



Lameness and welfare problems in donkey in Shashemene and Negelle Arsi district, Ethiopia.

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Abstract

A cross sectional study was conducted from November 2017 to April 2018 at Negele Arsi and Shashemene district to estimate the prevalence of lameness and welfare problem in 301 donkeys in the two districts. Well-structured and pre tested, interviewer based questionnaire was used in addition to other data collection formats. The overall prevalence of lameness in donkeys working in the two districts was found to be 14.14%. The stepwise logistic regression reveals a significant association of lameness with Tropical Livestock Unit (TLU)(p-value =0.013) and housing (p-value=0.039), whereas road, load carried by donkey, water provided to donkey, daily working hours of donkey, daily expenditure on donkey, veterinary clinic remoteness and daily income gained from donkey was not statistically associated with lameness. Conformational abnormality statistically associated with taking donkey to the nearby veterinary clinic, daily expenditure on donkeys, load carried by quintals, daily cart income, frequency of taking donkey to the nearby veterinary clinic, roads and occupation of donkey owners. Body condition also statistically associated with taking donkey to the veterinary clinic, veterinary clinic remoteness, load carrying and daily cart income with p-value of 0.003, 0.028, 0.029 and 0.004 respectively. Wound of donkey also associated with housing, taking to clinic and live weight of donkey with a 0.020, 0.021 and 0.020 of the p-value respectively. Hoof overgrowth significantly associated with a district (p-value=0.025), working day per week (p-value=0.026), all option securing livelihood (p-value=0.042) and daily expenditure on donkey (p-value=0.018). From total 297 examined donkeys 58(19.53%) donkey expressed abnormal behavior. In both districts all owners provided feed to donkey at working site. Almost all working donkeys in the area were male. In this study area there is no active engagement of Non-Governmental organization (NGO). Furthermore more studies toned to be performed and all the concerned bodies have to work together for the good welfare of donkey as well as the society.

Keywords: Donkey, Lameness, Negelle Arsi, Shashemene, Welfare problem.

1. Introduction

The number of equines in Africa was in the range of 17.6 million comprising 11.6 million donkeys, 2.3 million mules and 3.7 million horses. Ethiopia possessed approximately half of Africa's equines population with 37%, 58% and 46% of all Africa, donkeys, horses and mules, respectively (Blench *et al.*, 2003). According to the current regional distribution of donkeys in Ethiopia, 97% of the donkeys are found in three regions: 44% in Oromia, 34% in Amhara and 19% in Tigray regional states (Feseha, 1998). Donkeys play an important role as working animals in rural, peri-urban and urban areas, employed for carting, packing, riding, tillage and weeding (Pritchard *et al.*, 2005) at a low cost. Despite this huge resource, it contributes limited growth of household and national economy in the country (Befikadu and Berhanu, 2000).

The donkey drawn carts, transport building materials, farm products, and consumer goods. They are also used for public transport. Pack donkeys, on the other hand are used for distributing milk and transport of light goods and plastic containers (Angra *et al.*, 2011). Donkeys are also used in agricultural operations for ploughing (Pearson *et al.*, 2003). Unlike motor vehicles or oxen, working equine animals can be used easily by virtually all ages, including women and children, maximizing families' earning potential (Johnson, 2016).

Despite their invaluable contributions, equines in Ethiopia are the most neglected animals, accorded low social status, particularly the male working equines (Salim *et al.*, 2015). Many of the working donkeys are owned by poor people and the animals' needs are often ignored. The donkeys are forced to work in harsh environments without sufficient resources (e.g. food, veterinary treatment and shelter) and appropriate equipment may not be prioritized (Pritchard *et al.*, 2005). Studies have shown that working donkeys suffers from animal welfare problems such as gait abnormality, joint swelling, broken skin, deep lesions (Burn *et al.*, 2010) and dental problems (Kumar *et al.*, 2014). When their health deteriorates and they are unable to work they are usually abandoned and left to die (Starkey, 1998).

Although there are large numbers of donkeys used for different purposes in Shashemene and Negelle Arsi districts, there is lack of information on the health status and welfare aspect of the donkeys in this study area.

