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Assessment of Welfare Problems on Working Donkeys in Hosaena District, Hadiya Zone, Southern Ethiopia

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ABSTRACT

Aim
The objective of this study was to assess the major welfare problems in working donkeys in Hosaena district, Hadiya Zone, Southern Ethiopia.

Methods and Materials
A total of 318 male and 76 female working donkeys were randomly selected using a cross-sectional study from November 2015 to April 2016.

Results
According to the current investigation, 70% of donkeys were used for draught and 30% were used for pack type of work. All females (100%) were used for packing purpose, whereas 86.8% of male donkeys were used for draught purpose. Overall, 41.6% of donkeys had a poor body condition in all age groups, whereas most donkeys (44.3%) under the age group less than 5-years were having poor conditions. Regarding wound on the skin, a higher proportion (82.2%) of back lesions were observed in pack donkeys whereas lip lesions were observed in 87.7% of draught donkeys. Besides, the welfare problem was observed in 28.9% of working donkeys due to overloading. A significant association ($p<0.01$) was found between the duration of working hours of donkey and poor body condition. Out of the interviewed, the majority of animal owners (76.4%) had one donkey.

Conclusion
The assessment showed that working donkeys in the present study area were experiencing multiple welfare problems. Accordingly, awareness creation through mass education, training and extension service should be promoted in the study area in order to ensure better donkey welfare and productivity.

Keywords
Assessment; Ethiopia; Hosaena; Welfare of working donkey.

INTRODUCTION

Donkeys are an important farm animal species that descended from the African wild-ass (*Equus africanus asinus*) and early-domesticated equines that have been around as long as mankind.[1] Donkeys have been used principally as working animals for at least 5000-years. Donkeys are adapted to dry and mountainous conditions with limited access to water and poor quality sparse vegetation.[2,3] The low cost of purchase and maintenance of donkeys, their relatively small size, ease of training and handling, highly effective digestive system and their ability to withstand thirst has endeared them to small scale farmers and the poor living in peri-urban, remote and hostile environments with no infrastructure and road access.[2,4-6]

The world donkey population is estimated to about 44 million; half is found in Asia, just over 25% in Africa and the rest mainly found in Latin America. Over 32% (approximately 6.21 million donkeys) of African donkeys are resident in Ethiopia and 10% of the world population, which makes Ethiopia harboring the larg-

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est population of donkeys in Africa and the second largest donkey population in the world after China. In Ethiopia, the majority of donkeys are found in highland areas, even though they are widely distributed in all agro-ecological zones of the country widely distributed in the dry and mountainous areas.[7,8]

The animal welfare is being compromised internationally due to several constraints such as poverty and lack of knowledge. Research conducted in Ethiopia demonstrated that improvements in the welfare of donkeys had significantly improved their work output which in turn improved livelihood situations of the poorest communities in the rural and peri-urban areas.[9] The welfare of working donkeys in developing countries is therefore crucially important, not only for the health and survival of those animals, but also for the livelihoods of those people dependent on them.[4,6,10]

The low-level of development of road transport, network and rough terrain of the country make donkeys the most valuable, appropriate and affordable pack animals under the smallholder farming system.[11,12] In areas where draft power is a constraint for crop cultivation, a pair of well-conditioned donkeys could be used as alternative draft power sources for secondary and tertiary land preparation.[4] Many activities that are performed by donkeys within the community are collecting firewood, transporting water, farm inputs and goods to markets and/or homes in the rural areas.[13-15]

Despite the fact that around the world, many working donkeys live and work in harsh conditions and can suffer from poor health and lack of productivity due to infectious diseases and poor management practices.[16,17] Working donkeys are prone to painful, debilitating and often fatal tropical illnesses and conditions such as tetanus, parasitic infestation, and colic. In addition, these animals work under difficult environmental conditions including intense heat, difficult topography dehydration, malnutrition, lesions on different body part, and hoof problems. Animals are often engaged in work for long hours and when getting free, they are left to browse and feed on grass garbage. These have the potential to affect negatively their welfare and quality of life.[10,18]

