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The Prevalence of Work Related Wound and Associated Risk Factors in Working Equines

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ABSTRACT

Across-sectional study was conducted in Hawasssa town, the capital city of Southern Nations and Nationalities People Regional state; to estimate the prevalence of work related wound and associated risk factors in working equines. The study animals were selected randomly. A total of 309 equines were included in the study comprising 164 (53.1%) of donkey, 95(30.74%) of horses, and 50(16.18%) of mules. The risk factors sex, age, body condition scores, purpose of the animals were assessed through questionnaire survey and physical clinical examination of animals. The study shows that an overall prevalence of external injuries in working equines was 84.1%. The prevalence of external injuries by the species was 25.89%, 45.95% and 12.3% for horse, donkey and mule respectively. Statistically significant difference ($p<0.05$) in the occurrence of external injuries was noted among working equines of different sex groups, different functions, and different causes. Higher prevalence of external injuries was recorded in male animals (79.93%) than female (4.6%). Moreover, the occurrence of external injuries was higher in equines used for cart pool (40.77%) than those used for fetching of water (14.28%). In addition to this the distribution rate of external injuries between animals of different body condition showed that the highest rate was recorded in animals with medium body condition (31.39%) followed by those with good condition (27.18%).The major causes of external injury was inappropriate use of harness materials (33.7%) followed by over load and falling (12.3%). The prevalence of distribution of wounds on various body parts, was (23.46%) on the back which was relatively highest than shoulder, multiple body parts and wither which represent 11.5%, 10.77% and 8.1% respectively. The occurrence of external injuries in horses were 18.75% multiple wounds, 17.5% on the back and 15% on the shoulder while 23.24% on the back, 9.86 on wither and 8.45% multiple wounds, were found in donkeys. The occurrence of 36.86% of external injuries in the back of mule was observed in the study which was higher than other parts of the body. The study showed that working equine owners practice different approaches (70.4%) to manage wounds while 29.6% owners left their animals without any follow up. Hence, greater proportion of the owners (40%) have taken their animals to nearby health centers, while treated with medicine purchased from local markets 11.5% and 9.6% with medical plants. Relatively horse owners seek veterinarian services (43.5%).

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Introduction

Equidae is the mammalian family comprising the single genus Equus consisting of domestic and feral horse, donkey, mule and zebra [1]. Mule is a hybrid, the offspring of different species the dam being mare and the sire a jack or stallion donkey. The mule combines the donkey's longevity toughness and level headedness with the horses size and superior in intelligence, almost equal to the horse, which is an advantage in certain circumstances such as work in back, cart-drawing and ploughing [1].

The number of equines in Africa is in the range of 17.6 million comprising 11.6 million donkeys, 2.3 million mules and 3.7 million horses [2]. Ethiopia possesses approximately half of Africa's equine population with 37, 58 and 46% from total of donkeys, horses and mules, respectively [3]. The country ranks 8th in the world and there are about 7.88 million donkeys being the second largest donkey population in the world next to China, 0.41 million mules and 2.08 million horses [4].

Equines play an important role in the transportation of food products, fodder, fuel wood, agricultural inputs, and construction and waste materials. Equine provides cheap and viable transport system in both rural and urban area. It provides the best alternative in a place where the road network is insufficiently developed, or the terrain is rugged and mountainous and in cities where narrow streets prevents easy delivery of merchandise [5].

Equines are important animals to the resource of poor communities in Ethiopia, providing traction power and transport services. It also provides urban dwellers with opportunity of income generation [6]. In Ethiopia, the use of equines for transportation will continue for years to come because of rugged terrain characteristics inaccessible for modern road transportation facilities as well as the absence of well-developed modern transport networks and prevailing low economic status of the community [7]. Despite their invaluable contributions, donkeys in Ethiopia are given low status and are consequently the most neglected animals. This resulted in multiple welfare problems associated inaccessible water, feed