Therefore this study was designed;

- To assess and estimate the prevalence of donkeys lameness,
- Evaluate donkey welfare problems with their associated risk factors

2. Materials and Methods

2.1 Study area

Shashemene district

Shashemene is a town and a separate woreda in West Arsi Zone, Oromia Region, about 150 miles (240 km) from the capital city Addis. It has a latitude of 7° 12' north and a longitude of 38° 36' east (Wikipedia, 2017).

Negelle Arsi

Negelle Arsi district is located in west Arsi Zone of Oromia National Regional State at about 226 km from Addis Ababa with area of 1838 km². Geographically, the district is located from 38° 25' E to 38° 54' E longitude and 07° 09' to 07° 42' N latitude. Except for the South-Eastern part, most of the

District's elevation is between 1500 and 2300 meters. Negelle Arsi has the highest number of rivers in the zone. The major rift valley lakes of Abijata, Langanjo and Shalla are also partly in Arsi Negelle district. The main crops grown in the area include wheat, maize, teff, barley, sorghum, onion and potato. Annual crops accounted for 95% of all croplands in the district. About 80% of the district is sub-tropical, while 20% belongs to the temperate agro-climatic zone. The temperature of the area ranges from 16°C to 25°C and annual rainfall ranges between 500-1150 mm. The rainfall of the area is a bimodal, with short rain occurring from February to April and the main rain from June to October. The short allow farmers to grow potato early and later replace by small cereals specifically wheat Ahmed *et al.*, (2014).

2.2 Study population

The study populations were donkeys working in Shashemene and Negelle Arsi district. The target populations were all randomly selected working donkeys in the two districts.

2.3 Study design

A cross sectional study was conducted on donkeys in Shashemene and Negelle Arsi districts from November 2017 to April 2018.

2.4 Sampling method and sampling size determination

The sampling method used for this study was systematic random sampling method.

The sample size was determined using the formula for single population proportion and the following assumptions were made. A confidence interval of 95% is considered and level of significance was taken at = 0.05. Margin of error of 5 percent and from previous study by Fekadu *et al.*, (2015) in Hawassa administration prevalence of 40.20% was considered. But due to the political instability at the time this study was conducted only with 301 sampling size margin was taken, even though the sampling size was determined to be 374 following Thrusfield (2005) formula.

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

Where; Z= confidence interval (95%)
 P_{exp} = expected prevalence
 n= the required sample size and
 d= absolute precision

$$n = \frac{(1.96^2 \times 0.42) (1 - 0.42)}{0.05^2} = 374$$

2.5 Methodology

2.5.1. Data collection instrument

A structured data collection format was used to register the findings of the lameness examination and welfare problems. In addition to the interviewer administered structured questionnaire was used to interview owners or driver of the cart.

2.5.2. Data collection techniques

A well-structured and pretested questionnaire was used to interview donkey owners or drivers. The questionnaire was prepared in English and translated to Afaan Oromo language to achieve effective interviewing.

Donkey cart owners or drivers were interviewed by researcher and their response was recorded in questionnaire format. The questionnaire was aimed to collect information relevant to the owner/driver experience. General physical examination was conducted to detect presence or absence of lameness while simultaneously welfare problems were also assessed. Lameness was examined first by observation while in motion and later by palpation and flexion of the limb. Age of the animal was identified by their teeth according to Donkey sanctuary (2016) while body condition was categorized in to poor, moderate, ideal, fat and obese as explained by NEWC (2003). Weight of each donkey also initially measured by using a regression formula that established for donkey, $G^{2.12} \times L^{0.688} / 3801$ where G is girth and L is length (Pearson *et al.*, 2000), and after reaching at the mid of data collection it was estimated.

2.5.3. Data Management and Analysis

The data collected in the study area was stored in the MS-excel Spread Sheet Program employed to create the data base. Descriptive statistics was used to summarize the data. After the data was analyzed through step backward logistic regression at the cut off 0.2 p-value then all the risk factors or variables that were associated with the hypothesized dependent variable was identified. Odd ratio statistics was used to test the association between variables as necessary. P-value equal or less than 0.05 at 95 percent confidence level was considered significant in interpreting the results.