Donkeys are subjected to different welfare problems in rural and urban areas, even though they have a crucial role in day-to-day activity. Among the welfare issues of donkeys, overloading and inadequate access to feed or health care facilities are the most common problems.[19-21] Moreover, they are exposed to long working hours with little rest, poor husbandry, lameness, poorly designed harnesses, severely tethered or hobbled, cruel training methods, lack of shade, lack of water, inhumane handling, heat stress, inhumane disposal when old or worn out.[4,22,23]

Donkeys provide invaluable support for the livelihoods of communities. However, there is limited information regarding donkey welfare issues in and around the Hosaena area, Hadiya Zone, Southern Nation, Nationalities and Peoples Regional State. Little attention has been given to this animal and no study was conducted regarding the welfare issues of the donkey. So, the current study was performed with the objective to assess welfare issues and associated-risk factors affecting the welfare of working donkeys in and around the Hosaena area, Hadiya Zone.

MATERIALS AND METHODS

Study Area

The study was conducted in Hosaena, capital of Hadiya zone in Southern Nations, Nationalities and People Regional State, Ethiopia. Hosaena is the administrative center of the Hadiya zone at a distance of 232 km away from Addis Ababa and 168 km away from Hawassa, the regional capital. It has a latitude and longitude of 7°33'N; 37°51'E, respectively with an elevation of 2177 meters above sea level. The mean annual temperature and rainfall are 16.9 ºC and 1071 mm, respectively. The area exhibits a bimodal rainfall system (long and short rainy season). The long rainy season extends from June to September, whereas the short rainy season ranges from mid-February to the end of April.[24]

Study Animals

The study animals were working donkeys kept by different peasant associations in and around Hosaena, Hadiya Zone, Southern Reginal state. Besides, the study includes donkeys of both sex, different age group, and used for draughting and packing purposes that are common sources of transportation of goods, construction materials, farm products, and others.

Study Design and Sampling Technique

A cross-sectional study was conducted from November 2015 to April 2016 to identify the welfare problems of working donkeys in terms of body condition and wounds on the body in and around Hosaena. A total of 394 working donkeys were randomly selected from Hosaena district based on their accessibility, easy of logistic and donkeys population. Moreover, the sampling method was carried out at field level, market, homestead, grind mill houses, around water point areas and in some purposively selected peasant associations of the district.

During sample collection, various potential risk factors including sex, age, and body condition scores of the donkey were recorded. The age of the selected working donkeys was determined by the dentition pattern as described by Crane and Svendsen.[25] Body condition score (BCS) was estimated based on the guides by Svendsen.[26] The body condition scoring was performed by assessing the donkey from both sides and the hindquarter without touching the animals and scored as '0' for very thin; '1' for thin; '2' for fair; '3' for good; 4 for fat and 5 for very fat. Donkeys were also classified to age classes based on structural change and/or eruption/wear of incisors teeth in to <5-years classified as young, 5-10-years considered as an adult and >10-years were classified as old.[27] These age classes were based on age of first work, productive age and the life span of Ethiopian donkeys.[11,26]

In addition, wounds on different parts of the skin were assessed based on the depth and location of the body regions. The lesions that fulfill the criteria were considered, identified and re-

corded. Thus, a lesion larger size than a 2×2 cm square or 1×4 cm rectangle or 2.3 cm diameter circle were considered as described by Dennison et al.[17]

Sample Size Determination

Perusal of different literatures and articles, there is no research work on the assessment of welfare problems in working donkeys in the Hosaena district. Hence, an expected prevalence of 50% was taken into consideration in order to determine the sample size of the study animals. Moreover, 95% confidence interval (CI) and 5% desired absolute precision was used to appreciate the significant difference. Thus, the Thrusfield formula was used to determine the sample size.[28]

$$n=Z^2\times P(1-P)/d^2$$

Where n=the required sample size, Z=Confidence level (regular value=1.96), P=expected prevalence (50%) and, d=desired absolute precision (0.05).

