



Prevalence of Wound and Associated Risk Factors of Donkeys in Merawi District, North-Western Ethiopia

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ABSTRACT

A cross sectional study was conducted from October 2014 to April 2015 to determine prevalence of wound and associated risk factors in working donkeys in and around Merawi district, Amhara region, Ethiopia. A total of 384 randomly selected donkeys were physically examined for any external body injury/wound. Simultaneously, donkey owners were interviewed with a pre-tested semi-structured questionnaire to extrapolate information regarding possible risk factors associated with wound occurrence. The overall prevalence of wound was 38.3%. The occurrence of wound varied significantly among donkeys with different age categories ($\chi^2 = 43.027$, $p < 0.05$) and with different body score conditions (47.5%, $\chi^2 = 53.8$, OR = 34.89, CI = 8.4-144.6). However the occurrence of wounds didn't vary significantly among sex of the animals, type of pack saddle used and type of load carried ($p > 0.05$). In terms of working nature, donkeys working for more than 10kms per single trip showed higher prevalence of wound (50.0%, $\chi^2 = 9.39$, $p < 0.05$) than those usually working for nearer distances (<10kms). There was a significant difference in the severity of wound among affected donkeys carrying different loads ($\chi^2 = 26.71$, $p < 0.05$). Questionnaire survey among the 384 respondents showed only 51% of the respondents usually seek for veterinary help for wound management. Generally, the study has clearly indicated wound as a prevailing welfare problem of working donkeys in and around Merawi district. Hence, implementing a comprehensive donkey health and welfare improvement program should be a priority for concerned stakeholder.

Keywords: Donkeys, Ethiopia, wound, prevalence, welfare

Equine population in the world is estimated to be 90 million, of which 80% are found in developing countries like Asia and Africa (Wilson, 2002). The majority of these animals are owned by the individuals who use them as their sole source of income to sustain their large and extended families (Pritchard *et al.*, 2005). Indeed, research suggests that working animals supply approximately 50% of agricultural power needs globally (Swann, 2006). In Ethiopia, there are an estimated 6.2 million donkeys, 2 million horses and 0.38 million mules (CSA, 2011). Ethiopia has the largest population of donkeys in Africa and the second largest population of donkeys in the world after China (Anon, 2007). Specific to Amhara National Regional State, there are 2 million donkeys, 124 thousand mules and 300 thousand horses (CSA, 2008).

Equine population plays a vital role in both economic as well as social functions in different agro-ecological zones of the country. They are kept and often used for land tillage, cultivation, threshing, riding as well as for pack purpose (Belay, 2005). Equines will remain as the main means of transport animals in the coming decades also, especially in the marginal lands of Ethiopia. In all zones of Ethiopia, donkeys are primarily used as pack animals. The low level of development of the road transport network and the rough terrain of the country, makes the donkey the most valuable pack animal under the smallholder farming systems of Ethiopia (Strakey and Fielding, 1997). It is known that donkeys often are involved in multipurpose activities and help in transporting goods to and from markets, farms, and shops, traveling long distances. They

also pull carts carrying heavy loads 3 to 4 times their body weight. They work from 4 to 12 hours/day, depending on the season and type of work. The increasing human population, demand for transporting of goods to and from far, remote areas, and construction activities around towns are making donkeys highly demanded animals (Biffa and Woldemeskel, 2006). Although donkeys are mostly kept for transportation, there are few areas in Southern Ethiopia where equine meat and milk are consumed (Fred and Pascal, 2006).

Even though donkeys have often been described as sturdy animals, they succumb to a variety of diseases and a number of other conditions and little attention have been paid in the past to study health and welfare of these animals. Most of the time these animals are being neglected and left to the mercy of nature. Livestock programmes by government and other foreign aid agencies mostly focus on increasing meat, milk, egg and wool production (Yoseph *et al.*, 2001). Moreover guidelines set by Prevention of cruelty to Animals Act 1960 are not being implemented. In addition to this most of the veterinarian in Ethiopia are not well trained in equine medicine and also the number is veterinarians especially in rural areas is far low than the required number (around 40 villages have a single government veterinarian). Feed shortage, diseases and external injuries are the major constraints to productivity and performance of donkey in Ethiopia. Wounds are one of the primary welfare concerns of working *equids* (Sells *et al.*, 2010). The most common cause of these wounds in working donkeys are over loading, without padding, improper position of load predisposing to falling, beating of donkeys, hyena bites, donkey bites, injuries inflicted by horned Zebu (DACA, 2006). They are brutally treated, made to work overtime without adequate feed or health care (Mengistu, 2003). This misuse, improper treatment and lack of veterinary care for equines have contributed enormously to early death, majority of which currently have working life expectancy of 4 to 6 years as compared to 30 years in developed countries (Fred and Pascal 2006).

