RESEARCH ARTICLE

ASSESSMENT ON WORKING DONKEY WELFARE PROBLEM IN JIGJIGA CITY, SOMALI REGION, EASTERN ETHIOPIA

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ABSTRACT

A cross-sectional study was done with the objectives of assessment on working Donkey welfare problem in Jigjiga City, Somali Region. A total of 384 working donkey were observed. Both direct (animal based) and owner interview were used to collect data. According to the current investigation, 64% of donkeys were used for draught and 36% were used for pack type of work. All females were used for packing purpose, whereas 86.8% of male donkeys were used for draught purpose. Out of 134(77.9%) of donkeys had a poor body condition in >10years of age group, whereas most donkeys 57(75%) under the age group less than 5-years were having good conditions. A significant association ($p<0.01$) was found between the duration of working hours, and working type of donkey and poor body condition. Out of total 384 working donkeys examined in the study area about 59.9%, 34.9%, 45.6% and 44.8% were suffering with different type of wounds, other disease signs, musculo-skeletal problems and dermatological diseases respectively, whereas about 80.9% animals showed abnormal behavior such as depressed and other odd sign. Donkeys used for draught purpose experienced higher prevalence of wound than those used for other purpose. The current study also showed that 45% of donkeys used for work were in >10 years of age group. Most of the respondents (44.8%) of the study area had no knowledge and information on donkey welfare. Beating of working animal was widely practiced (45.1%). In conclusion working donkeys in the present study area were experiencing a compound health and welfare problems. 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**.**

INTRODUCTION

Animal welfare, according to the World Organization for Animal Health (OIE), refers to the ability of an animal to cope with its current living conditions. An animal is in a good state of welfare if it is comfortable, safe, healthy, and well nourished. Such an animal is free from distress, pain, and fear, and can express innate behavior. Consequently, good animal welfare requires humane handling of animals, provision of shelter, proper nutrition, and prevention of diseases (OIE, 2015). Animal welfare is an intricate issue which has implications on scientific, *et*hical, economic and political dimensions. According to the Farm Animal Welfare Council, animal welfare is about the state of physical and mental well-being of animals and is also referred to as an animal's "quality

of life" (FAWC, 2009). Worldwide, it estimate that there are approximately 43 million donkeys (FAOSTAT, 2015); most of them contribute directly and indirectly to peoples livelihood in they are used as draught animals and or in agriculture (Pritchard *et al.*, 2005; Leeb *et al.*, 2003). Ethiopia has the largest donkey's population in Africa (FAOSTAT, 2013) and for the resource-poor communities in the rural and urban areas, donkeys are of the greatest importance (A Gajie *et al.*, 20000). Donkeys are commonly used to transport different products such as crops, vegetables, water, fuel wood and livestock feed (Pearson, 2000) and for many families the donkey is very important source of income (Starkey, 1998). In someareas, the roadsare of low quality and motor vehiclesare 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, horsesandmules. Despite, the donkeys are invaluable contribution to the people in Ethiopia the donkey is the most neglected animal and has a very low status (Biffa and wondemeskel, 2006). This resulted in multiple welfare problem associated inaccessible water, feed and shelter at working site and suffering several lesions (Solomon *et al.*, 2010). Some method of hobbling to restrain donkeys cause discomfort and inflict wounds (Alujia *et al.*, 1991). 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 like Food, veterinary treatment and shelter and appropriate equipment may not be prioritized (Pritchard *et al.*, 2005). In Ethiopia the majority of donkeys are found in highland areas, so they are distributed I all agro-ecological zones of the country) CSA, 2010). Poor infrastructure and very rugged topography in many part of rural Ethiopia have made transportation by vehicle inaccessible. Hence, farmers use alternative means like draught animals especially donkeys to combat transportation problems (Mohammed *et al.*, 1991).