and shelter at the working sites and suffering several lesions [8]. Some methods of hobbling to restrain donkeys cause discomfort and inflict wounds without proper padding and overloading for long distances causes external injury to donkeys [9]. The most common cause of wounds in working equine are over loading, improper position of load predisposing to falling, beating of mules, hyena bites, mule bites and injuries inflicted by horned bovine [10]. Some hobbling methods, inappropriate harnesses or yokes that may be heavy and ragged, long working hours may cause discomfort and inflict wounds [11]. This misuse mistreatment and lack of veterinary care for donkey have contributed enormously to early death, majority of which currently have working life expectancy of 4 to 6 years. However, in countries where animal welfare is in practice the life expectancy of donkeys reaches up to 30 years [12].

Due to the minimum management attention given to equines particularly in countries like Ethiopia, they are prone to a number of diseases. The worst problem in Ethiopia are malnutrition, early death due to parasitic infestation and acute back sores due to total lack of any types of saddle or protection for the donkeys back from the load it is forced to carry [13].

Even though, there are large number of working equine in Hawassa town information on the magnitude, distribution and predisposing factors to equines injuries is lacking in this area. Therefore, objective of the study is designed to assess the prevalence, causes and risk factors for external injuries of working equines in Hawassa town of Sidama zone.

Materials and Method

Study Area

The study was conducted in Hawassa town, the capital city of South Nations and Nationalities People Regional state, is located in rift valley, 275 Kilometers South of Addis Ababa at elevation of 1708 meters above sea level. The area has an average annual rain fall and temperature of 997.6 millimeter and 25 degree Centigrade [14].

Study Population

The target population was all working equines at Hawassa town and the study population was randomly selected working equines. All were indigenous breed.

Study Design

A cross sectional study was conducted on working equines in Hawassa town from November 2020 to june 2021. Questionnaire survey and physical clinical examination were simultaneously administered. According to injuries were classified as sever when there was ulceration involving a pronounced contusion in wider areas, tissue hypertrophy and sever complication [15]. Moderate injuries involved coalition of small wounds with tissue sloughing no complication and hypertrophy and some with chronic courses. Injuries were categorized as mild when they involve only loss of epidermis and superficial layers with no further trauma. Age of the animal was estimated based on the observation of the animal's front teeth (Incisors). Accordingly, the study animals were categorized into four age groups as less than 5 years, 6 to10 years, 11 to 15 years and above 16 years [16]. The scoring of body condition of the selected animals was recorded based on the criteria described by [17]. Body condition assessment was done by looking the animal from both sides and the hind quarter without touching the animals and scored as 1, 2, 3, 4 and 5 for very thin (Poor), thin (Moderate), fair, fat and obese, respectively.

Sampling and Sample Size

A simple random sampling technique was employed to select the study animals from working equines in Hawassa town. The sample size calculation by using the formula by [18]. Fixing the confidence level at 95% and expected prevalence of 72.1% according to the work of [15].

$N= (1.96)^2 pexp (1-pexp)/ d^2$.

Where, n= required sample size.

Pexp = expected prevalence.

D= required precision (usually 0.05).

Accordingly, the sample size was 309.

Questionnaire Survey

A Questionnaire was developed to collect all information that were required including sex, age, species, function and cause of injuries, extent of injury, injury management. Animals were examined physically and clinically and injures were characterized and causes were identified.

Data Analysis and Presentation

Data generated from questioner survey and direct physical examination were properly coded and entered into Microsoft Excel-2007 spread sheet. The data was filtered for any invalid entry and then transferred to Stata 9 for Statistical analysis. Descriptive statistics was made and differences in the prevalence of wound within each risk factor were tested for significance through Pearson's Chi-square and analysis at a probability level of 0.05. Where test result considered being significant when p-value is less than 0.05 and chi-square value greater than 3.84.