Accordingly, the calculated sample size was 384, which is the minimum sample size to be taken in the control area. Consequently, the sample size was determined to be 394 were sampled randomly for physical examination in the study area.

Method of Data Collection

Observational study: An observational study was made for direct welfare assessment of the donkeys and data were collected by direct physical examination. Prior to the assessment, consent was obtained from the animal's owners by presenting the aim of the study. Information regarding general conditions such as wound type, dermatological disease, musculoskeletal disease, other disease signs and behavior, age categories, body condition score, work type and condition of harnessing were properly recorded on data collection format.

The assessment carried out at field level, market and around the homestead in the day time. Based on the types of work animals were categorized as draught, pack, both draught and pack. "Draught" animals are those used for the transport of goods by carts. "Pack" animals are those used for transport of goods on their back (pack) and both for draught and pack.[27] The donkeys were allowed to stand for 5-10-minutes after being held by head halter and collar before assessment began, without causing major disturbance to donkey routine work.

Questionnaire survey: A questionnaire survey was also conducted simultaneously with observational study to indirectly assess the welfare status of the working donkeys by interviewing the donkey's owner. In addition, a semi-structured questionnaire was developed to collect relevant information on major welfare problems associated with working donkeys such as management practices (feeding, watering, health care, and housing practice), age, sex, duration of working hours, work type of the donkey population and number of donkey at household level. Besides, the knowledge and perceptions regarding donkey welfare issues in the area were obtained by interviewing donkey owners/attendants.

Data Analysis

All data collected during the study period were entered into Microsoft Excel spreadsheets and analyzed using Stata version 13 statistical software. Descriptive statistics were made and the results of the analysis were presented through tables and figures and Chi-square (χ^2) was used to determine the association of the wound problem with hypothesized risk factors. Statistical significant differences were considered at a *p*-value of less than 0.05.

RESULTS

Observational Welfare Assessment Results

Management and working practices of donkey: During the study period a total of 394 donkeys, which comprised 80.7% male donkeys and 19.3% female donkeys, were thoroughly observed for body condition status and the presence of lesions on different parts of the body. According to the current observation, most donkeys (73.6%) between 5-10-years of age group were the best productive, whereas donkey above 10-years of age (8.6%) was the least productive. Regarding work type, donkeys less than 5 years of age group (68.6%) were mostly engaged in packing, whereas most donkeys in the age group 5-10-years (79.7%) were used for draughting. Furthermore, most donkey owners prefer male donkeys (86.8%) to draught and females (100.0%) to pack (Table 1).

Table 1. *Description of Sex and Age Group of the Observed Working Donkeys within Work Type*

Category	Frequency N (%)	Percentage within work type	
		Pack (%)	Draught (%)
Age group			
<5-years	70 (17.8)	68.6	31.4
5-10-years	290 (73.6)	20.3	79.7
>10-years	34 (8.6)	32.4	67.6
Sex			
Jack Ass	318 (80.7)	13.2	86.8
Jenny	76 (19.3)	100.0	0

Assessment of body condition score: According to the current body condition assessment, 54.1% of the donkeys were having medium a body condition and 42.1% and 3.8% of donkeys were having thin and fat body condition, respectively. Besides, donkeys less than 5-years (44.3%) were having poor body condition as compared to the age group of 5-10-years (42.1%). Consequently, most of the donkeys less than 5-years of age were managed under poor husbandry practice (Table 2).

On the basis of work type, a high proportion of pack donkeys showed a poor body condition (45.8%) as compared to draught animals (39.9%). Besides, 55.3% of female donkeys were having poor body scores than male ones (38.4%) since according to observation, most donkey owners preferred female donkeys for packing and trek long distances without providing proper access to

feed and water (Table 2).

