

Prevalence and Factors Associated with Lameness among Cart Pulling Donkeys in Hawassa City Administration, Southern Ethiopia

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Abstract: A cross sectional study was conducted from November 2013 to April 2014 at Hawassa city, Southern Nation Nationality and Region of Ethiopia to determine the prevalence of lameness and identify associated risk factors with lameness among cart pulling donkeys. Systematic random sampling was employed to select donkeys and their owners to be sampled and a structured data collection format was used to register findings of the lameness examinations in 415 donkeys. The overall prevalence of lameness in cart pulling donkey was found to be 40.2% (n=167). Most lameness were originating from the hoof cavity 18.3% (n=76) and followed by knee area 7.2% (n=30). High frequency of lameness was observed in the front legs than in the hind limb. The current study revealed there was significant association between the occurrence of lameness and body condition score, number of working days per week, owner ship status and number of working hours per day. However, there was no statistical association between the occurrence of lameness and age of the donkey, age of the owner, educational status of the owner and working experience the owner. Analysis of the interview with owners/users revealed that, the floors of the house of 99.8% donkeys were mud with no drainage and only 0.2% donkeys had shelters with concrete floor. Only 0.2% respondents practiced routine hoof care after every working day. As far as management of lameness is concerned, 21.9% took to government veterinary clinic, 3.4% to private clinic, 20.9% practiced hoof trimming, washing with warm and salty water; 2.7% gave injections themselves and 9.2% and did nothing. Awareness creation on hoof care, visiting veterinary clinics, balancing work load with energy intake, provision of adequate rest and improving body condition of the donkey are recommended.

Key words: Cart Pulling Donkeys • Hawassa. Lameness • Prevalence • Risk Factors

INTRODUCTION

Animal power is an economical form of energy for traction, cultivation and transportation. It helps to minimize the flow of foreign currency involved in the import of tractor, spare parts and fuels [1]. More than half of the human population is dependent on the power provided by draft animals, 90 million of which are equines [2]. Unlike motorized traction power which relies heavily on fossil fuels, equine traction is supported by 60% renewable resource, such as locally grown crops, compared with only 9% for tractor [3]. Thus equine traction has a lower environmental impact, is more sustainable and is comparatively inexpensive [4].

According to CSA [5], Ethiopia has 5.42 million donkeys, 1.78 million horses and 373,519 mules. In Ethiopia the use of donkeys as pack animal or for pulling cart has enabled small scale farmers to participate in the market economy. They are used for fetching water, for household shifting, carrying the sick to hospital, carrying sick calves, transportation and pulling materials needed [4]. Many these horses frequently work long hours in harsh conditions, often experiencing dehydration and multiple chronic conditions leading to poor welfare [6].

As any other animals, equines are vulnerable to a variety of disease of biological origin, nutritional diseases and other miscellaneous cause that leads them to ill health, suffering, considerable loss of work output and

reduced longevity [7]. Problems involving musculoskeletal system are among the reason for veterinary attention to equines [8]. The major and common clinical manifestations of disease which affect organs of support are lameness, failure of support, insufficiency of movement and deformity [9]

Lameness is one of the most prevalent health problems in the horse. It can be caused by a wide range of conditions and both the severity of the disease and prognosis for return to previous function can vary markedly [10]. It is one of the most important causes of loss of performance in horse [11]. Currently, there is limited information on the prevalence and risk factors of lameness. Therefore the objective of the study were to determine the prevalence of lameness in cart pulling donkeys in Hawassa City and Identify predisposing factors of lameness in cart pulling donkeys in Hawassa City.

MATERIALS AND METHODS

Study Area and Period: The study was conducted in Hawassa from November 2013 to April 2014. Hawassa is capital city of southern nation nationality and region of Ethiopia, found at 270 km south of Addis Ababa. It is geographically located between 4°27' and 8°30' latitude. It lies in plain which allows the use of carts. The annual rain fall range of town is 800-1000 mm. The maximum annual temperature does not exceed 30°C and minimum temperature range between 11.2°C-19.2°C. The total population of donkey, mule and horse for Hawassa town are 13,961,369 and 5161 respectively [5].