Results

The descriptive statistics for age, sex body condition scores, distributions of wound throughout the body of working equines, cause, extent and its management of sampled working equines and demographic data for working equine owners were summarized in table with appropriate short notes bellow. A total of 309 equines were included in the study out of comprising 164 (53.1%) of donkey, 95 (30.74%) of horses, and 50 (16.18%) of mules. Among these 260 animals were found injured and the overall prevalence of external injuries was 84.1%. With regard to wound distribution on the body of examined working equines, greater proportion (23.46%) was observed in the back sore followed by shoulder; the major cause of the wounds was inappropriate harness materials

Table 1: Prevalence of external injuries in working equines with respect to species, sex and age

Risk factors		Examined no.	Injured no.	Prevalence, %	x^2 (p-value)
Species	Donkey	164	142	45.95	3.2183 (0.2)
	Horse	95	80	25.89	
	Mule	50	38	12.3	
Sex	Male	288	247	79.93	8.3505(0.004)
	Female	21	13	4.20	
Age	<5years	27	20	6.42	3.3621 (0.339)
	6-10years	114	94	30.42	
	11-16years	105	92	29.77	
	>16 Years	63	54	17.48	

Intensity of injuries was reported associated with species (Table 1). The proportion of severely injured horses was (45.95) χ^2 =3.2183, P< 0.2) than donkeys (25.89%) and 12.3% was for mule. The degrees of external injuries were higher in equines used for those with cart pool (40.77%) than those used for public transport (23.3%). The higher prevalence of external injuries was recorded in male animals (79.93%) and for female (4.2%). This difference between both sexes showed statistically significant difference (p <0.004). As summarized in above Table1, wound prevalence was higher with at the category of ages 6-10years was 30.42% and 29.27% for 11-15years as well as the least prevalence was 6.42% at < 5 years.(x^2=3.3621, p- value 0.339). There was a significant difference in the prevalence of wound among sex groups.

Table 2: Prevalence of external wound by body condition score and functions of the animal

Risk factors		Examined no.	Injured no.	Prevalence	x^2 (p-value)
Body condition	Poor	31	25	8.09	4.5505 (0.337)
	moderate	115	97	31.39	
	Good	104	84	27.18	
	Fat	39	37	11.97	
	Obese	20	17	5.5	
Housing	Indoor				
	Outdoor	212	180	58.25	
Function	Cart pool	97	80	25.9	0.2949 (0.587)
	Load of sac	150	126	40.77	
	Fetching of water	18	18	5.83	12.9293 (0.005)
	Public transport	46	44	14.24	
		95	72	23.3	

This difference in the prevalence between animals used for different functions was statistically significant (p<0.005). Likewise, the distribution rate of working equine external injuries between animals of different body condition showed that and the highest rate was recorded in animals with moderate body condition (31.39%) followed by those with good (27.18%), fat (11.97%) and obese (8.09%) body conditions.

Table 3: Summary of demographic data

Variable		No. of animals examined	No. of injured	prevalence
Educational- status	Illiterate	59	46	17.7
	Elementary	163	139	53.5
	Junior and above	87	75	28.8
Ownership	Owner	212	179	68.8
	Renter	58	49	18.8
	Daily labor	39	32	12.3
	Total	309	260	

The demographic data result on ownership status and external injuries showed that highest prevalence (68.8%) of external injury was recorded in animals living with their owner than others which was 18.8% in rented equine and 12.3% in daily laborer living equines.

This result may be from the proportion of the number of animals to each owner. Those people who were attained their elementary education play great role to be injured their working equines, in the contrary illiterates were give more cares than junior and above owners education status

Table 4: Causes of External Injuries in working animals

Cause	Horses	(%)	Donkey	(%)	mule	(%)	Total	(%)
Harness material	24	30	60	42.2	15	39.5	104	33.7
Over load	8	10	22	15.5	8	21.0	38	12.3
Nail piercing	16	20	13	9.2	7	18.4	36	11.7
Burning of fire	3	3.80	7	5	2	5.3	12	3.9
Biting of other animals	7	8.8	21	14.8	4	10.5	32	10.4
Falling	17	21.3	19	13.4	2	5.	38	12.3

X^2=309, $p < 0.05$

Injuries caused by improper harness material design were significantly contributed more than others were 33.7% as well as over load and falling accounted for 12.3% each. The least prevalence was observed in burning of fire. In case of donkeys (42.2%), horses (30%) and mule (39.5%) other than the other causes of injuries inappropriate harness material takes the first rank. Overloading in donkeys (15.5%), falling in horses (21.3%) and nail piercing for mule (18.4%) were the next leading causes of injuries. All of the causes play significant roles for the occurrences of wounds in the working equine world.