Table 2. *Age Group and Work Types Expressed as a Proportion within Body Condition of Working Donkeys*

Variables	Frequency	Proportion of Body Condition Score		
		Poor	Good	Obese
Age group				
<5-years	70	44.3	47.1	8.6
5-10-years	290	42.1	54.1	3.8
>10-years	34	32.4	61.8	5.8
Work types				
Pack	118	45.8	49.2	5.0
Draught	276	39.9	55.4	4.7
Sex				
Jack Ass	318	38.4	57.5	4.1
Jenny	76	55.3	36.8	7.9

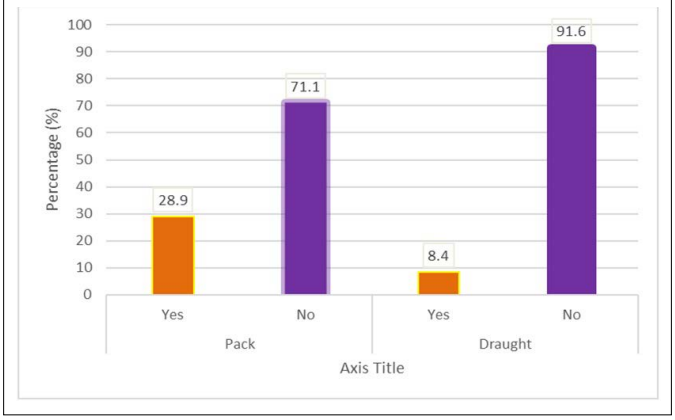
Health and welfare problems encountered in working donkeys: An observational welfare assessment of 394 working donkeys revealed, 48.9%, 21.1%, 13.5%, and 16.5% of the donkeys were suffering from different type of wound, dermatological problems, musculoskeletal problems, and other disease syndromes, respectively. Moreover, a higher proportion of lip (76.2%), head/neck sore (60%) and beat sore (59.3%) was observed on draught donkeys whereas a higher proportion of back (70.6%) and tail sore (55.3%) was observed on the pack donkeys (Table 3).

Table 3. *The Proportion of Health Problems in Working Donkeys with their Work Type*

Health Problems	Condition	Frequency	Proportion (%)		Overall (%)
			Pack	Draught	
Wound	Lip sore	21	23.8	76.2	48.9
	Head & neck sore	15	40	60	
	Back sore	38	55.3	44.7	
	Chest/Girth sore	16	43.8	56.2	
	Beat sore	27	40.7	59.3	
	Bite wound	25	52	48	
	Tail base sore	51	70.6	29.4	
Dermatological problems	Sarcoid	31	54.8	45.2	21.1
	Ectoparasite	46	45.7	54.3	
	Habronemiasis	6	66.7	33.3	
Musculoskeletal problems	Lameness	21	42.9	57.1	13.5
	Fracture	4	25	75	
	Hoof overgrowth	44	63.6	36.4	
Other disease syndromes	Metabolic disease	11	54.5	45.5	16.5
	Eye problems	26	42.3	57.7	
	Respiratory problems	12	41.7	58.3	

Assessment of workload in working donkeys: As described in the Figure 1, 114 (28.9%) of donkeys were suffered from overloading. Besides, a higher 81 (29.3%) proportion of overlading was recorded on draught/cart donkeys than pack donkeys 33 (8.4%). Therefore, regardless of their work type, working donkeys were suffered from overloading in the study area.

Figure 1. *Proportion of Overloaded on Working Donkeys*



Questionnaire Survey Results

Association of working hours and body condition: According to the current survey, there was a statistically significant association ($p<0.01$) between the duration of working hours and body condition. The present questionnaire survey showed that 50% of the donkeys in the study area had poor body condition due to longer working hours (>8-hours). Moreover, most donkeys (54.1% and 63.4%) that were in good condition were those donkeys who spend <5 and 5-8 working hours, respectively. In addition, 43.2% of working donkeys with less than 5 working hours had an obese body condition (Table 4).