Moreover, increasing human population in Ethiopia has resulted in an increase in demand of donkeys for multipurpose activities such as transport crops, fuel wood and water, building material and people by carts or in their back from farms and markets to home (Biffa and wondemeskel, 2006). Draught animals along with human provide an estimated 80% of the power input on farm in developing nations (Pearson, 2005) but, animals often suffer from maltreatment, overloading and inappropriate feeding during working period (Swarup, 2007). The animal welfare is being compromised intentionally duet several such as poverty and lack of knowledge. Working donkeys are prone to painful, debilitating and often fatal tropical illnesses and conditions such as tetanus, parasitic infection and colic. In addition these animal work under difficult environmental conditions include intense heat, difficult topography, dehydration, malnutrition, lesion and hoof problem (Brooke, 2007). Animals are often engaged in work for a long hour and when get free, they left to browse and feed garbage. These have a potential to affect negatively their welfare and quality of life (Yilma *et al.*, 1991). Therefore, the object of this study are:

General object

Assessment on Working Donkey Welfare problem in Jigjiga City, Somali Region, Eastern Ethiopia

Specific objectives

- To asses welfare issues and associated risk factorof working donkey in Jigjiga city
- To asses attitude and knowledge of working donkey welfare in Jigjiga city
- To assess health and behavioral problem of working donkey in Jigjiga city

MATERIALS AND METHODS

Study Area: The study was conducted in Jigjiga city. Jigjiga is the capital city of Somali regional state. Jigjiga is located in eastern part of Ethiopia about 630 km east of Addis Ababa at 90 35' Latitude and 420 8' Longitude.

It has an average elevation of 1,609 meter above the sea level (masl). The climate is generally semi-arid and arid with 402 mm average annual rainfall. The annual daily minimum and maximum temperature range is 12.6-29.3 ^{0}C. Overall, Jigjiga zone has a typical pastoral and agro pastoral setting (NMSA, 2001).

Study Population: The study animals were working donkeys kept by differences peasant associations in Jigjiga city, fafan zone, Eastern Ethiopia. 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 and farm products.

Study Design: A cross-sectional was conducted from April to September to identify the welfare problem of working donkeys in terms of body condition and wound on the body in Jigjiga city. A total of 384 working donkeys were randomly selected from Jigjig city based on their accessibility, easy logistic and donkeys population. Moreover, the sampling method was carried out at field level, market, and grind mill houses, around water point areas.

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 Jigjiga city. 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 Thrus field formula was used to determine the sample size.

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

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

Data Collection: Direct welfare assessment: data collection format for direct assessment was developed and data were collected by direct physical examination of the donkeys. Prior to the assessment, consent was obtained from animals owners by asking information regarding general body condition such as wound type, dermatological diseases, musculo-skeletal disease and behavior change, age categories, body condition score, work type and condition for harnessing were properly recorded on data collection format

Data analysis and management: All data collected during the study period were entered into micro soft excel spread sheet and analyzed using SPSS version 20 statistical software. Descriptive statistics were used to summarized the data and chi-square was used the association of the wound problem with hypothesized risk factor. In all calculations, the confidence interval was set at 95% and statistical significant differences were considered at P – value < 0.05.

RESULTS

During the study period a total of 384 donkeys, which comprised 340(88.5%) male donkeys and 44(11.5%) female donkeys, were thoroughly observed for body condition status and the presence of lesions on different parts of the body.

Table 1. Sex, Age Group, working hours and Work Types Expressed as a Proportion within Body Condition of Working Donkeys

Variables	Frequency	Proportion of Body Condition Score				
		Poor	Medium	Good	Chi-square (X^2)	P-value
Sex	Male	150(44.1%)	99(29.1%)	91(26.8%)	2.98	0.244
	Female	20(45.5%)	17(38.6%)	7(15.9%)		
Age	<5-year	14(18.4%)	5(6.6%)	57(75.0%)	272.85	0.000
	5-10-year	22(16.2%)	93(68.4%)	21(15.4%)		
	>10-year	134(77.9%)	18(10.5%)	20(11.6%)		
Working hours	<5 hours	14(18.4%)	5(6.6%)	57(75.0%)	272.85	0.000
	5-8 hours	22(16.2%)	93(68.4%)	21(15.4%)		
	>8 hours	134(77.9%)	18(10.5%)	20(11.6%)		
housing system	Simple shade	120(41.2%)	93(32.0%)	78(26.8%)	6.04	0.196
	Proper donkey house	33(58.9%)	12(21.4%)	11(19.6%)		
	Sharing with family	17(45.9%)	11(29.7%)	9(24.3%)		
Work type	Pack	74(53.2%)	27(19.4%)	38(27.3%)	12.63	0.002
	Draught	96(39.2%)	89(36.3%)	60(24.5%)		