Table 5: Intensity of External Injuries by Species

Intensity of Injuries	Horse	%	Donkey	%	Mule	%	Total	%	X^2	P-value
Mild	25	31.3	59	41.5	8	20.1	92	35.4	294.23	0.0
Moderate	36	45	60	42.3	20	52.6	116	44.6		
Sever	19	23.6	23	16.2	10	26.3	52	20		

The highest prevalence of the severity of external injuries was recorded on moderately affected animals (44.6%), mildly (35.4) followed by severely affected. Intensity of injuries was reported highly associated with species. There was a significantly higher proportion of moderately injured mule (52.6%) than donkeys (45%) and horse (42.3%).

Table 6: Distribution of External Injuries on Various Body Parts

Site of injury	Horse no. (%)	Donkey no.(%)	Mule no.(%)	Total no (%)
Wither	5(6.25)	14(9.86)	2(5.26)	21(8.1)
Flank	6(7.5)	8(5.63)	1(2.63)	15(5.77)
Head region	4(5)	5(3.52)	3(7.89)	12(4.61)
On the back	14(17.5)	33(23.24)	14(36.84)	61(23.46)
Hind legs	1(1.25)	10(7)	1(2.63)	12(4.62)
Fore legs	3(3.75)	8(5.63)	2(5.26	13(5)
Abdomen	7(8.75)	7(4.93)	1(2.63)	15(5.77)
Thigh	3(3.75)	9(6.32)	1(2.63)	13(5)
Shoulder	12(15)	14(9,86)	3(7.89)	29(11.5)
On the back &hind legs	2(2.5)	3(2.1)	1(2.63)	6(2.3)
Flank & on the back	1(1.25)	7(4.93)	____	8(3)
Fore legs &on the back	____	1(0.7)	1(2.63)	2(0.78)
Shoulder & on the back	3(3.25)	8(5.63)	7(18.42)	18(6.92)
Abdomen & on the back	3(3.25)	3(2.1)	____	7(2.69)
Multiple	15(18.75)	1(2.63)	12(8.45)	28(10.77)

Based on table 6 the occurrences of injuries on various body parts showed significant variation (x^2=309, $p<0.00$). When the injured animals were considered, the proportion of injured on the back was higher (23.46%) than those with other injured body parts. Shoulders, multiple bodies parts and wither were 11.5%, 10.77%, 8.1% respectively. The least distribution was occurred on the head region. By species, injuries in horses were more frequently observed on multiple or more than three wounds (18.75%), on the back (17.5%) and 15% of shoulder compared with other body parts. Whereas, back (23.24%) followed by wither (9.86%) and multiple (8.45) injuries were common in donkeys. As the study indicates 36.86% of the back of mule was injured which was higher than other body parts.

Table 7: The management of wounds

Treatments	Horse, no. (%)		Donkey, no. (%)		Mule, no. (%)		Total, no. (%)	
Take to health enter Treated with medicine-	35	43.5	54	38	15	39.5	104	40
Purchased from local market	7	8.8	17	11.97	6	15.8	30	11.5
Treated with medical plants	10	12.5	13	9.2	2	5.3	25	9.6
Takes to local healer	7	8.8	13	9.2	4	10.6	24	9.2
Do nothing	21	26.3	45	31.7	11	28.9	77	29.6

The study revealed that working equine owners practice different approaches (70.4%) to manage wounds while 29.6% owners left their animals without any follow up. Hence, greater proportion of the owners (40%) have taken their animals to nearby health centers, while Treated with medicine purchased from local markets 11.5% and 9.6% with medical plants. Relatively horse owners seek veterinarian services (43.5%).