Table 4. *Duration of Working Hours as Expressed as Percentages within Body Condition Score*

Working Hours	Body Condition Score (%)			Chi-square (χ^2)	*p*-value
	Poor	Good	Obese		
<5-hours	2.7	54.1	43.2	148.26	0.00
5-8-hours	33.3	63.4	3.2		
>8-hours	50.0	50.0	0.0		

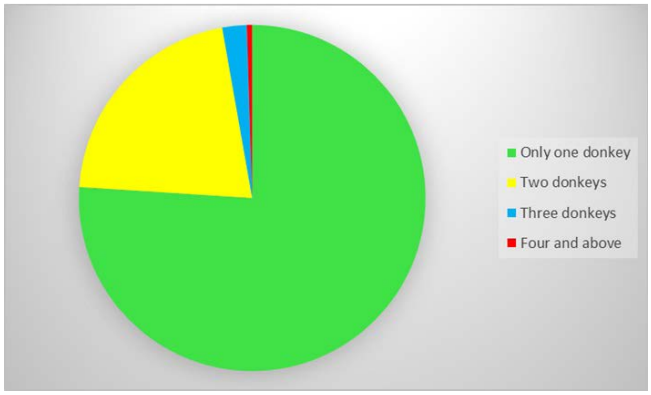
Knowledge of feeding and watering practice of working donkeys: Out of a total of 394 respondents, the majority of the respondents in this study, provided feed (51.0%) and water (5.6%) to their donkeys. Regarding the provision of water for the working donkeys, most of the respondents give less attention and do not provide adequate water for their donkeys (Table 5).

Table 5. *Proportion of Household Respondents on Management Practice of Donkeys in the Working Area*

Types of Service	No. of Respondents	Respondents Said 'yes'	Proportion (%)
Feed provision	394	201	51.0
Water access		22	5.6

Proportion of working donkeys per household: Out of the total interviewed, most 301(76.4%) households had only one donkey and 84(21.3%) households had two donkeys. Only a few households were having three 7(1.8%) and four and above donkeys 2(0.5). Therefore, the majority of donkey owners rear only one donkey in the area (Figure 2).

Figure 2. *The Number of Donkeys Owned per Households*



DISCUSSION

In this study, it was observed that all donkeys were used for work, mainly for pack and draught. Similar reports were done by Herago et al[4] and Mekuria et al[10] in Wolaita Sodo and Hawassa town, respectively where all equines are mainly kept to transport people and goods in order to assure their owners' daily income. In the present study, the overall prevalence of wound in working donkeys was 48.9% which was comparable with the prevalence reported by Herago et al[4] in Wolaita Sodo, Burn et al[29] in Jordan (59%) and 54% in Morocco.[30] However, this finding was higher than the prevalence of 40% in Central Ethiopia,[31] 42.2% in Adet town.[32] On the other hand, the current result was markedly lower than the previous report 77.5% and 79.4% by Curran et al[33] and Biffa et al[19] respectively in Ethiopia.

According to the current body condition assessment, 54.1% of the donkeys were having medium body condition and 42.1% and 3.8% of donkeys were having thin and fat body condition, respectively. Besides, donkeys less than 5-years (44.3%) were having poor body condition as compared to the age group of 5-10-years (42.1%). Heavy work burden also might be the reason for a high proportion of thin and very thin animals. Moreover, poor people who cannot afford to provide supplementary feeds to their donkeys might be the reason. Observation in this study area also shows that pack donkeys were kept usually by tethering around homestead. It was also discussed by Herago et al,[4] Mohammed[13] and Burden[21] that pack donkeys were kept usually by tethering around the homestead and in turn it caused discomfort and even wounds.

The present study revealed that beat sore, tail base sore, back sore and donkey bite sore were among the major type of wound identified in the area. Earlier studies have identified that as there was a probability of occurrence of all types of wounds on the same donkey.[4,10,29,32] These wounds are often caused by a combination of multi-factorial reasons. The difference in management and husbandry practices including environmental factors, the type of harness material used (natural or synthetic), the fit of the harness, the behavior of the owner, the frequency of work and the load were among risk factors that contribute to the onset of different type of wounds in working donkeys.[4,31,32]

Regarding work overload, 28.9% of donkeys were suffered from overloading. Besides, a higher 29.3% proportion of overlading was recorded on draught/cart donkeys than pack donkeys 8.4%. Therefore, regardless of their work type, working donkeys were suffered from overloading since owners sometimes loaded beyond their capacity, which led to even loss of donkeys, in order to transport enough products in one journey. Concerning the duration of working hours per day, those who worked for greater than eight hours showed a high proportion of poor body condition compared to those working for less than 5-hours and 5-8-hours since overworking utilizes maintenance energy. Therefore, the association between duration of working hours and body condition was very significant (p value<0.01). This finding was in agreement with the report of Herago et al,[4] Burden[21] and Getnet et al[12] that work overload and duration have an impact on body condition and health of working donkey.