Table 2. The Proportion of Health Problems in Working Donkeys with their Work Type

Health Problems	Conditions	Frequency and Proportion (%)		Overall (%)
		Pack	Draught	
Wound	Lip sore	18(4.7%)	32(8.3%)	
	Head & neck sore	9(2.3%)	19(4.9%)	
	Back sore	12(3.1%)	35(9.1%)	59.9
	Chest/Girth sore	12(3.1%)	13(3.4%)	
	Bite wound	15(3.9%)	17(4.4%)	
	Tail base sore	21(5.5%)	27(7.0%)	
Dermatological problems	Sarcoid	32(8.3%)	61(15.9%)	44.8
	Ectoparasite	9(2.3%)	28(7.3%)	
	Firing lesion	15(3.9%)	27(7.0%)	
Musculoskeletal problems	Lameness	35(9.1%)	68(17.7%)	
	Fracture	8(2.1%)	26(6.8%)	45.6
	Hoof overgrowth	14(3.6%)	24(6.3%)	
Other disease syndromes	Digestive problem	39(10.2%)	63(16.4%)	
	Eye problem/ ocular discharge	2(0.5%)	9(2.3%)	34.9
	Respiratory problem	7(1.8%)	14(3.6%)	

Table 3. Distribution of respondent knowledge on donkey welfare

Respondent knowledge		Frequency	Proportion (%)
Animal welfare knowledge	Free from injury and disease	69	18.0
	Free from thirst and hungry	143	37.2
	No information	172	44.8
Presence of animal beating	Yes	242	63.0
	No	142	37.0
Care for sick donkey	Yes	251	65.4
	No	133	34.6
Type care given for sick donkey	Traditional medicine	116	30.2
	Veterinary clinic	209	54.4
	House medication	19	4.9
	Nothing	40	10.4
Presence of rest for animal	Yes	264	68.8
	No	120	31.3

Table 4. Observer approach test and the response during the welfare assessment

Measure		Frequency	Proportion (%)
General alertness	Alert	268	69.8
	Apathetic	116	30.2
Observer approach	No response	8	2.1
	Friendly	267	69.5
	Avoidance	89	23.2
	Aggressive	20	5.2
Behavior response when touched by the observer	Biting attempt	173	45.1
	Kicking attempt	142	37.0
	Avoidance	69	18.0

According to the current observation, most donkeys (44.8%) were above 10-years of age group and most donkeys (45%) of them works above 8 hours per day. Regarding work type, most donkeys were used (64%) were used for draught whereas the rest of the others were engaged in packing. Furthermore, most donkey owners were used poor body condition donkeys (39.2%) to draught and to pack (53.2) (Table 1).

Regarding to Health and welfare problems encountered in working donkeys in the study area an observational welfare assessment of 384 working donkeys revealed, 59.9%, 44.8%, 45.6%, and 34.9% of the donkeys were suffering from different type of wound, dermatological problems, musculoskeletal problems, and other disease syndromes, respectively.

Moreover, a higher proportion of sarcoid (15.9%), lameness (17.7%) and digestive problem (16.4%) were observed on draught donkeys whereas a higher proportion of sarcoid (8.3%), lameness (9.1), lip sore (4.7%) and digestive problem (10.2%) was observed on the pack donkeys (Table 2). According knowledge on donkey welfare a total of 384 respondents were participated, the majority of the respondents in this study, had no information about animal welfare (44.8%) were (18%) of them described free from injury and disease while the remaining respondents (37.2%) was described Free from thirst and hungry provided feed (51.0%) and water (5.6%) to their donkeys (Table 3).

Behavioral problems: The results of the general alertness test, observer approach test and behavior response when the donkey was touched by the observer is presented in Table 4. In total, 69.8% of the 384 donkeys showed alertness. According the observer approach 69.5% was showed friendly response. In this study behavior response when touched by the observer 45.1%, 37% and 18% of the donkey was responded that biting attempt, kicking attempt and avoidance respectively, when they were touched.