Discussion

This study indicated that the total prevalence of external injuries in working equines was 84.1% showing their inhumane suffering due to inappropriate management and neglect. Compared with the 44% prevalence reported from central Ethiopia [19]. This figure is relatively higher than other study done in Hawassa by [15]. Which revealed an overall prevalence of 72.1%. This difference might be due to variation in management and health care given to equines. In addition to this situations the weather condition changes (dry and sunny season) during this study conducted may contributed for the exacerbation of wound. The majority of town dwellers that was gained their income from giving different services with the help of working equine, change their life styles to modernize, instead of working equines they are using vehicles like baggage leads to lack of attention for their working equines and left them to the road side when the animals become sick and give up work.

The same report was made by [20]. This study shows that donkeys (45.95%) were highly affected by external injuries compared to horses (25.89%). Even though the reality those donkeys are tolerant to hardship and diversified working conditions: that might be attributed to the low attitude of the society towards donkeys and their low price compared to others that they are ignored animals with poor health care services and management. Consequently, they are supposed to work and transport loads inhumanely.

The higher prevalence of external injuries was recorded in male equines (79.93%) than for female (4.2%). This difference between both sexes showed statistically significant. (X^2=8.3505, p- value=0.004) the same report was made by [20]. This might be due to the unavailability of female horses in market in the study area and the owners interest i.e. the a owner's thought that if female equines are worked together with males the working power of the male equines will decrease and create a fight during reproduction among themselves. Thus, males are most frequently used for work than female and are hence highly exposed to injury in the present study area.

The present finding has also showed higher prevalence of wound in adult animals which is contradict with the findings of is may due to the fact that the majority of working animals are adult that raising the chance of acquiring injury is high and which stressed by works leads to exposed to different types of diseases and trauma in their entire life which may affect the normal process of wound healing [15,21]. It could also be attributed by lack of regular care.

The distribution rate of external injuries among working equines of different body condition was studied and the highest rate was recorded in animals with medium body condition (31.39%) similar with [8]. Who rare reported higher incidence of injury in animals with medium body condition (70.2%) followed by those with poor body condition score (26.2%) which is contradict with the current study that was good body conditions (27.18%) are next to moderate: while, the lowest rate was recorded in animals with obese body condition (5.5%). This relatively higher rate of external injury in animals with medium and good body condition could be due to the large number of male animals included in the present study. Moreover, animals with medium and good body conditions represent those animals which are most frequently used for work and hence raising the chance of acquiring injury

The occurrence of external injuries was higher in equines used for transport of load (60.84%) than those used for transport of people (23.3%). The higher occurrence rate of external injuries in the present study in animals used for load transport than those used for transport of people could be due to improper harnessing of animals for load transport while those used for people transport are used with safe and comfortable padding materials and hence reducing the occurrence of external injury moreover people do not like to be transported by wounded animals, keep in mind this owners give great care for their animals to continue in the market.

This result also prove that improper harnessing materials and over loading were participants of as major causes of external injuries in the town as the harnessing materials were made from wood and metal materials by local harnessing material makers who didn't consider the prepared materials with the body condition of the animal, movement and balance of the weight. As a result, the materials are unable to distribute the weight equally in either side of the animal leading to injury. Moreover, those traditionally made harnessing materials were kept on the body of the animal and strongly tied by rope. During this time some of the owners didn't put any protective materials while few of them use protective materials on the animals' body which are not that much effective in keeping the comfort of the animals and in protecting injury. This finding is consistent with results reported by [22,23]. In Northern Ethiopia that improper harnessing and saddle were major causes of injuries. The highest prevalence of the severity of external injuries was moderately (44.6%) affected then mildly (35.6) followed by severely affected. Intensity of injuries was reported to be highly associated with species. There was a significantly higher proportion of moderately injured mule (52.6%) than donkeys (45.3%) and horse (42.3%) this higher prevalence may be until the animals become severely affected owners are still working with them.