Study Design: Cross-sectional study carried out to determine the prevalence of lameness and factors associated with it among cart pulling donkeys in Hawassa city.

Study Population: Cart pulling donkeys and their owners/users included in the sample and studied.

Source of Population: All cart pulling donkeys and their owners/users residing in all sub-cities of Hawassa (From different sites where cart donkeys are located in mass like market places, construction sites and veterinary clinic of Hawassa).

Sample Size Determination and Sampling Technique: The sample size was determined using the formula for single population proportion and the following assumptions were made. A confidence interval of 95%

was considered and level of significance was taken at $\alpha = 0.05$. Margin of error of 5% and prevalence of 50% was considered as there was no previous study conducted on the issue. The sample size has been determined according to the formula given by Thrusfield [12].

$$N = 1.962 P_{exp}(1 - P_{ext})/d^2$$

where,

N = Required sample size,

P_{exp} = Expected prevalence (50%),

d = Desired precision (5%),

A critical value for 95% confidence interval is 1.96.

A non-response rate of 10% was taken in to account and a total sample size of 415 donkeys and their owners were sampled from study area. Systematic random sampling was employed to select donkeys and their owners to be sampled.

Data Collection Techniques: Structured questionnaire was used to interview donkey owners/drivers and the questionnaire prepared in English was translated into Amharic language. Owners/drivers were interviewed and their responses were recorded in questioner format. The questioner was aimed to collect information related to owner/driver, experience with donkey and experience with lameness. Physical clinical examination was conducted to detect the presence of lameness and identify the possible origin of lameness. The study animals were examined when they are in motion for detection of any kind of abnormality in locomotion and donkeys that move with clear abduction, adduction, clearly impaired movement with uneven length and timing and that were reluctant to bear weight on one or more limb were considered as lame donkey. The examination was performed initially by visualizing the donkey at the side, in front and behind both at rest and movement followed by friendly approach to the animal [8]. The skeleton and joint of each donkey was subjectively assessed by visual observation and palpation. Limb palpation was performed from distal to proximal, noting pain responses, swelling and wounds. A grading system of lameness, 1-5 was applied to each lame donkey. For sake of simplicity the examined donkey were categorized in to five age groups, 1= <3, 2= 3-6, 3= 7-10, 4= 11-15, 5 = >15. Similarly, the body condition score was categorized in five groups.

Data Management and Analysis: Data both from the direct physical examination and questionnaire were properly coded and entered into Microsoft Excel-2007

spread sheet. The data was filtered for any invalid entry and then transferred to SPSS 16.0 version for windows package (2007) for statistical analysis. Descriptive statistics was made and differences (associations) in the prevalence of wound within each risk factor (independent variable) have been tested for significance through Pearson's Chi-square analysis at a probability level of 0.05. Results of the analysis are presented through illustrative figures and tables.

RESULTS

Prevalence and Distribution of Lameness: Among 415 cart pulling donkeys examined 167(40.2%) donkeys were lame. Regarding the origin of lameness, hoof cavity 76(18.3%), knee area 30(7.2%), knee joint 18(4.3%), elbow 8(1.9%), generalized system 5(1.2%), elbow and knee area 1(0.2%) were the origin of lameness (Table 1). High frequency of lameness observed in the front legs than in the hind limb; left front 59(14.2%), right front 45(10.8%), right hind 32(7.7%), left hind 15(3.6), all four limbs affected 5(1.2), right front and left hind 1(0.2%), right front and right hind 4(1%), left front and right hind 3(0.7%), left front and left hind 1(0.2%), left front and right hind 2(0.5%) (Table: 2). Out of 167 lame donkeys 69(16.6%) had lameness grade 2, 84(20.2%) scored lameness grade 3 and 14(3.4%) had lameness grade 4.