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., (2015), in Wolaita Sodo, Mekuria et al., (2013) Hawassa town and Fesseha et al., (2020) in Hadiya district 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 59.9% which was comparable with the prevalence reported by Herago et al., (2015), in Wolaita Sodo, Burn et al., (2008) in Jordan (59%) and 54% in Morocco (sells et al., 2010). However, this finding was higher than the prevalence of 40% in Central Ethiopia by Pearson et al., (2001), 42.2% in Adet town by Birhan et al., (2014) and Fesseha et al., (2020) in hadiya district 48.9%. On the other hand, the current result was markedly lower than the previous report 77.5% and 79.4% by Curran et al., (2005) and Biffa et al., (2006) respectively in Ethiopia. According to the sex a total of 384 donkeys, most of the donkey was male 340(88.5%) and 19.3% female donkeys. Besides, 45.5 % of female donkeys were having poor body scores than male ones (44.1%) since according to observation, most donkey owners preferred female donkeys for packing and trek long distances without providing proper access to feed and water. Besides, donkeys less than 5-years (18.4%) and age group of 5-10-years (16.2%) were having poor body condition as compared to the age group of 5-10-years 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., (2015), Mohammed, (1991) and Burden that pack donkeys were kept usually by tethering around the homestead and in turn it caused discomfort and even wounds. Regarding to housing system 75.8% owners were housed their donkey's simple shade while14.5% of owners used proper donkey house and 9.6% were housed their donkey by sharing with family.

Concerning the duration of working hours per day, those who worked for greater than eight hours showed a high proportion of poor body condition (77.9%) compared to those working for less than 5-hours (16.2%) and 5-8-hours (18.4%) 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., (2015), Burden 21, Fesseha H et al., (2020) and Getnet et al., (2014) that work overload and duration have an impact on body condition and health of working donkey. On the basis of work type, a high proportion of pack donkeys showed a poor body condition (53.2%) as compared to draught animals (39.2%). Therefore, the association between working type and body condition was very significant (p value<0.01). This finding was in agreement with the report of Fesseha et al., (2020) and Getnet et al., (2014) that the condition of donkey is working have an impact on health and body condition of working donkey. The present study revealed that sorcoid, lip sore, lameness and digestive problem were among the major type wounds and health problems 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 (Herago et al., (2015), Mekuria et al., (2013), Burn et al., (2008), Birhan et al., (2014).

These wounds are often caused by a combination of multifactorial 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 (Herago et al., (2015), Pearson et al., (2001), Birhan et al., (2014). The prevalence of dermatological diseases such as sarcoid, Firing lesion 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 (Herago et al., (2015) and Biswaset al., (2013)). The present overall finding of dermatological disease was 44.8%, which is higher than the findings of Kumar et al., (2014) in Mekelle city (23.7%) and Sameeh et al., (2014) in Jordan (22.7%) The reason may be the suggestion of Mekuria et al., (2013) that donkeys were the most neglected animals in Ethiopia, receiving less attention by owners and kept under poor management conditions. Whay et al., (2006) 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, and hoof overgrowth. Overall problem of 45.6% which is close to findings in Jordan (32.2%) and higher than finding in Mekelle city (18.2%), Heragoet al., (2015), and in Wolaita Sodo (21.8%), Sameeh et al., (2014). 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 (Hemsworthlt et al., (1993) and Upjohn et al., (2013). In the present study, it was observed that among other disease problems the most frequently encountered in the study areas were digestive disease, [16.4% (draft) and 10.2% (pack)], respiratory problem [3.6% (draft) and 1.8% (pack)] and from eye problems [2.3%

(draft) and 0.5% (pack)]. This finding was much lower than the report by Fesseha *et al.* digestive 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)]. 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 current study showed that 65.4% of respondent provide care for their sick animal out which 54.4% of respondents took donkey to nearby veterinary clinic, 4.9% provide house medication (treat with medication purchased from local market) and 30.2% gave traditional medications. This result was disagreed with the findings of Kumar *et al.*, (2014) in Mekelle city that 31.6% of diseased donkeys were taken to the nearby veterinary clinics, 10.5 % were treated traditionally and 57.9% did not get any help from their owner and forced to work regardless of their health problem. Other study also identified that low number of donkeys in Ethiopia presented annually to the clinic compared to other domestic animals (Mohammed, 1991). This difference might be influenced by owner economic status and knowledge on donkey welfare issues as the majority of working animal owners are poor, illiterate and most of them were not aware of animal welfare issues and engaged in earning extra money with the animal (Kumar *et al.*, 2014).