2.6. Ethical considerations

All the study participants were informed about the purpose of the study; the right to refuse and assurance of confidentiality and informed verbal consent was obtained from every respondent. Donkeys were handled as per the ethical standard of the donkey sanctuary.

3. Results

From a total of 301 donkey owners/drivers, 297 successfully responded to the questionnaires' and at the same time equal number of donkey was observed yielding a 98.67% response rates for the questionnaire

3.1 Detail of the donkey or cart owners

From the total 297 owners/drivers that were interviewed, 287 (96.63%) were male whereas only 10 (3.37%) were female, and all the male donkeys were uncastrated. Out of the 297 respondents, 155 (52.19%) owned 2 donkeys and use both donkeys for cart pulling, in reverse 142 (47.81%) respondents owned only one donkey. In terms of livestock composition, 102 (34.34%), 142 (47.81%), 29 (9.76%) and 24 (8.08%) owners own 1-3, 3.1-6, 6.1-9 and above or equal to 9.1Tropical livestock unit (TLU), livestock numbers are converted to a common unit by multiplying each number of animals with each specific conversion factor (Harvest choice, 2005) and then all animals was added together as a common unit as above in this study. Most of the respondents have two options, that is they secure their livelihood from the income they get from donkeys and from other options of securing livelihood like Trade, Crop farming, Dairy farm, fattening, civil servant, daily labor and small business, of securing livelihood that is 182 (61.28%) were owners of the donkeys, in other way 85 (28.62%) owners have three option of securing livelihood and

only 30 (10.10%) owners depend in one option, from the income gained from donkey work, of securing livelihood. Almost all owners use their donkey for cart pulling which is 288 (96.97%) while only 9 (3.03%) donkey was used for other duty. All owners provide feed and water for their donkey after work except one owner.

The detail of the owner was described by descriptive Table 1 of below regarding all the information acquired through the questionnaire.

3.2 History of lameness

From total interviewed 297 respondents, 130's had come across with lameness in their donkey in the past one year which is 43.77%. From the total 130 respondents that had seen lameness in their donkey 97 (74.61%) observed it during kiremt season (it is a rainy season of the country) whereas 22 (16.92%) respondents observed lameness during bega season (a season in which the country get a little or no rain at all) and only 11 (8.46%) respondents had a history of lameness throughout the year or in all seasons.

Table 1: Descriptive table of the result of the questioner survey

Variables/Factors	Levels	Numbers/ frequency	Percent/proportion
District	Shashemene	163	54.88
	Arsi Nagele	134	45.12
age of driver	9_15	87	29.29
	16_20	104	35.02
	21_25	49	16.49
	>25	57	19.2
	Other ^[1]	90	30.3
Ownership	Own	207	69.7
	Illiterate	16	5.39
Education	Elementary	232	78.11
	high school	49	16.5
	cart driving	94	31.65
occupation of the owner	Others	203	68.35
	one option	30	10.1
all livelihood	two options	182	61.28
	three options	85	28.62
	daily cart income	≤150 birr	190
donkey age	> 150 birr	107	36.03
	1-5 age group	75	25.25
donkey age	6-10 age group	168	56.57
	11-15 age group	38	12.79

working day(s) per week	>15 age group	16	5.39
	1day per week	28	9.42
	2 day per week	88	29.62
	3day per week	173	58.24
	Others	8	2.69
Housing	no roof	178	59.93
	have roof	119	40.07
taking to vet clinic	No	187	62.96
	Yes	110	37.04
vet clinic remoteness	no clinic	57	43.85
	near	48	36.92
	Far	25	19.23
feeding at stall	No	33	11.11
	Yes	264	88.89
water provision at stall	No	63	21.21
	Yes	234	78.79
road status	Asphalt	47	15.82
	Pista	129	43.43
	Others	121	40.74

Note been: - vet clinic remoteness is only associated with owners that come across with history of lameness 1, other: - it includes borrowed donkey, work by commission and hired riders of cart.