When the injured animals were considered, the proportion with wounds on the back (23.46%) was relatively higher than those with other injured body parts. The shoulder, multiple body parts and

wither are 11.5%, 10.77%, 8.1% respectively. By species, injuries in horses were more frequently observed on multiple or throughout its body parts (18.75%) indicates infection related injuries were also shown as causes of external injury indicating involvement of bacterial and mycotic pathogens. Such type of infections were identified and characterized by abscess, ulceration and their typical clinical signs observed in the equines. Similar to this observation, a Gobena, (2001) reported that mycotic dermatitis and ulcerative and epizootic lymphangitis were the major infectious skin disease of equines in Ethiopia [24]. Whereas, on the back (23.24%) followed by wither (9.86%) and multiple (8.45) injuries were common in donkeys as a result of improper harness materials. As the study indicates 36.86% of the back of mule is injured which is higher than other parts.

The highest prevalence (68.8%) of injury was found from the owners of the animals; while daily labors are contribute the least. This result may be from the proportion of the number of animals to ownership and those daily laborers give more care. Those people who were attained their elementary education injured their working equines, in the contrary illiterates were give more cares because of that they do not have better option to generate income those completed their high school and above education levels have good management as a result of awareness of animal welfare.

In line with agreement with the report of working equine owners practice different approaches to manage wounds [25]. Hence, 40% the owners have taken their animals to nearby health centers while 29.6% owners left their animals without any follow up. Others treated with medicine purchased from local markets 11.5% and 9.6% with medical plants. Relatively horse owners seek veterinarian services (43.5%). This indicates that the majority of owners are left their animals without any follow up (treatment) or they try to treat by means of traditionally because of they are lack of awareness creation education about animal welfare and veterinarian services.

Conclusion and Recommendation

In conclusion, this study showed higher prevalence of external injuries among the working equines population in Hawassa town, and lack of proper management was the major contributing factor [26-28].

To alleviate the problems a comprehensive equine health and welfare promotion program through a legal institution and intervention plans targeting the developmentof knowledge and attitude of animal owners should be in place to improve use and management of working equines and Stakeholders should be involved in improving the welfare of working equines and use of improved harness materials are recommended.

