Int.J.Curr.Res.Aca.Rev.2026; 14(10): 72-81

EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 (Online) Volume 14 Number 10 (October-2026)

Journal homepage: http://www.ijcrar.com

doi: https://doi.org/10.20546/ijcrar.2026.1410.008

Study on Prevalence of Wound Infection and Welfare Practice on Working Donkey in and Around Haramaya

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Abstract

Donkeys are crucial in domestic responsibilities, income generation, and as valuable pack animals for resource-poor communities in both rural and urban areas. However, animal welfare is compromised for various reasons. The welfare of working donkeys in developing countries including, Ethiopia is crucial for their health and survival as well as the livelihoods of the population dependent on them. A cross-sectional study with a questionnaire survey of donkey owners and direct observation of studied animals was conducted from January to May 2024 with the objectives of assessing wound management and welfare practice on working donkeys in Haramaya District. A total of 384 donkey and 100 respondents were included in this study using simple random sampling techniques. Both direct and indirect assessment methods were appilied for the assessment of would management and welfare practice in the study araea. For direct assessment, a structured developed format was developed, and data was collected through direct physical examination of the studied animals. A semi-structured questionnaire was also developed to collect data on major welfare practice by interviewing 100 randomly selected donkey owners using indirect methods. Among the total 384 donkeys enrolled in this study, 186 (48.44%) were affected by different wound infections. Most of the wounds (22%) were caused by foreign bodies, followed by improper harnessing (19.9) compared. Regarding wound type and site, bite wound and incision were the two common wound type accounting for 32% and 31% respectively, more than half (53,8%) of wound were observed on the back of the animals. The analysis of this data indicated that there was no statistically significant difference obsereved among sex, age and body condition of the animlas in the occurrence of wound infection. Concerning welfare practice, the current study showed that 80 % of the study participants had poor pratctice towards animal welfare. The analysis also indicated that the type of treatment given (P-value = 0.001), using of proper harnessing (P-value = 0.001) and feeding and watering habits (P-value = 0.001) were strongly associated with good welfare practices. The high prevalence of wound infection and poor welfare practices demonstrated in the studied area has a great impact on the health and surivival of donkey, as well as the livelihood of donkey owners, requiring due attention to halt its effect.

Article Info

Received: xx August 2026
Accepted: xx September 2026
Available Online: October 2026

Keywords

Working donkeys, wound prevalence, welfare assessment, wound management practices

Introduction

Ethiopia has a substantial equine population, accounting for approximately 37%, 58%, and 46% of Africa's donkeys, horses, and mules, respectively (Ayale *et al.*, 2018). Globally, equines play a vital role in transportation, agriculture, and livelihood support, particularly in developing countries, where most donkeys

and mules and a large proportion of horses are used for work (Fielding and Starkey, 2004). The global equine population has been estimated at 112.5 million, comprising 44.3 million donkeys, 58.5 million horses, and 9.7 million mules, with a substantial proportion found in developing regions, particularly Africa and Asia (Aliye *et al.,* 2022).

Working donkeys are essential to rural and urban livelihoods in Ethiopia, providing affordable transport and traction services for resource-poor households.

They support agricultural activities, the transportation of goods, and domestic responsibilities, particularly for women. Limited road infrastructure and difficult terrain further increase their importance in remote communities, where they may be among the most accessible means of transporting agricultural produce and other goods (Wold *et al.,* 2004; Biffa and Woldemeskel, 2006).

Despite their socioeconomic importance, working donkeys often experience welfare problems associated with poverty, inadequate knowledge, poor husbandry, and inappropriate working conditions. Evidence from Ethiopia suggests that improving donkey welfare can enhance working performance and support the livelihoods of dependent households (Moltumo *et al.,* 2020). Ensuring the welfare of working donkeys is therefore important for maintaining animal health and productivity while protecting the livelihoods of the communities that depend on them (Mekuria *et al.,* 2013).