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 (Pearson and Krecek, 2006; Wilson, 2002). Studies to elucidate the magnitude of this problem are lacking in the present study area and such information would be useful for designing strategies

that will help to improve donkey's health and welfare. Therefore, the objectives of the study were to assess welfare problems and risk factors associated with external injuries/ wounds in working donkeys.

MATERIALS AND METHODS

Study Area

The present study was conducted from October 2014 to April 2015 on randomly selected donkeys in and around Merawi District, Ethiopia. The area falls within Western Gojjam Zone Administration of Amhara National Regional State, North-western part of Ethiopia located at a distance of 530km from the capital Addis Ababa. The area has an altitudinal ranging from 2,000 to 2,500 meters above sea level. The annual rainfall of the area ranges from 1,000 to 2,000 mm. The mean annual minimum and maximum temperatures are 15 and 20 °C, respectively and the area experiences a bi-modal rainfall patterns with a short rainy season which occurs from February to March and long rainy season which starts at the end of June and ends at the end of September, followed by dry season from October till end of May. The agro-climatic zone comprises lowland (12%), mid highland (64%) and highland (24%). The farming system in the area is mixed type (crop-livestock production).



Fig. 1: Map showing study area

Study Design and Animals

The study was cross-sectional with simple random technique. 384 working donkeys kept under extensive management system in the study area were taken as sample animals. The sample size required for this study was determined based on the expected prevalence (50%) of small ruminant metacestodes and the 5 % desired absolute precision and 95% confidence interval (CI) according to Thrusfield (2005).

$$n = 1.96^2 \frac{P_{exp}(1 - P_{exp})}{d^2}$$

Where,

- n = sample size
- P_{exp} = expected prevalence
- d = desired absolute precision (5 %)
- 1.962 = z value at 95 % confidence level

Accordingly, the required sample size was 384. Data like sex, age and geographical origin of each study animal were recorded during the survey. The study animals were physically examined for presence of any external body injury, and findings including site, severity and class of wound were recorded on a structured body mapping and physical examination sheet. Wound severity and classification were made as indicated by Biffa and Woldemeskel (2006) and Knottenbelt (2003), respectively. The body condition score (BCS) and age of the selected donkeys were determined according to the method given by Svendsen (1997) and Crane (1997) respectively. Donkeys were grouped into three age categories; Young (<2 years), Adult (2 -10 years age), Old (>10 years age). Moreover wounds were categorized into Infected wounds (when the wound begins to drain yellow or greenish fluid (pus) or skin around the wound becomes red, warm, swollen, or increase singly painful and when its occurrence of wound is beyond 8 hours) and Fresh wound (wound without inflammatory signs and which come early after the injury 8 hours after its occurrence) Knottenbelt (2003)

In addition to the direct physical examination, each randomly selected donkey owners were interviewed with a semi-structure interview (having both open and close questions) to extrapolate information regarding owner's

general information, donkey management practice (harnessing, feeding, housing, health care), working nature (duration of work, weight carried, length of journey covered, nature of working environment) and donkey-owner relationship.

Data Analysis

The collected raw data were organized and arranged using the Microsoft Excel spread sheet computer programme and analyzed using SPSS 20.0 software version. The prevalence of wound in donkeys was calculated and association in the prevalence of wound within each risk factor was tested for significance through Pearson's Chi-square analysis at a probability level of $p < 0.05$.

RESULTS AND DISCUSSION

The major objective of this study was to estimate prevalence of wound and associated risk factors in the donkeys in and around Merawi district. The overall prevalence of wound in working donkeys in the current research was 38.3%. This finding was markedly lower than the reported 77.5% (Curran *et al.*, 2005), 79.4% in Hawassa (Biffa and Woldemeskel, 2006), 59% in Jordan (Burn *et al.*, 2007) and 54% in Morocco (Sells *et al.*, 2010), but closer to the reported 40% by Pearsons *et al.* (2000) in Central Ethiopia. This might be due to variation in management and husbandry practice to the donkeys by the farmers among different geographical areas.

With regard to wound distribution and their severity on the body of examined donkeys, wounds in donkeys was found most commonly in the area of back (21.1%), which is in line with the findings of Pearson *et al.* (2000) and Mekuria, *et al.* (2013). Similarly Biffa and Woldemeskel (2006) and Tesfaye and Curran (2005) reported the same scenario in South and Central Ethiopia respectively. This might be due to poorly designed and ill fitted saddles and straps manufactured by unskilled artisans or donkey owners. Also, greater proportion of wound cases were graded as mild (58.5%) in working donkeys which is in contrast to Biffa and Woldemeskel (2006), who have reported greater proportion of the cases with severe wounds in working equines of Hawassa. The differences in wound severity might be due to difference in body condition of donkeys, average length of journey covered and average load

transported (Mekuria *et al.*, 2013). Moreover, majority of the identified wound cases were found infected (71.4%), while only 28.6% of them were fresh. This concurs with the findings of Birhan *et al.* (2014).

