donkeys and 27% of urban donkeys were aged 16 years or over when the working life expectancy of a donkey has previously been estimated at 4–6 years (Usman *et al* 2015) with a life expectancy of 9–13 years (Stringer *et al* 2011). The age of our sample may account for the amount of wither and spine lesions seen in the donkeys assessed, as these lesions have been found at a higher prevalence in donkeys over 15 years of age (Mekuria & Abebe 2010).

While the locations did not significantly differ in the gait abnormalities observed, a larger proportion of urban donkeys showed moderate or severe gait deviation during assessment, further supporting previous findings that urban donkeys show more lameness issues than rural donkeys (Morgan 2006). It was positive to see that over one-third of donkeys in each location exhibited a normal gait on assessment, particularly given that lameness is one of the main welfare issues reported in working equids globally (Pritchard *et al* 2005; Lanas *et al* 2018). Urban donkeys bore fewer lesions indicative of tethering and hobbling than rural donkeys where these lesions were identified in 88% of individuals assessed. This is likely to reflect the differences in management practice between regions as urban donkeys are often confined in rented shelters overnight (Geiger *et al* 2020). Tethering/hobbling are still common practices for restraining working equids throughout the world, and Haddy *et al* (2020) recently reported that over half of the donkeys sampled in Spain and Portugal bore marks and lesions indicative of tethering.

It is crucial to consider human factors and attitudes, alongside the animals, when designing welfare interventions (Pritchard *et al* 2018). Animal welfare concerns are often anthropogenic, and consequently could be overcome if human attitudes and practices were changed. This is particularly true for donkeys. Understanding what people do and why is critical for success (Upjohn *et al* 2014; Haddy *et al* 2020) and interventions must be bespoke (Kubasiewicz *et al* 2020) to reflect the differences in practices and beliefs between areas. In this study, donkeys were considered to be low status animals, below that of cows. This is likely to contribute to them being overlooked in terms of food and veterinary care in favour of those with perceived higher value (Martin Curran *et al* 2005; Mekuria & Abebe 2010; Stringer *et al* 2011; Usman *et al* 2015). This attitude is found not only in Ethiopia but is also reported by working donkey owners in Europe (Haddy *et al* 2020).

Our findings provide a broad insight into the socio-economic value and welfare of working donkeys in rural and urban Ethiopia and highlight the differences between these settings. It is important to recognise the limitations of the approach taken, particularly the risk of the Hawthorne effect (participants altering their behaviour simply as a result of participating in a study) which may bias how items in the questionnaire were answered (Stringer *et al* 2011; Upjohn *et al* 2012; Fröhlich *et al* 2020). The welfare assessment represents welfare at a single point in time (Pritchard *et al* 2005), although this is ameliorated to an extent by the inclusion of measures (eg lesion scores) that reflect welfare challenges accumulated over time. Interpreting the findings of such studies also presents challenges of its own, for example, the weighting given to different measures and the question of whether good welfare scores can ever cancel out bad ones (Kubasiewicz *et al* 2020). Our findings, however, show the value in taking a more holistic approach to working equids' welfare assessment and the necessity of understanding the situational factors and attitudes influencing the human component of these vital human-equine interactions when designing targeted interventions for welfare improvement. Donkeys in rural and urban settings have different roles to play within these communities and face different welfare challenges. Consequently, the recent development of the Equid Assessment Research and Scoping (EARS) tool (Haddy *et al* 2020; Raw *et al* 2020; Watson *et al* 2020) and the Welfare Aggregation and Guidance (WAG) Tool (Kubasiewicz *et al* 2020; Norris *et al* 2020) by The Donkey Sanctuary represent an important advancement in standardised protocols that encompass both the human and equine elements of working equids' welfare.

Animal welfare implications

Rural and urban working donkeys are critical for their owners' income-generating activity and therefore their livelihoods. The work they undertake differs substantially between locations, as does their welfare. Work in each setting presents its own challenges and these are reflected in the behaviour and physical health of the donkeys. Rural

donkeys showed more apathetic behaviour, a higher ectoparasite burden and increased evidence of tethering/hobbling. Urban donkeys were more alert and had a wider range of body condition scores. The severity of lesions observed in different anatomical locations differed between rural and urban donkeys, although there was no significant difference in overall lesion score. Despite their significant financial contribution, donkeys were still perceived as low-status animals by participants in both rural and urban locations.

Acknowledgements

We would like to thank the team at The Donkey Sanctuary, Ethiopia and everybody involved in facilitating this project. We would like to give special thanks to the participants who allowed us to assess the welfare of their donkeys and who took the time to complete our questionnaire.