Wounds are important welfare concerns in working equids because they can cause pain, bleeding, tissue damage, impaired movement, and secondary infection (Kassa *et al.,* 2014). Wounds may vary in severity and presentation, including abrasions, lacerations, open lesions, abscesses, and infected tissue damage. Common contributing factors include overloading, poorly positioned loads, inappropriate or ill-fitting harnesses, prolonged working hours, beating, and injuries caused by other animals (Kassa *et al.,* 2014). Inadequate hobbling practices and the use of heavy, rough, or poorly fitted harnesses may further increase discomfort and the risk of injury (Mekuria *et al.,* 2013). Appropriate wound management and improved working conditions are therefore essential for reducing pain, preventing complications, and improving the welfare of working donkeys.

Despite the importance of working donkeys in and around Haramaya, eastern Ethiopia, information on wound occurrence, associated risk factors, wound management practices, and related welfare conditions remains limited. Understanding these factors is necessary to identify preventable causes of injury and inform practical interventions to improve donkey health and welfare. Therefore, this study aimed to assess wound occurrence, wound management practices, and welfare conditions among working donkeys in and around Haramaya, eastern Ethiopia.

Materials and Methods

Study Area

The study was conducted in the Haramaya District, which is located in the Eastern Hararghe Zone of Ethiopia, approximately 500 kms East of Addis Ababa. Its elevation is approximately 2000 m a.s.l. and the mean annual temperature and relative humidity are 18 °C and 65 %, respectively. An annual Rainfall is approximately 900 mm, with a bimodal distribution pattern, peaking in mid April and mid August. There are four seasons, such as a short rainy season (from mid March to mid May), a short dry season (from end May to June), a long wet season (July to mid October) and a long dry season (end of October to February). Main pasture production is expected after the short rainy season, continuing until the end of the long wet season. Mixed-type agriculture is the main occupation of the population of the area. A total livestock population of this district was cattle population about, 98090, 120145 goat, 69950 sheep, 480 camel and 28250 Equine species.

Study Population

The study animals were (Donkeys) from different three district areas of in and around Haramaya town (Aweday, Haramaya, Iresa). Randomly selected donkeys, irrespective of age, sex, body conditions and used for common sources of transportation of goods, construction materials, farm products, and others. In addition donkey owners from these three selected districts were interviewed for assessment prevalence of wound infection and welfare practices during the study period.

Study Design and Period

A cross-sectional questionnaire survey of equine owners and direct observation of selected donkyes was conducted from January to May 2024 to assess of prevalence wound infection and welfare practice of working donkeys in the study area.

Sample size determination and Sampling Technique

Since there was no previous research on the assessment the prevalence of wound infection and welfare practices applied to working donkeys in the study area, a 50% prevalence with a 95% confidence interval (CI) and 5% absolute precision (acceptable error) using Thrufield, 2018 was used to calculate the sample size for this research. The sample size determination was done using the formula.

$$N=\frac{1.96^2*Pexp\ (1-Pexp)}{d^2}$$

Where; N= the required sample size; Pexp= expected prevalence (50%); D=desired absolute precision level of 95(0.05 confidence interval) and A total of 384 donkey were sampled for this study.

Moreover, A total of 100 donkey owners were randomly selected and included for indirect assessment of welfare and wound management practice in the studied area.

Method of Data Collection

The prevalence of wound infection and welfare practice evaluation was conducted by observing and recoding data on randomly selected animals and families across the study area. The study employed both direct and indirect research measurement methods in the assessment of the animals' welfare hence enabling the generation of enough information. The study used both direct and indirect research measurement methods in the assessing the animals' welfare, thereby generating sufficient information. Direct assessment of working donkeys: A structured developed direct assessment format was developed and data was collected by direct physical examination of the animals. This includes address, age of donkeys, the body condition score, presence of wound/physical injuries, cause, type and site of wound. The scoring of body condition animals and lesions observed on different regions of the body was recorded based on the criteria Pritchard *et al.,* (2005).

Indirect assessment: Semi-structured questionnaire was developed to collect data on the major activity of welfare utilizing of donkeys, veterinary service program and wound management system. These were obtained by interview made with randomly selected 100 donkey owners to generate some information which was missed during direct assessments of the animal.

Operational Definitions

Good Welfare Practice= those study participants who respond to the positive above the mean score of welfare assessment questionnaire or statements. Poor Welfare Practice= those study participants who respond to the negative below the mean score of welfare assessment questionnaire or statements.