References

1. Bradley M (1981) Horses: practical and scientifical approach Mc Gram Hill Book Company 1-13.
2. Cole HH, M Running (1974) Animal agricultural husbandry and use of domestic animals; 2nd ed. Sanfransisco, USA 45-49.
3. Mulate B (2005) Preliminary study on helmenthosis of equines in south and north Wollo zones. J. Vet. Assoc 9: 25-37.
4. FAO (2003) Food and agriculture organization, Rome, Italy. Available at: http://faostat.fao.org/default.aspx.
5. CSA (2016) Federal democratic republic of Ethiopia.Central statistical agency. Agricultural sample survey, Volume II, Report on livestock and livestock characteristics.Statistical bulletin 583.
6. Feseha G (1997) Disease and health problems of donkeys abroad.The professional handbook of the donkey (compiled by E.D. Svendesen) 3rd edn, Whither Books 207-226.
7. Wilson RT (1991) Equines in Ethiopia. In: Fielding D, Pearson RA, eds. Donkeys, Mules andHorses in Tropical Agricultural Development. Proceedings of Colloquium Held 3-6 September (1990) Centre Trop. Vet. Med. Univ., Edinburgh, Scotland 33-47.
8. Mengistu A (2003) The genetic resources perspective of equines in Ethiopia and the contribution to the rural livelily hoods. Proceeding of the 11th annual conf. Ethiop.soc.anim. prods. (ESAP).AddisAbaba, Ethiopia 81-85.
9. Solomon M, A Rahmeto (2010) Observation on major welfare problems of equine in Meskan district, SouthernEthiopia. Livestock Res. R. Develop 22: 14-18.
10. Alujia AS, F Lopez (1991) Donkeys in Mexico. In: Fielding, D. and Pearson, R.A. (eds.): Donkeys, Mules and Horses in Tropical Agricultural Development. CTVM: Edinburgh 1-7.
11. DACA (Drug Administration and Control Authority (2006) Standard Treatment Guideline for Veterinary Practice of Ethiopia 209-211.
12. Mekuria S, M Matusala, A Rahameto (2013) Management practices and welfare problems encountered on working squids in Hawassa town, Southern Ethiopia. Journal of Veterinary Medicine and Animal Health 5: 243-250.
13. Fred O, Pascal K (2006) Extension approaches to improving the welfare of working equines. Kenya Network for Dissemination of Agricultural Technologies (KENDAT): Kenya, Nairobi 1-28.
14. Svendsen E (1997) Donkeys abroad. In: the professional handbook of the donkey (compiledbySvendsen ED) b 3rd Edition, Whittet Books 166-182.
15. CSA (2008) Report on size, Characteristics and Purpose of Livestock and Use of Livestock Products, SNNPR, Central Statistical Agency of Ethiopia 279.
16. DemelashB, MogesWoldemeskel (2006) Cause and factor associated with occurrence of external injury working equine in Ethiopia, Intern J Appl res Vet Med 4: 3.
17. MorkaAmante, AdisalemHunde, BojiaEndebu, EyobHirpa, BedassoMamo, et al. (2014) Health and Welfare Assessment of Working Equine in and Around Nekemte Town, East Wollega Zone, Ethiopia;College of Health Sciences, School of Veterinary Medicine, Wollega University; American-Eurasian Journal of Scientific Research 9: 166.
18. Pritchard JC, AC Lindberg DCJ Main, HR Whay (2005) Assessment of the welfare of working horses, mules and donkeys, using health and behavior parameters. Preventive veterinary medicine 69: 265-283.
19. Thrustfield M (2005) Veterinary Epidemiology, 3rd edition, University of Edinburg,Blackwell Science Ltd 233.
20. Pearson RA, Mengistu A, Agajie T, Eleanor FA, David GS, et al. (2000) Use and management of donkeys in peri-urban areas of Ethiopia. Centre for Tropical Veterinary Medicine: University of Edinburgh, Scotland Draught Animal Power Technical Report 5.
21. Satessa G D, Lemma F A (2014) Prevalence of External Injuries in Working Equines in Mehal Saint Woreda of South Wollo Zone, Ethiopia; Journal of Veterinary Advances J Vet Adv 4: 654-660.
22. Fikru A, Tadese A, Gebreegziabher Z (2015) Prevalence of Equine Wound and Associated Risk Factors in and around Kombolcha Town, North Ethiopia: Veterinary Science &Technology:Volume 6: 1-4.

23. Helen B (2001) The Gharry horses of Gonder. Draught Animal News. Centre for Tropical Veterinary Medicine: University of Edinburgh, Scotland 35: 23-24.
24. Sisay WZ (2013) Causes and Factors Associated with the Episode of External Injuries in Cart-Horses of Mekelle Town, North Ethiopia. J Vet Adv 3: 265-274.
25. Gobena A (2001) Epizootic lymphangitis: study on its epidemiology and socioeconomic importance in cart horses in selected sites of Ethiopia. In: proceeding of the 15th annual conf. Ethiop. vet. assoc., Addis Ababa, Ethiopia.
26. Addisalem S, Girma, Birhan, Tewodros T (2015) Prevalence of Work Related Wound and Associated Risk Factors in Cart Mules of Adet Town, North-Western Ethiopia: American-Eurasian Journal of Scientific Research 10: 264-271.
27. Mekuria S, Abebe R (2006) Observation on major welfare problems of equine in Meskan district, Southern Ethiopia. Hawassa University DVM Thesis.
28. Fielding D, Pearson RA (1991) the number and distribution of equines in the world.Donkeys, mules and horses in tropical agriculture development. Proc. Calloq. On donkeys, mules and horses Eds: university of Edinburgh, centre for Trop. Vet. Med., UK 62-66.