References

- Burn CC, Dennison T and Whay HR** 2010a Environmental and demographic risk factors for poor welfare in working horses, donkeys and mules in developing countries. *The Veterinary Journal* 186: 385-392. <https://doi.org/10.1016/j.tvjl.2009.09.016>
- Burn CC, Dennison TL and Whay HR** 2010b Relationships between behaviour and health in working horses, donkeys, and mules in developing countries. *Applied Animal Behaviour Science* 126: 109-118. <https://doi.org/10.1016/j.applanim.2010.06.007>
- Fröhlich N, Sells PD, Sommerville R, Bolwell CF, Cantley C, Martin JE, Gordon SJG and Coombs T** 2020 Welfare assessment and husbandry practices of working horses in Fiji. *Animals* 10: 392. <https://doi.org/10.3390/ani10030392>
- Geiger M, Hockenhull J, Buller H, Tefera Engida G, Getachew M, Burden FA and Whay HR** 2020 Understanding the attitudes of communities to the social, economic, and cultural importance of working donkeys in rural, peri-urban, and urban areas of Ethiopia. *Frontiers in Veterinary Science* 7: 60. <https://doi.org/10.3389/fvets.2020.00060>
- Haddy E, Rodrigues JB, Raw Z, Burden F and Proops L** 2020 Documenting the welfare and role of working equids in rural communities of Portugal and Spain. *Animals* 10: 790. <https://doi.org/10.3390/ani10050790>
- Kubasiewicz LM, Rodrigues JB, Norris SL, Tamlin L, Watson TL, Rickards K, Bell N, Judge A, Raw Z and Burden FA** 2020 The welfare aggregation and guidance (WAG) tool: A new method to summarise global welfare assessment data for equids. *Animals* 10: 546. <https://doi.org/10.3390/ani10040546>
- Lanas R, Luna D and Tadich T** 2018 The relationship between working horse welfare and their owners' socioeconomic status. *Animal Welfare* 27: 47-54. <https://doi.org/10.7120/09627286.27.1.047>
- Luna D and Tadich TA** 2019 Why should human-animal interactions be included in research of working equids' welfare? *Animals* 9: 42. <https://doi.org/10.3390/ani9020042>
- Martin Curran M, Feseha G and Smith DG** 2005 The impact of access to animal health services on donkey health and livelihoods in Ethiopia. *Tropical Animal Health and Production* 37(S1): 47-65. <https://doi.org/10.1007/s11250-005-9008-z>
- Mekuria S and Abebe R** 2010 Observation on major welfare problems of equine in Meskan district, Southern Ethiopia. *Livestock Research for Rural Development* 22(3): 1-15
- Morgan R** 2006 The epidemiology of lameness in working donkeys in Addis Ababa and the Central Oromia region of Ethiopia: a comparative study of urban and rural donkey populations. In: Pearson A, Muir C and Farrow M (eds) *The Future for Working Equines: Proceedings of the 5th International Colloquium on Working Equines* pp 99-106. The Donkey Sanctuary: Sidmouth, UK
- Norris S, Kubasiewicz LM, Watson TL, Little HA, Yadav AK, Thapa S, Raw Z and Burden FA** 2020 A new framework for assessing equid welfare: A case study of working equids in Nepalese brick kilns. *Animals* 10: 1074. <https://doi.org/10.3390/ani10061074>
- Popescu S and Diugan EA** 2013 The relationship between behavioral and other welfare indicators of working horses. *Journal of Equine Veterinary Science* 33: 1-12. <https://doi.org/10.1016/j.jevs.2012.04.001>
- Popescu S, Diugan EA and Spinu M** 2014 The interrelations of good welfare indicators assessed in working horses and their relationships with the type of work. *Research in Veterinary Science* 96: 406-414. <https://doi.org/10.1016/j.rvsc.2013.12.014>
- Pritchard J, Upjohn M and Hirson T** 2018 Improving working equine welfare in 'hard-win' situations, where gains are difficult, expensive or marginal. *PLoS One* 13: e0191950. <https://doi.org/10.1371/journal.pone.0191950>
- Pritchard JC, Lindberg AC, Main DCJ and Whay HR** 2005 Assessment of the welfare of working horses, mules and donkeys, using health and behaviour parameters. *Preventive Veterinary Medicine* 69: 265-283. <https://doi.org/10.1016/j.prevetmed.2005.02.002>
- Raw Z, Rodrigues JB, Rickards K, Ryding J, Norris SL, Judge A, Kubasiewicz LM, Watson TL, Little H, Hart B, Sullivan R, Garrett C and Burden FA** 2020 Equid assessment, research and scoping (EARS): The development and implementation of a new equid welfare assessment and monitoring tool. *Animals* 10(2): 297. <https://doi.org/10.3390/ani10020297>
- Stringer AP, Bell CE, Christley RM, Gebreab F, Tefera G, Reed K, Trawford A and Pinchbeck GL** 2011 A cluster-randomised controlled trial to compare the effectiveness of different knowledge-transfer interventions for rural working equid users in Ethiopia. *Preventive Veterinary Medicine* 100: 90-99. <https://doi.org/10.1016/j.prevetmed.2011.02.001>
- Upjohn MM, Pfeiffer DU and Verheyen KLP** 2014 Helping working equidae and their owners in developing countries: Monitoring and evaluation of evidence-based interventions. *The Veterinary Journal* 199: 210-216. <https://doi.org/10.1016/j.tvjl.2013.09.065>
- Upjohn MM, Shipton K, Pfeiffer DU, Leretholi T, Attwood G and Verheyen KLP** 2012 Cross-sectional survey of owner knowledge and husbandry practices, tack and health issues affecting working horses in Lesotho. *Equine Veterinary Journal* 44: 310-318. <https://doi.org/10.1111/j.2042-3306.2011.00442.x>
- Usman S, Disassa H, Kabeta T, Zenebe T and Kebede G** 2015 Health and welfare related assessment of working equine in and around Batu Town, East Shoa, Central Ethiopia. *Nature and Science* 13(10): 1-8
- Watson TL, Kubasiewicz LM, Chamberlain N, Nye C, Raw Z and Burden FA** 2020 Cultural 'blind spots', social influence and the welfare of working donkeys in brick kilns in Northern India. *Frontiers in Veterinary Science* 7: 214. <https://doi.org/10.3389/fvets.2020.00214>