Conclusion and Recommendation

In conclusion present study revealed that welfare issues were the major problems encountered in working donkeys in Jigjiga town. Lip sore, Beat sore, tail base sore, back sore, chest sore and donkey bite sore were among the major type of wound identified in working donkeys in the study area. Others like musculo-skeletal, lameness, dermatological diseases, sarcoid, digestive problem, and eye problem were commonly encountered health problems in donkeys. Owner's poor awareness owners to provide good nutrition, veterinary care and animal beating practice were among indicators of poor donkey welfare. Therefore based on the current finding it can be recommended that comprehensive awareness creation on donkey welfare issues should be promoted through training, extension service by the government and different NGOs. Policies and legal frameworks that used to support animal welfare issues and inspect animal facilities should be promoted in order to ensure animal welfare issues

Based on above conclusion the flowing recommendations are forwarded

- The comprehensive awareness creation on donkey welfare issues should be promoted through training, extension service by the government
- The owners should be taught about improving management and harnessing in order to reduce the incidence of the back sore, lip sore, head sore, chest sore, bite wound and tail base sore on the working donkeys

Conflict of interest

Samatar Abshir Mahamed, Abdifatah Mahamed and Nesra Yusuf.

None of the authors has any other financial or personal relationships that could inappropriately influence or bias the content of the paper.

REFERENCES

Abu tarbush SM, Alqawasmeh DM, Shaheen ZH, Anani SF, Ledger MP. 2014. Equine diseases and welfare in Jordan: A retrospective study (1261 cases). *Jordan J Agri Sci., 10* (3): 493-503.

Agajie, T., Tamirat, D., Pearson.A. &Temesgen, T. 2000. Socio-economic circumstances of donkeys use and management in the rural and urban areas of central parts of Ethiopia. *Proceedings of the Workshop on Promoting the Peri-Urban Livelihood through Better Donkey Welfare. Debre-Zeit,* Ethiopia.*16*- 28.

Ahmed S, Muhammad G, Saleem M, Rashid I. Comparative aspects of prevalence and chemotherapy of ecto-parasite, endoparasite and blood parasites of draught equines in Faisalabad metropolis Pakistan. Paper presented at: 6th International conference of improving the welfare in working equines; 2010; Habitat Centre, New Delhi, India

Alujia, A.S. and F. Lopez, 1991.Donkeys in Mexico. In: Fielding, D. and Pearson, R.A. (eds.): Donkeys,Mules and Horses in Tropical Agricultural Development. CTVM: Edinburgh, pp: *1*-7.

Anderson M, Dennis R. 1994. Improving animal-based transport: options, approaches, issues and impact. Improving Animal Traction Technology. *18*-23.

Biffa D, Woldemeskel M. 2006. Causes and factors associated with occurrence of external injuries in working equines in Ethiopia. *Int J Appl Res Vet Med., 4*(1): 1-7.

Biffa, D. & Woldemeskel, M. 2006. Causes and Factors Associated with Occurrence of External Injuries in Working Equines in Ethiopia. *The International Journal of Applied Research in Veterinary Medicine*, *4*, 1-7.

Biffa, D. &Woldemeskel, M. 2006. Causes and Factors Associated with Occurrence of External Injuries in Working Equines in Ethiopia. *The International Journal of Applied Research in Veterinary Medicine*, *4*, 1-7.

Birhan G, Chanie M, Tesfaye T, Kassa A, Mekonnen B, Wagaw N. Incidence of wound and associated risk factors in working donkeys in YilmanaDensa District. Global Veterinaria. 2014; *13*(1): 133- 140.

Birhan G, Chanie M, Tesfaye T, Kassa A, Mekonnen B, Wagaw N. Incidence of wound and associated risk factors in working donkeys in YilmanaDensa District. Global Veterinaria. 2014; *13*(1): 133- 140.

Biswas P, Dutt T, Patel M, Kamal R, Bharti P, Sahu S. Assessment of pack animal welfare in and around Bareilly city of India. Vet World. 2013; *6*(6): 332-336. doi: 10.5455/vetworld.2013.332-336

Brooke, 2007. Bearing a HeavBurden. Http://www.fao.org/fileadmin/user_upload/animalwelfare/brookereport.pdf/.