Fig. 1: Hoof of donkey working in Asphalt road In Shashemene. District



Fig. 2: Hoof overgrowth in donkey working in Negelle Arsi.

Parts hoof/foot is destroyed out by the road.

3.3 Result of lameness examination

Among 297 examined donkeys 42 (14.4%) donkey were lame. Regarding the risk factor of lameness, housing and tropical livestock unit have a significance for occurrence of lameness with a P-value of 0.039 and 0.013 respectively, from 42 lame donkeys, 29 (69.04%) live in the house that have no shelter whereas only 13 (30.95%) live in the house that have

shelter. Other hypothesized risk factors, such as sex, daily cart income, daily expenditure on donkey, veterinary clinic remoteness, taking to clinic, hoof overgrowth, all options of securing livelihood of the respondents, feeding, water provision, load carried, road status and ownership status have been proved as have not a significance with prevalence of lameness through analysis made by stepwise backward regression.

Table 2: Risk factors significant with lameness

variables lev	Levels	Number	Prevalence	odd ratio	p-value
Housing	shelter without roof	178	59.93		
	shelter with roof	119	40.07	0.391	0.039
Tropical livestock unit				1.089	0.013

Tropical livestock unit are livestock numbers converted to a common unit, conversion are cattle=0.7, sheep=0.1, goat=0.1, pigs=0.2, chicken 0.01, in this case TLU was calculated by multiplying each number of livestock the owner owned with a conversion factor according to **Chilondaand Otte (2006)**.

3.4 Health problems and factors that have welfare implications

3.4.1 Abnormality

From the total examined donkeys, 138 (46.46%) had conformational abnormality whereas 159 (53.54%)

donkeys were found free from conformational abnormality. There were number of risk factors identified as having significance with prevalence of the conformational abnormality through backward stepwise regression using STATA analysis. From this, taking donkey to the nearby veterinary clinic, daily expenditure on donkeys or cost to buy feed and water for donkeys during working days, Average load or weight carrying by quintals, daily cart income and frequency of taking donkey to nearby veterinary clinic with 145.85, 4.56, 0.49, 5.21, 3.631, 4.79, 3.02, 3.03 odd ratio and 0.003, 0.004, 0.011, 0.004, 0.008, 0.037, 0.007, 0.045 p-value respectively,

Table 3: Risk factors associated with occurrence conformational of abnormality in donkey

Variables	Levels	Number	Percent	OR	P-value
Taking to clinic	No	186	62.62		
	Yes	111	37.37	145.85	0.003
Donkey’s daily cost	≥12 birr	165	55.55		
	<12 birr	120	40.40	4.56	0.004
	Other	12	4.04		
Roads	Asphalt	47	15.82		
	Pista (korkonch)	129	43.43		
	Others	121	40.74	4.79	0.037
Load weight(quintal)	5.2 quintals	297	47.60	0.49	0.011
	daily cart income				
	≤150 birr	190	63.97		
	>150 birr	107	36.03	5.21	0.004
frequency of taking to- clinic	Yes	185	62.71	3.631	0.008
	No	110	37.29		
Donkey age	1_5 age	75	25.34	3.02	0.007
	6_10 age	169	57.09		
	>10 age	153	17.57		
Occupation	Cart driving	94	31.65	3.03	0.045
	Others	203	68.35		

3.4.2 Body condition score

From total 297 examined donkeys, 82 (27.6%), 148(49.8) and 67(22.5) had poor, moderate and ideal body condition. Taking donkey to clinic, remoteness of the clinic, load carrying in quintals and daily cart income were significantly associated with poor body condition with 6.135, 0.463, 1.973, 0.194 and 0.003, 0.028, 0.029, 0.004 odds ratios and p-values respectively



Fig 3: Wound on the commissure of lip caused by

Improper use of bit Or a metal mouth piece attached to bridle, used to control a horse or donkey.