Data Management and Analysis

The data collected from the 384 donkeys and interviews made with 100 owners were entered into Microsoft excel spread sheet and analyzed using IBM SPSS version 23 statistical software. Descriptive statistics in the form of table, graph, frequency and percentage were used to describe data like age, sex, body condition and other factors on wounds in working donkey's and Chisquare ($\chi 2$) was used to determine the association of the outcomes with the risk factors. In all calculations, the confidence interval was set at 95% and statistical significant differences were considered as ($p<0.05$).

Results and Discussion

Distribution of Age, Sex, and Body Condition

A total of 384 donkeys were included in the study. Of these, 294 (76.6%) were male and 90 (23.4%) were female. Regarding age, 46.4% were 2–10 years old, while 39.6% were older than 10 years. More than half (56.0%) had good body condition, whereas 25.2% had medium and 18.8% had poor body condition (Table 1).

Prevalence of Wound Infection and Associated Factors

Of the 384 donkeys examined, 186 (48.4%) had wound infections. The prevalence was higher in females (54.4%) than in males (46.6%). By age group, donkeys aged 2–10 years had the highest prevalence (55.1%), while donkeys with good body condition had a prevalence of 50.2%. However, no statistically significant associations were observed between wound infection and sex, age, or body condition (Table 2).

Causes, Types, and Sites of Wounds in Working Donkeys

Wounds in working donkeys were attributed to several causes. Foreign bodies were the most frequently reported cause (22.0%), followed by improper harnessing

(19.9%). Other contributing factors included bites, infection, falls, and overloading, with reported proportions ranging from 8.6% to 14.5% (Figure 1).

They were different wound type observed on the affected donkey in the study area. Among this, bite and incision were the most common type of wound recorded at 32% and 31% respectively followed by abrasion (22%) and pucture (15%) (Fig 2).

Regarding wound site, wounds were observed in various body part of working donkey. But the highest proportion (53.8%) was recorded on back of the animals followed by shoulder (10.2%) (Fig 3).

Sociodemographic Characteristics of Respondents

A total of 100 respondents participated in the assessment of welfare practices among working donkeys in and around Haramaya. Of these, 34% were from Aweday, while 33% each were from Haramaya and Iresa. Most respondents were male (75%), while 25% were female. Regarding age, 46% were adults, 30% were young, and 24% were older. In terms of educational status, 60% had received formal education, whereas 40% were illiterate (Table 3).

Animal Husbandry and Management Practices among Donkey Owners

Respondents were asked about treatment-seeking practices, harness use, and feeding and watering management. The most common treatment-seeking practice was taking sick donkeys to veterinary clinics (34%), followed by the use of traditional medicine (27%).

More than half of the respondents (54%) reported not using proper harnesses. In contrast, 63% reported providing feed and water to their donkeys separately from other animals (Table 4).

Donkey Welfare Practices Among Owners

Regarding welfare practices, most respondents reported that they did not provide adequate resting comfort (89%) or thermal comfort (86%) for their working donkeys. Similarly, 87% reported that they did not provide opportunities for donkeys to express appropriate behaviour, while 98% reported that they did not take measures to protect their animals from fear and distress (Table 5).

Factors Associated with Donkey Welfare Practices

The study found that 80% of respondents had poor animal welfare practices. Treatment-seeking practices, proper harness use, and feeding and watering practices were significantly associated with welfare practices (all $p = 0.001$). In contrast, location, sex, age, and educational status were not significantly associated with welfare practices (Table 6).

Wounds and welfare problems are common among working equids, particularly donkeys, which often experience inadequate nutrition, limited access to water, poor husbandry, and insufficient veterinary care. In the present study, the overall prevalence of wound infection among working donkeys was 48.4%. This finding was comparable to the prevalence reported by Eriso *et al.,* (2023) (45%) and Pearson *et al.,* (2000) (44%) in Ethiopia. However, it was lower than the prevalence reported by Biffa and Woldemeskel (2006) in Hawassa (79.4%), Curran *et al.,* (2005) (77.5%), and Burn *et al.,* (2007) in Jordan (59%). These differences may reflect variations in study populations, geographical and environmental conditions, study methods, and husbandry practices. However, these potential explanations should be interpreted cautiously because management and environmental factors were not directly compared across the studies.