Burden F. Practical feeding and condition scoring for donkeys and mules.Equine Veterinary Education. 2012; 24(11): 589-596. doi: 10.1111/j.2042-3292.2011.00314.x

Burn CC, Pritchard JC, Farajat M, Twaissi AA, Whay HR. Risk factors for strap-related lesions in working donkeys at the world heritage site of Petra in Jordan. *Vet J.* 2008; *178*(2): 263-271. doi: 10.1016/j.tvjl.2007.07.014

Burn, C.C., J. Pritchard, M. Farajat, A. Twaissi and R. Whay, 2007. Risk factors for strap related lesions in working donkeys at the World Heritage Site of Petra in Jordan. Vet. J., *17*8(2): 263-271.

Crane, M., 1997.Medical. In: Svendsen, E. (ed.): The professional hand book of the donkey. 3 ed. w140 by London: Whittet Books LTD, pp: *29*.

CSA, 2010.Central statistical agency agricultural sample survey. Rep. Livestock Char, *236*: 11-15.

Curran MM, Feseha G, Smith D. The impact of access to animal health services on donkey health and livelihoods in Ethiopia. Trop Anim Health Prod. 2005; *37*(1): 47-65. doi: 10.1007/s11250- 005-9008-z

Dennison, T., A. Hassan and M. Shabir, 2006.Welfare assessment in Enseno, Butajira, Ethiopia.Equine Vet. J. Supp., 23: 12-19

Dennison, T., A. Hassan and M. Shabir, 2006.Welfare assessment in Enseno, Butajira, Ethiopia.Equine Vet. J. Supp., *23*: 12-19.

Dinka H, Shelima B, Abalti A, Geleta T, Mume T, Chala R. Socio-economic importance and management of carthorses in the mid Rift Valley of Ethiopia. Paper presented at: 5th International Colloquium on Working Equines; 2007; Addis Ababa, Ethiopia.

Faostat. Available online: http//www.faostat.fao.org (accessed on 20 November 2015).

Farm Animal Welfare Council (2009): Five Freedoms

Getnet F, Feyera T, Alemu F, Niguse A, Abera T. Injuries in donkeys and mules: Causes, welfare problems and management practices in Amhara Region, Northern Ethiopia. American-Eurasian Journal of Scientific Research. 2014; *9*(4): 98-104.

Hemsworthlt P, Barnett J, Coleman G. The human-animal relationship in agriculture and its consequences for the animal.*AnimalWelfare*. 1993; 2(1): 33-51.

Henneke D, Potter G, Kreider J, Yeates B. Relationship between condition score, physical measurements and body fat percentage in mares. Equine Vet J. 1983; *15*(4): 371-372. doi: 10.1111/j.2042- 3306.1983.tb01826.x

Henneke, D., G. Potter, J. Kreider and B. Yeates, 1983.Relationship between body condition score, physicalmeasurement and body fat percentage in mares.Equine Vet. J., *15*: 371-372.

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, *Southern Ethiopia. Global Veterinaria*. 2015; *14*(6): 867-875. doi:

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, *Southern Ethiopia. Global Veterinarian*. 2015; *14*(6): 867-875. doi: 10.5829/ idosi.gv.2015.14.06.95169

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, Southern Ethiopia. Global Veterinaria. 2015; *14*(6): 867-875. doi: 10.5829/ idosi.gv.2015.14.06.95169

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, Southern Ethiopia. Global Veterinaria. 2015; *14*(6): 867-875. doi: 10.5829/ idosi.gv.2015.14.06.95169

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, Southern Ethiopia. Global Veterinaria. 2015; *14*(6): 867-875. doi: 10.5829/ idosi.gv.2015.14.06.95169

Herago T, Megersa M, Niguse A, Fayera T. Assessment on working donkey welfare issue in WolaitaSoddoZuria District, Southern Ethiopia. Global Veterinaria. 2015; *14*(6): 867-875. doi: 10.5829/ idosi.gv.2015.14.06.95169

Mekuria S, Mulachew M, Abebe R. Management practices and welfare problems encountered on working equids in Hawassa town, Southern Ethiopia. *J Vet Med Anim Health*. 2013; *5*(9): 243- 250. doi: 10.5897/JVMAH10.017.5829/ idosi.gv.2015.14.06.95169

Mekuria S, Mulachew M, Abebe R. Management practices and welfare problems encountered on working equids in Hawassa town, Southern Ethiopia. J Vet Med Anim Health. 2013; *5*(9): 243- 250. doi: 10.5897/JVMAH10.017

Mengistu, A. (2003). *The genetic resources perspective of equines in Ethiopia and their contribution to the rural livelihoods.*Proceedings of the 11th Annual Conference of the Ethiopian Society of Animal Production (ESAP). Addis Ababa, Ethiopia.