3.4.4 Hoof overgrowth

From examined 297 working donkeys in the two districts, working days per week, all option of securing

3.4.3. Wound

From the total of 297 examined donkeys, 129(43.43%) had a wound at different parts of their body and 168 (56.7%) donkeys were free from wound and different factors were found significantly associated with wounding of donkey; housing, taking to veterinary clinic, weight of donkey in kilograms with 0.500, 0.177, 0.988 odd ratio and 0.02, 0.021, 0.020 p-value respectively.



Fig 4: wound on the chest of donkey

livelihood, donkey expenditure and district had significant associations with hoof overgrowth.

Table 4: Prevalence of hoof overgrowth in the two districts with 0.025 and 0.249 p-values and odd ratio respectively

District	hoof overgrown		prevalence %
	Yes	No	
Shashemene	51	112	31.29
Negelle Arsi	31	103	23.13

Table 5: Factors that have a significant association with a poor body condition

variables	Levels	Number	Percent	odd ratio	p-value
taking clinic	Yes	185	62.62	6.135	0.003
	No	112	37.37		
vet clinic remoteness	no clinic	57	43.85	0.463	0.028
	near	48	36.92		
	far	25	19.23		
Load carrying (average quintals) daily cart income	-	-	-	1.975	0.029
	≤ 150 birr	190	63.97	0.194	0.004
	> 150 birr	107	36.03		

Table 6: Risk factors that responsible for the hoof overgrowth in donkey

variables	odd ratio	p-value
District	0.249	0.025
working day per week	1.909	0.026
all livelihood	2.736	0.042
donkey cost	0.337	0.018

Table 7: Factors associated with wounding of donkey

variables	Levels	Number	Prevalence	odd ratio	p-value
Housing	shelter without roof	178	59.93	0.500	0.020
	shelter have roof	119	40.07		
taking to clinic	No	186	62.62	0.177	0.021
	Yes	111	37.37		
Weight (average)	Mean weight of donkey (kg)	132.1582 kg	-	0.988	0.020

4. Discussion

The overall prevalence of donkey lameness in Shashemene and Negelle Arsi district was 14.14% and it was found significantly associated with housing and tropical livestock unit (TLU). This prevalence report was lower than earlier study of Fekadu *et al*, (2015) in Hawassa city administration which reported as the overall prevalence of lameness in working donkey was 40.20%. This difference may be due to the fact that most of the working donkeys in Hawassa city administration worked for more days, 6 or 7 days per week, where as in this study almost all donkeys worked for less than or equal to three days (≥ 3) days per week. It may also be due to the ownership status difference, in which in the current study area more than 96% of the rider was the owner or the owners' family which is reverse of the ownership status in the Hawassa city administration which is indicated by the fact that many of the riders of the cart and donkey had rented was around 42%.

However the prevalence of lameness in working donkeys in current study was higher than the work of Morgan (2006) who reported 3.1% prevalence of lameness in working donkeys in and around DebreZeit including Addis Abeba. This variation can be explained by the fact that the working donkey in this study was primarily used for cart pulling while the donkey in and around Debrezeit was used primarily for pack purpose.

Regarding the risk factor of lameness donkeys that have been housed in the house that have no shelter were more likely to be lame as compared to those who live in enclosure or open air like kraal. A similar finding was reported by Sane (2004). This may be as a result of wet and dirty nature of the open air enclosure that moisten hoof of the donkey and predispose it to infectious disease(s) and in return result in the lameness.

Tropical livestock unit was also associated with the occurrence of lameness, according to this study donkey was kept in enclosure, kraal, which can't prevent the rain and also not allow for proper drainage. Additionally the donkey lived with other livestock overnight which exacerbate the muddiness of the floor and perhaps result in lameness.

In this study the welfare problems in donkey in Shashemene and Negelle Arsi was assessed directly by hypothesizing wound, different abnormality, body condition, hoof overgrowth and behavior of the donkey. Each hypothesized risk factor was analyzed through stepwise backward logistic regression at the cut point of p-value less than 0.2.