Factors Associated with the Occurrence of Lameness in Cart Pulling Donkeys in Hawassa: Out of the hypothesized risk factors for lameness in donkeys body condition score ($x^2=22.1$, $p=0.000$), working days per week ($x^2=29.0$, $p=0.000$), working hours per day ($x^2=17.1$, $p=0.004$) and ownership status ($x^2=24.4$, $p=0.000$) were found to be statistically significantly associated. Whereas age of the donkey ($x^2=1.3$, $p=0.86$), owner/rider age ($x^2=0.5$, $p=0.9$), educational level of the owner ($x^2=3.4$, $p=0.1$), work experience of rider ($x^2=1.86$, $p=0.3$) and family donkey farming experience ($x^2=0.69$, $p=0.4$) had no statistically significant association in the occurrence of lameness in chi-square (Table. 3).

Result for the Questioner Survey: From a total of 415 donkey owners interviewed, most of respondents had some elementary level education 286(68.9%) and were in age of were 16-30, 323(77.83%). All respondents provide feed and water for their donkeys after work. But only 1(0.2%) person took care for the foot of his donkey through washing and picking foreign bodies from in the hoof after work. The rest 414(99.8%) persons had not taken any care for their donkey's foot. They used to

Table 1: Occurance of lameness in cart pulling donkeys at Hawassa city by origin

Origin of lameness	Frequency	Percentage
Shoulder	29	7%
Elbow	8	1.9%
Knee area	30	7.2%
Knee joint	18	4.3%
Hoof cavity	76	18.3%
Generalized system	5	1.2%
Elbow and knee area	1	0.2%
Total	167	40.2%

Table 2: Occurrence of lameness in cart pulling donkeys at Hawassa city by affected limb

Affected limb	Frequency	Percentage
Left front	59	14.2%
Right front	45	10.2%
Right hind	32	7.7%
Left hind	15	3.6%
All limbs affected	5	1.2%
Right front and left hind	1	0.2%
Right front and right hind	4	1%
Left front and right front	3	0.7%
Left front left hind	1	0.2%
Left front right hind	2	0.5%
Total	167	40.2%

check the foot when there is a problem in the foot. Only 1(0.2%) donkey's shelter floor is made of concrete while the rest shelter floor is made of mud with no drainage. The prevalence of lameness obtained from the questionnaire data was higher 241(58.1) than the prevalence obtained from physical examination.

DISCUSION

In the present study, the overall prevalence of lameness in cart pulling donkeys in Hawassa was 40.2%. And it was found to be associated with body condition score, ownership status, number of working days per week and number of working hours per day.

The present finding was markedly higher than earlier reports in the country Morgan [13] were 3.1% in donkeys in Debre Zeite including Addis Ababa. This might be due to variation in management and husbandry to the donkeys in the region and working nature of donkeys.

However, the current report is lower than the reported of Broster *et al.* [14] 98% in donkeys in Pakistan and India; and Reix *et al.* [15] 89% in donkey in Pakistan. This difference may be due to difference in donkey work type and work load, difference in working environment which includes topography. It may also be explained by

Table 3: Result of chi square analysis

Risk factors	Number examined	Number of lame donkeys	Percentage of lame donkeys	Calculated χ^2	P-value	95% CI of χ^2			
BCS									
Moderate	60	36	60%	22.1	0.000	0.000-0.007			
Ideal	250	106	42.4%						
Fat	102	24	23.5%						
Obese	3	1	33.3%						
Age									
<3 years	29	14	48.3%	1.3	0.89	0.81-0.88			
3-6years	108	43	39.8%						
7-10years	128	48	37.5%						
11-15years	103	42	40.8%						
>15 years	47	20	42.6%						
Ownership									
Owner	230	68	29.6%	24.4	0.000	0.000-0.007			
Rented	177	95	53.7%						
Commission	8	4	50%						
Family experience of donkey owning									
Yes	224	86	34.4%	0.69	0.4				
No	191	81	42.4%						
Experience of working with donkeys									
1-5years	339	140	41.3%	1.86	0.3	0.34-0.44			
6-10 years	66	22	33.3%						
11-17years	10	5	50%						
Working days per week									
2 day	16	1	6.2%	29.0	0.000	0.000-0.007			
3 day	15	2	13.3%						
4 day	23	7	30.4%						
5 day	63	14	22.2%						
6 day	221	106	48.0%						
7 day	77	37	48.1%						
Hours per day									
3hrs	7	2	28.6%	17.1	0.004	0.000-0.011			
4hrs	52	10	19.2%						
5hrs	31	14	45.2%						
6hrs	52	15	28.8%						
7hrs	52	23	44.2%						
8hrs	221	103	46.6%						
Educational Level									
Illiterate	104	46	44.2%				0.5	0.9	0.16-0.24
Elementary	286	115	40.2%						
High school	25	6	24%						
Age of Rider									
8-15 years	47	17	36.2%	0.5	0.9	0.85-0.91			
16-30 years	323	131	40.6%						
31-45years	39	16	41%						
46-70years	6	3	50%						