Mohammed, A., 1991. Management and breeding aspects of donkeys around Awassa, Ethiopia. In:Fielding, D. and Pearson, R.A. (eds.): Donkeys, Mules and Horses in Tropical AgriculturalDevelopment. CTVM: Edinburgh UK, pp: *185*-188.

NMSA (National Meteorological Services Agency) (2001).*Climatic and agro climatic resources of Ethiopia meteorological researchrReport series1*: 1. Addis Ababa, Ethiopia

OIE World Organization for Animal Health.(2015)

Pearson RA, Alemayehu M, Tesfaye A, Allan EF, Smith DG, Asfaw M. Use and Management of Donkeys in Peri-urban Areas of Ethiopia. Phase One of the CTVM/EARO Collaborative Project (Ethiopia). 2001

Pearson, A.R., Alemayehu, M., Tesfaye, A., Allan, E.F., Smith, D.G., Asfaw, M. (2000).*USE AND MANAGEMENT OF DONKEYS IN PERI-URBAN AREAS OF ETHIOPIA*. Report of PhaseOne of the CTVM/EARO Collaborative Project April 1999-June 2000.

Pearson, R.A., 2005. Contributions to society: Draught and Transport. Encyc. Anim. Sci.,pp: *248*-250.

Pritchard, J. C., Lindberg, A. C., Main, D. C. J. &Whay, H. R. (2005). Assessment of the welfare of working horses, mules and donkeys, using health and behavior parameters. *Preventive Veterinary Medicine*, *69*, 265–283.

Sameeh, M., M. Dirar, H. Zain and F. Sarah, 2014. Equine diseases and welfare in Jordan: Aretrospective study (1261 cases). Jordan J. Agri. Sci.,*10*(3): 21-24.

Sells P, Pinchbeck G, Mezzane H, Ibourki J, Crane M. Pack wounds of donkeys and mules in the Northern High Atlas and lowlands of Morocco. *Equine Vet J.* 2010; 42(3): 219-226. doi: 10.2746/042516409X478532

Solomon, M. and A. Rahmeto, 2010.Observation on major welfare problems of equine in Meskan district,Southern Ethiopia. Livestock Res. R. Develop.*22*(3): 14-18.

Starkey, P. (1998). *Improving donkey utilization and management.DebreZeit, Ethiopia*. ATNESA Publication. Report of the international ATNESA workshop held 5-9 May 1997, DebreZeit, Ethiopia.

Swarup, D., 2007. Current status of animal welfare in India: Issues and options. Short course on animal behavior and

welfare under CAS in Veterinary Physiology: IVRI, pp: *23*-27.

Tesfaye, A. and M.M. Curran, 2005.A Longitudinal survey of market donkeys in Ethiopia. Trop. Anim. Health. Prod., *37*: 87-100.

Upjohn M, Attwood G, Lerotholi T, Pfeiffer D, Verheyen K. Quantitative versus qualitative approaches: A comparison of two research methods applied to identification of key health issues for working horses in Lesotho. *Prev Vet Med*. 2013; 108(4): 313-320. doi: 10. Hemsworthlt P, Barnett J, Coleman G. The human-animal relationship in agriculture and its consequences for the animal.*Animal Welfare*. 1993; *2(*1):33-511016/j.prevetmed.2012.11.008

Whay H, Farajat M, Twaissi A, Pritchard J. A strategic approach to improving the health and welfare of working donkeys in Petra, Jordan. Paper presented at: 9th Congress of the world equine veterinary association; 2006; Massakech, Morocco.

Yilma J, Feseha G, Svendsen E, Mohammed A. Health problems of working donkeys in Debre-Zeit and Menagesha regions of Ethiopia. Paper presented at: Donkeys, mules & horses in tropical agricultural development; 1991; Edinburgh, Scotland.

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