Table 1: Association between prevalence of wound and body condition score

Variable	Examined (n)	Wound cases (n)	(%)	Chi-square	P value
Body Condition Score	BCS \leq 2	305	145	47.5	53.8 0.000
	BCS $>$ 2	79	2	2.5	
Age	Young	19	—	0	43.027 P = 0.000
	Adult	327	116	35.5	
	Old	38	31	81.6	
Sex	Male	105	44	41.9	0.803 0.37
	Female	279	103	36.9	
	Total	384	147	38.3	

The analysis of the putative risk factors indicated that, prevalence of wound was found to be significantly associated with body condition. Donkeys with poor body condition (BCS \leq 2) had significantly higher prevalence of wounds ($\chi^2 = 53.8$, CI = 8.4-144.6) than those having good body condition (BCS $>$ 2) ($p < 0.05$) (Table 1). This is in line with the reports by Pearson *et al.* (2000) and Mekuria *et al.* (2013), who have indicated that poor physical condition mainly due to malnutrition is the leading causes of sores in donkeys. The probable reason for such association is due to donkeys with a poor body condition score may have less natural padding protecting them from pressure, friction and shear lesions caused by saddle. Concerning wound among different age categories, the present study

has showed a significantly higher prevalence of wound in old donkeys ($\chi^2 = 43.027$, $p < 0.05$) (Table 1). This finding was in agreement with the report of Biffa and Woldemeskel (2006) who stated that older donkeys had greater wound risk than other age group. This might be due to more exposure to work and carrying, heavy load over a long distance, less owners' attention to wound management and reduced immune defense mechanism of an animal with age advancement.

In terms of working nature it has been showed that donkeys working for more than 10kms per single trip were significantly with higher prevalence of wound (50%, $\chi^2 = 9.39$, $p < 0.05$) than those usually working for nearer distances ($<$ 10kms) (Table 2). A similar situation was also reported by Pritchard *et al.* (2005) from studies conducted in Afghanistan, Egypt, India, Jordan and Pakistan and Sells *et al.* (2010) in Morocco. The probable reason for such association is due to the fact that donkeys in bad working condition (working without rest) can be predisposed to persistent irritation and injury and may also cause reduction in their body condition score and this may lead the donkey to have less natural padding, protecting them from pressure. In the current study, weight of load carried by donkeys was observed to have no significant association with wound prevalence.

The study showed that, there was no any significant difference in the prevalence of back sore with respect to the type of pack saddle used in the study area ($P > 0.05$) as indicated in the (Table 3). However, a significant difference was observed in the severity of wound among affected donkeys carrying different loads ($\chi^2 = 26.71$, $p < 0.05$) (Table 4).

Majority of donkeys usually transporting a weight more

Table 2: Prevalence of wound among length of journey covered, weight and type of load carried

Variable	Categories	Examined (n)	Wound cases (n)	Percentage (%)	Chi-square	P – Value
Average length of journey covered	$<$ 5 kms	52	16	30.8	9.39	0.009
	5 - 10 kms	220	75	34.1		
	10 –15 kms	112	56	50.0		
Load weight transported by the donkey	\leq 50 kgs	92	39	42.4	0.865	0.352
	$>$ 50 kgs	292	108	37		
Type of load transported	Flour from grind mill house	50	18	36	0.127	0.722
	Multiple	334	129	38.6		

Table 3: The association between prevalence of back sore with type of saddle used

Type of saddle used	Examined (n)	Wound cases (n)	Percentage (%)	Fisher's Exact Test	P-value
Fertilizer sac + straw	282	85	30.1	4.082	0.381
Fertilizer sac + Jut sac + Straw	4	0	0.0		
Leather	27	6	22.2		
Blanket	46	15	32.6		
No padding	25	4	16.0		

than 50 kgs were observed of affected mainly with wounds of mild and moderate severity, while more severe cases were observed in donkeys carrying a load less than 50 kgs (n=12, 30.8%). This is in contrast with the findings of Birhan *et al.* (2014) who reported higher prevalence of severe graded wounds with increase in loads. The difference could be due to the fact that donkeys carrying higher loads often are provided frequent rests.

With regard to wound management, majority of donkey owners (51%) usually seek for veterinary help when their donkeys get wounded, while 32.3% of them seek for traditional healer. 16.4% of the owners try to cure it by themselves, and the rest 0.3% of the respondents abandon their wounded donkey to heal by itself without any intervention (Fig. 4). This finding was found in disagreement with previous report by Pearson *et al.* (2000) in central Ethiopia. With respect to rest, majority of the owners (57.0%) did not believe wound as possible reason to rest a donkey from working while only 42.4% of the owners believe rest is mandatory to facilitate wound healing. This study was contrasting to the Pearson *et al.* (2000) report in central Ethiopia (Table 6 and Fig. 5).