Conversely, the prevalence observed in the present study was higher than the 42.2% reported by Kassa *et al.,* (2014) in Yilmana Densa District and the 38.3% reported by Tsega *et al.,* (2016) in Merawi District, northwestern Ethiopia. Differences in study periods, sampling procedures, working conditions, and wound assessment criteria may partly explain the variation in prevalence between studies.

Foreign bodies (22.0%) and improper harnessing (19.9%) were the most frequently reported causes of wounds in the present study. This finding is consistent with Biffa and Woldemeskel (2006), who identified improper harnessing as an important contributor to external injuries in working equids. Similarly, Tesfaye *et al.,* (2016) described working conditions, management practices, and environmental factors as potential contributors to wounds in donkeys. Poorly fitted harnesses, excessive loads, and repeated friction may damage the skin and underlying tissues, increasing the risk of injury.

Table.1 Studied animals' characteristics on assessment of welfare issue and wound management practice of working donkey in and around Haramaya, 2024. (n=384).

Variable		Frequency	Percentage (%)
Sex	Male	294	76.6
	Female	90	23.4
	Total	384	100
Age	< 2 years	54	14.1
	2 - 10 years	178	46.4
	> 10 years	152	39.6
	Total	384	100
BCS	Poor	72	18.8
	Medium	97	25.2
	Good	215	56.0
	Total	384	100

Table.2 Analysis of animal factors on assessment of wound management practice of working donkey in and around Haramaya, 2024. (n=384).

Variable		No of animals examined	No of infected animals	Prevalence (%)	X^2 (P-value)
Sex	Male	294	137	46.6	1.698 (0.19)
	Female	90	49	54.4	
	Overall	384	186	48.4	
Age	< 2 years	54	24	44.4	5.91 (0.52)
	2 - 10 years	178	98	55.1	
	> 10 years	152	64	42.1	
	Overall	384	186	48.4	
BCS	Poor	72	35	48.6	0.93 (0.63)
	Medium	97	43	44.3	
	Good	215	108	50.2	
	Overall	384	186	48.4	

Table.3 Socio-demographic characteristics of donkey owners on assessment of welfare practice on working donkey in and around Haramaya, 2024. (n=100).

Variable		Frequency	Percentage (%)
Address	Aweday	34	34.0
	Haramaya	33	33.0
	Iresa	33	33.0
Sex	Male	75	75.0
	Female	25	25.0
Age	Adult	46	46.0
	Young	30	30.0
	Old	24	24.0
Edu level	Illiterate	40	40.0
	Literate	60	60.0

Table.4 Aminal Husbandry and Management practice by donkey owners towards animal welfare practice in and around Haramaya, 2024. (n=100).

Variable		Frequency	Percentage (%)
Treatment given	Traditional medicine	27	27.0
	House medication	20	20.0
	Vet clinic	34	34.0
	Nothing	19	19.0
Proper harnessing	Yes	46	46.0
	No	54	54.0
Feeding and Watering habit	Separately	63	63.0
	Together with other animals	37	37.0

Table.5 Distribution of welfare practice by donkey owners on working donkey in and around Haramaya, 2024. (n=100).

Variable		Frequency	Percentage (%)
Making animals free from hunger	Yes	42	42.0
	No	58	58.0
Making animals free from thirst	Yes	62	62.0
	No	38	38.0
Providing animals resting comfort	Yes	11	11.0
	No	89	89.0
Providing animals thermal comfort	Yes	14	14.0
	No	86	86.0
Providing enough space for free movt	Yes	39	39.0
	No	61	61.0
Making animals free from injury	Yes	43	43.0
	No	57	57.0
Making animals free from disease	Yes	31	31.0
	No	69	69.0
Provide freedom to animal to express appropriate behavior	Yes	13	13.0
	No	87	87.0
Making animals free from fear and distress	Yes	2	2.0
	No	98	98.0
Do you have good human animals relationship	Yes	34	34.0
	No	66	66.0

Table.6 Association of sociodemographic characteristics and husbandry practices with animal welfare practices among working donkey owners in and around Haramaya, Ethiopia, 2024 (n = 100).