The prevalence of dermatological diseases such as sarcoid, habronemiasis, and ectoparasites were common among working donkeys of the study area. This might be associated with the owner's poor knowledge of health care, feeding and irregular or no medication for parasites.[4,34] The present overall finding of dermatological disease was 21.1%, which is comparable with the findings of Kumar et al[35] in Mekelle city (23.7%) and Sameeh et al[36] in Jordan (22.7%) but, higher than the finding of Herago et al[4] in Wolaita Sodo (12.6%), Ahmed et al[37] in Pakistan (11%) and Yilma et al[23] in Debre Zeit (16%). Mekuria et al[5] made a similar observation, where higher prevalence of ectoparasites were found in donkeys than horses and suggested that donkeys were the most neglected animals in Ethiopia, receiving less attention by owners and kept under poor management conditions. Whay et al[38] also reported that skin lesions as one of the major prevalent and severe welfare issues in working donkeys.

Most donkey cases that were observed in this survey mainly related to the musculoskeletal system including lameness, fracture, hoof overgrowth and abnormal gait. Overall problem of 13.5% which is close to Kumar et al[35] finding in Mekelle city (18.2%) but lower than Herago et al[4] in Wolaita Sodo (21.8%), Sameeh et al[36] findings in Jordan (32.2%). This is likely due to many reasons such as overloading, lack of hoof care and continuous movement in various landscapes and on rough roads were the main reasons for the occurrences of musculoskeletal problems. This implies that any type of interaction between limb abnormalities in these animals may have serious welfare and health problems.[39,40]

In the present study, it was observed that among other disease problems the most frequently encountered in the study areas were metabolic disease, [54.5% (pack) and 45.5% (draft)],

respiratory problem [43.3% (pack) and 57.7% (draft)] and from eye problems [41.7% (pack) and 50.3% (draft)]. This finding was much higher than the report by Herago et al[4] that was digestive or metabolic problems(3.9%), respiratory problems (13.1%) and eye problems (20.9%) and Sameeh et al[36] who found 21%, 7% and 4% for digestive system, respiratory and eye problem, respectively in Jordan. These differences might arise due to difference in topographical nature and misuse; low-level of donkey health care, keeping characteristics of the donkey, digestive problem may also be related to high parasite burdens and impaction. The behavioral part of the welfare assessment aims gives some insight into the animals' emotional state.

The majority of the respondents in this study had only one donkey and do not provide enough feed and water to their donkeys. This finding disagrees with the report of Herago et al[4] in Wolaita Sodo, Dinka et al[41] in southern Ethiopia (98.6%) who reported that the majority of the respondents provided feed and water separately at different frequencies in a day. The type and amount of feed fed requirement varies according to the workload of the donkey.[42] Anderson et al[16] suggested that animals which are being used year-round for transport, need more feeds than animals that are only worked for short periods seasonally.

CONCLUSION AND RECOMMENDATIONS

In conclusion, many of the working donkeys in the study area were faced with multiple welfare problems. Beat sore, tail base sore, back sore and donkey bite sore were among the major type of wound identified in working donkeys in the study area. Furthermore, poor husbandry, underfed and overloading are also prominent problems, that predisposed the animal for poor body condition and skin lesions that was directly associated with work type. In light of the current finding, it is recommended that comprehensive awareness creation on donkey welfare issues should be promoted through training, extension service by the government. Besides, the owners should be taught about improving management and harnessing in order to reduce the incidence of back sore and tail lesions on working donkeys.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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