In conclusion present study revealed that welfare issues were the major problems encountered in working donkeys in Merawi district. Despite the pivotal role played by donkeys in sustaining livelihoods in the study area, owners give little care and attention as compared to other farm animals. Owner's poor awareness to provide good nutrition, veterinary care and animal 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.

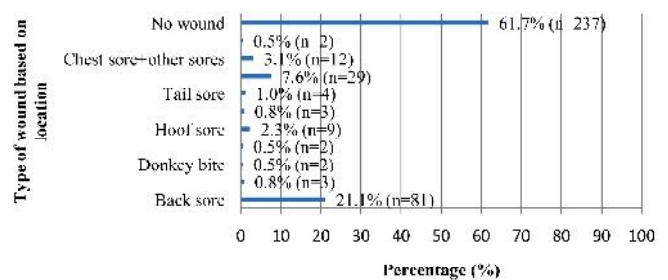


Fig. 2: Distribution of wounds on different body parts of examined donkeys (n = 384)

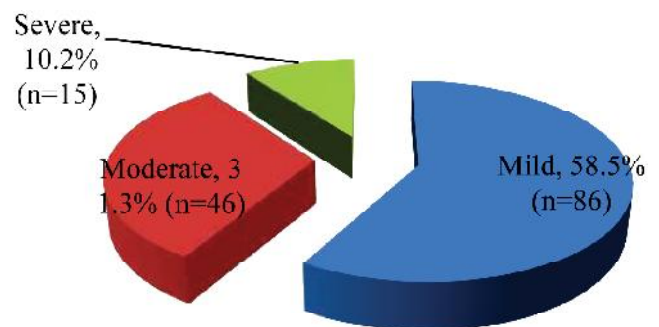


Fig. 3: Relative percentage of wound intensity/severity of the total injured (wounded) donkeys (n= 147).

Table 4: Association between wound intensity and average load weight carried

Average load weight	Severity of wound		
	Mild n (%)	Moderate n (%)	Severe n (%)
> 30 - ≤ 50 kg (n = 39)	14 (35.9)	13 (33.3)	12 (30.8)
>50 - ≤ 70 kg (n = 108)	72 (66.7)	33 (30.6)	3 (2.8)

Chi-square = 26.71, P = 0.000

Table 5: Summary of demographic data for donkey owners interviewed, (n =384)

Variable		Frequency (n)	Percentage (%)
Age of respondents (in years)	< 30 years	16	4.2
	30 - 40 years	43	11.2
	40 - 50 years	138	35.9
	50 - 60 years	105	27.3
	> 60 years	82	21.4
Gender	Male	287	74.7
	Female	97	25.3
Educational status	Illiterate	195	50.8
	Only read and write	98	25.5
	Elementary	84	21.9
	High school and above	7	1.8

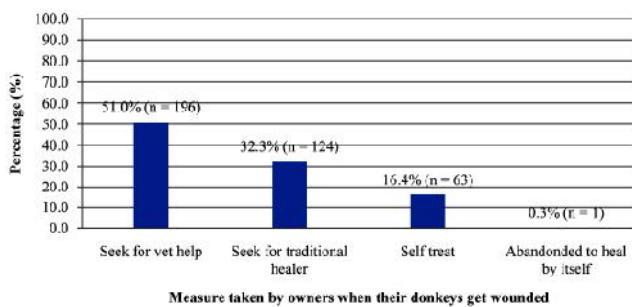


Fig. 4: Owners’ measure when donkeys get wounded

Table 6: Response of Farmers towards their donkeys

	Response	Frequency	Percentage (%)
Wound as enough reason to rest a donkey	Agree	163	42.4
	Disagree	219	57.0
	Not sure	2	0.5
Way of handling donkey after work	Tethering	176	45.8
	Hobbling	1	0.3
	Let loose	207	53.9
	Total	384	100.0

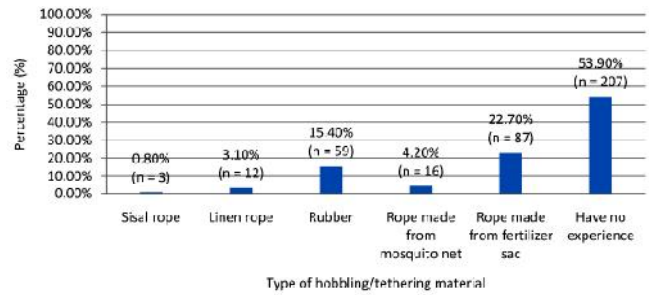


Fig. 5: Materials for tethering/hobbling of donkeys after work

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