Variable	Category	Good practice, n	Poor practice, n	χ^2 (p-value)
Location	Aweday	5	29	1.75 (0.42)
	Haramaya	9	24	
	Iresa	6	27	
	Overall	20	80	
Sex	Male	15	60	0.00 (1.00)
	Female	5	20	
	Overall	20	80	
Age	Adult	11	35	2.69 (0.26)
	Young	3	27	
	Old	6	18	
	Overall	20	80	
Educational level	Illiterate	8	32	0.00 (1.00)
	Literate	12	48	
	Overall	20	80	
Treatment given	Traditional medicine	2	25	21.29 (0.001)
	Home medication	3	17	
	Veterinary clinic	1	33	
	No treatment	14	5	
	Overall	20	80	
Proper harnessing	Yes	2	44	21.29 (0.001)
	No	18	36	
	Overall	20	80	
Feeding and watering habits	Separately	6	57	42.57 (0.001)
	With other animals	14	23	
	Overall	20	80	

Note: χ^2 = chi-square statistic. Values are transcribed from the supplied table; please verify the test statistics and p-values against the original analysis before submission.

Figure.1 Cause of wound on working donkey in and around Haramaya

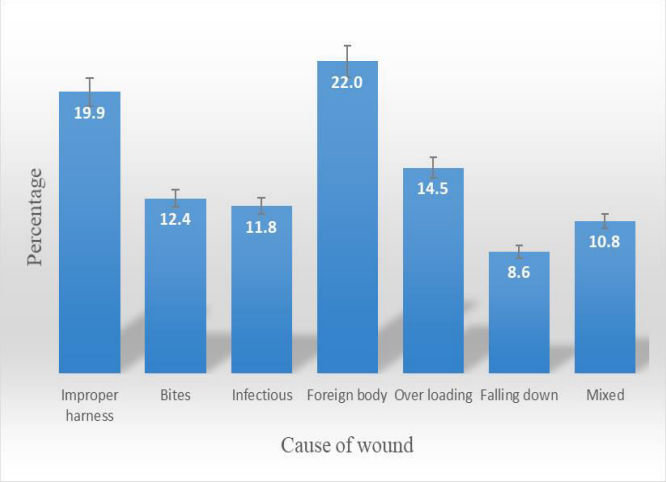


Figure.2 Types of wound on working donkey in and around Haramaya

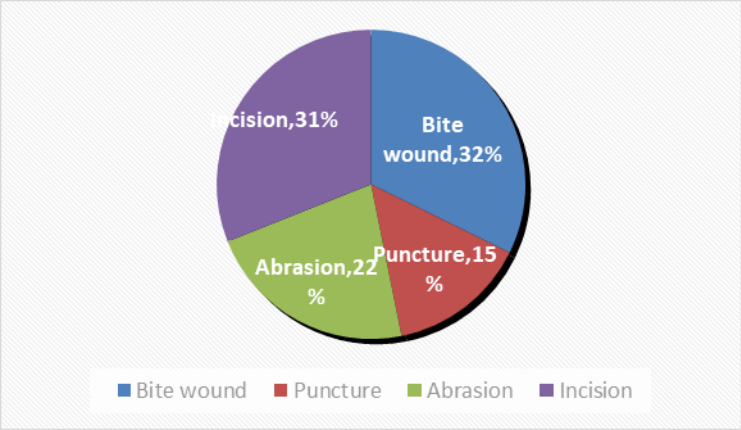
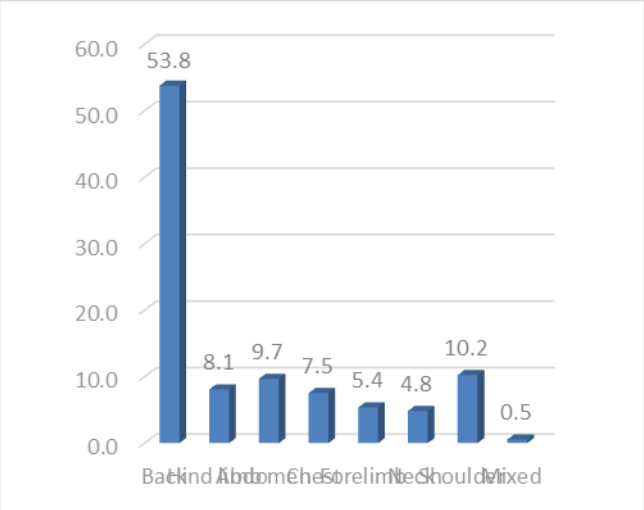