the differences in care for donkeys. But closer to the report by Grave and Dyson [16] who reported comparative prevalence of 38.1% in Horses in the UK.

Regarding the predisposing factors, in the current study lameness was found to be significantly associated with body condition ($\chi^2=22.1$, $p=0.000$), donkeys with poor body condition were found to be more likely to be lame compared to those with good body condition. This

is in line with the reports by Reix *et al.* [15] indicated that poor physical condition due mainly to malnutrition is the leading causes of lameness in donkeys. This may possibly be due to increased energy expenditure on locomotion and possible loss of appetite due to pain. Moreover, overworking coupled with under nutrition could lower body condition and increase lameness simultaneously [14, 17].

Table 4: Result of questioner survey

Study variable	frequency	Percentage (%)
Educational level		
Illiterate	104	25.1%
Some elementary	286	68.9%
Some high school	25	6%
Age of users		
8-15years	47	11.3%
16-30years	323	77.8%
>31years	45	10.5%
Management of donkey after work		
Provide feed and water	414	99.8%
Provide feed, water and Hoof care	1	0.2%
Income per day		
10-50 birr	272	65.5%
60-100 birr	132	32.5%
130-150 birr	8	1.9%
Floor of shelter		
Concert	1	0.2%
Mud with no drainage	414	99.8%
Family donkey owning experience		
Yes	224	54%
No	191	46%
Work experience		
1-5years	339	81.7%
6-10years	66	15.9%
11-17years	10	2.4%

In the current research cart donkeys which are continuously used without any day off in a week and which are used for prolonged time in a day were significantly associated with lameness than those having rest more than a couple of days. This might be due to the fact that all of the donkey owners depend heavily on their animals for income generation; hence they use their donkeys without rest which might predispose them to lose their body condition and possibly to become lame. A report by Maranhao *et al.* [18] has indicated that over work on unstable surfaces result in prevalence of multiple joint and tendon swellings and reduced joint flexion, which are clinical signs of lameness.

Kane *et al.* [19] and Broster *et al.* [14] reported that a higher lameness scores in older horses than young ones. Similarly, a study on the range and prevalence of clinical signs and conformation associated with lameness in working draught donkeys in Pakistan has showed a higher lameness scores in older donkeys than young ones [15]. But in the current study there was no any significant association between lameness and age of the donkey.

CONCLUSION

The result of this study showed that lameness is one of the most important causes of loss of performance in cart pulling donkeys. The overall prevalence of lameness

in cart pulling donkeys was 40.2%. The study indicated that the foot of the donkey is the origin of most lameness cases. Multi limb lameness was observed in donkeys in the study area. It was also observed in this study that body condition score, ownership status, number of working days per week and number of working hours per day are found to be the important risk factors for the occurrences of lameness.

Continuous awareness creations to donkey owners on proper management and handling of donkeys should be in place. A comprehensive approach targeting the improvement of welfare of working equids should be given priority by stakeholders. Further and detailed investigations on equines are required to be done to having a wider scope able to mitigate the problems on time.

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