From the above variables that were assessed directly for welfare implication, wound was one factor associated with lameness, in this study the overall prevalence of wound is 43.43% which is in agreement with report of Ashinde (2017), who reports the overall prevalence of wound as 47.7%. In this study there is a significant association between wound prevalence and housing but this finding disagrees with earlier finding of Aragaw (2016) who found that the prevalence of wound on the back (back sore) is higher in the donkey those housed indoor. This difference may be due to the husbandry management and working days difference. The current study was in agreement with the finding of Tesfaye and Mekuria (2017). Taking to the clinic is another variable that have a significant association with the prevalence of wound in donkey in this study. This is because the animal that have wound problem is not taken to the clinic, this observation was comparable with Seyoum *et al.*, (2015) in which only 18.92% owners' seeked for modern treatments for their donkey's from veterinary clinics.

Poor body condition has also a welfare implication, but this study reveals 27.61% poor body condition, where as 49.83% and 22.56% were moderate and ideal body condition. This finding is disagree with the finding of Yenew (2017) which indicates high percentage of poor body condition, which is perhaps as a result of feeding management and weather condition of the study area difference. A number of variables have been showed a significant association with a body condition score (p-value 0.05), this includes taking to clinic, daily cart income and age of the owner The association of body condition score and treatment of donkey is due to the effect of the drug like anti helminthes, those drug that decrease the burden of parasite and result in weight gain in donkey, in the previous study also found that as Body

condition score was closely associated with the level of helminthes infection Shiferaw *et al.*, (2003).

An abnormality is also have a major welfare concern because an abnormality like conformational can affect the comfort of the animal and sometimes also may result in pain. In this study an abnormality was significant with treating animals in veterinary clinic, this is may be due to the fact that those donkey with abnormality can predisposed to the different health problem like lameness and other. According to Kiros *et al.*, (2016) several conformational abnormality were associated with pain which has welfare importance. Load carried is negatively associated with conformational abnormality this is may be due to the fact that donkey with conformational abnormality were not comfortable enough to carry more load as those of sound donkey.

Hoof overgrowth in this study was negatively associated with district, The study performed with a p-value less than 0.05, this indicate that when Negelle Arsi compared to Shashemene hoof overgrowth is higher in Shashemene which is a negative association. The findings of this study also support the above association in which the prevalence of hoof overgrowth in Shashemene is 31.28% where as in Negelle Arsi it was 22.55%. This difference may be due to the difference in infrastructure like roads. The other factor that had a significant association was livelihood, which means the livelihood has a positive significant association for the occurrence of hoof overgrowth

Behavior of the donkey in the current study also assessed indirectly by asking the owner or the rider of the cart if there is divergence from normal, accordingly from 297 total donkey, 58(19.53%) of donkey have an odd behavior; this may be as a result of those male donkeys in the current study area was uncastrated, uncastrated donkey have an aggressive behavior, in agreement with Madure (2014).

Conclusion and Recommendations

Donkey that is used for cart pulling and packing have been contributing for much of the country's GDP, which is not considered by most of the people in the country and have not given equal value and emphasis as those of other livestock? In this area, equines play a great role in securing the livelihood of the people

though their welfare status is poor. In addition I have not found any published paper in the current study area on donkey welfare. Those donkey which was lame falls pain while at the same time working and carrying load without any rest, Even though lameness was not highly prevalent. additionally in this area, there were much of welfare problems prevail even though this study is give an emphasis on the few of the welfare problems in which most of them assessed directly. Furthermore I have seen only SPANA and Brooke Ethiopia NGOs in collaboration with AADA were working on equine welfare protection for improved resident communities’.

Based on the above conclusions the following recommendation was forwarded

- In this study area donkeys need a shelter that prevents rain and coldness
- In the area there is a need of further research and study to identify welfare problems and to make all the concerning body to work on it.
- In the area of the result of this paper mentioned above, if a good welfare of animal, donkey, and also human is required, Awareness in the society of this district is mandatory
- Non-Governmental organization (NGO) and all concerning body have to be appreciated for what they have been doing and they have to actively participate and contribute their part in this two vast society holding districts in training owners of the donkey and all stakeholders.
- Policy maker have to give an emphasis toward the welfare of Equines by legislating laws that prevents overloading of donkey and also improve their welfares.
- donkeys which was lame, those clearly known by the owners, have to be not used for work

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