Figure.3 Site of wound on working donkey in and around Haramaya



Bite and incision wounds were the most frequently recorded wound types in the present study. This finding was consistent with the report by Mekuria *et al.,* (2017), but differed from Biffa and Woldemeskel (2006), who reported lacerated wounds as the most common type, accounting for 19.3% of injuries. Differences in animal handling, working environments, and exposure to traumatic injuries may contribute to these variations. Fighting among donkeys and bites from other animals may also explain some injuries, although the specific contribution of these causes requires further investigation.

Regarding anatomical location, the back accounted for the highest proportion of wounds (53.8%) in the present study. This finding agrees with reports by Mekuria *et al.,* (2017) and Tesfaye *et al.,* (2016). In contrast, Ayalew *et al.,* (2018) reported that shoulder injuries were particularly common in working equids. These differences may be associated with variations in harness design, load positioning, load distribution, and working practices. The high proportion of back wounds observed in the present study highlights the importance of appropriate harness fitting and load placement.

No statistically significant associations were observed between wound occurrence and the donkeys' sex, age, or body condition. This finding is consistent with Genetu *et al.,* (2017), who reported no significant association between age and wound occurrence.

However, Eriso *et al.,* (2023) and Tesfaye *et al.,* (2016) reported significant associations involving age and body condition. These differences may reflect variation in sample size, study design, animal management, and the distribution of risk factors across study populations.

The assessment of owner practices revealed that 80% of respondents demonstrated poor animal welfare practices. This finding is comparable to the 94.2% prevalence of poor welfare practices reported by Tesfaye *et al.,* (2016) in Mirab Abaya District, southern Ethiopia. In contrast, Marufu (2014) reported good welfare practices among 92% of respondents in a peri-urban area of South Africa. Differences in access to veterinary services, welfare awareness, available resources, and animal management practices may contribute to these contrasting findings.

Furthermore, treatment-seeking practices, proper harness use, and feeding and watering practices were significantly associated with overall welfare practices among donkey owners. These findings are consistent with Herago *et al.,* (2015), who highlighted the importance of management practices in working-equid welfare. Seeking appropriate veterinary care, using well-fitted harnesses, and providing adequate feed and water may help improve welfare outcomes and reduce preventable injuries. Nevertheless, because the present study used a cross-sectional design, these associations should not be interpreted as evidence of causation.

Conclusion and recommendations

Working donkeys provide many benefits for the daily livelihood of humans. In the present study, the overall prevalence of wound infection was 48.4%. The wound observed in the study area were mainly bite and incision types occurring on the backs of the animals, caused by foreign bodies and improper harnessing. The study also indicated that 80% respondents had poor practices towards animal wefare. The type of treatment given to the sick animals, utilization of proper harnessing and feeding and watering habit were factors significantly associated with good welfare practice. The high prevalence of wound infection in the current study is evidence that wound infection is one significant problem for working donkey in the study area, lead to poor performance, health issue, and reduced survival of donkeys, as well as diminished service obtained from these animals. Moreover, the condition is exacerbated by poor welfare practices observed in the study area, which affects the health and productivity of the animals and the economy of donkey owners and the country at large. Based on the above conclusion, the following recommendation are forwarded:

Comprehensive awareness of donkey welfare issues should be promoted through training and extension service by the government and different NGOs. Health education about the diseases transmission, risk factors reduction, use of proper harnessing, care, and handling of animals to avoid wound infection should be provided. Policies and legal frameworks that support animal welfare issues and inspect animal facilities should be promoted to ensure animal welfare issues.

Funding

No funding was received for this review.

Conflict of Interest

The authors declare that they have no conflict of interest.

Data Availability Statement

The data generated and analyzed during this study are available from the corresponding author upon reasonable request.

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How to cite this article:

Yelak Hulugeza Mengstu and Ayube Nasir. 2026. Study on Prevalence of Wound Infection and Welfare Practice on Working Donkey in and Around Haramaya. *Int.J.Curr.Res.Aca.Rev.* 14(10), 72-81.
doi: https://doi.org/10.20546/ijcrar.2026.1410.008