



Assessment of carting equine welfare and management practice in Bahir Dar town

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Abstract

A study was conducting to identify the major welfare and management practice on cart pulling mules of Bahir Dar town Amhara Region of Ethiopia from March 2012 to June 2012. Questionnaire Survey was caring out on 50 cart pulling mule owners to collect information on examined the welfare and management practice on cart pulling mules of Bahir Dar town at different carting mules working and rearing place. When we saw the educational background of the respondents, 23(46%) the respondents were illiterate, 20(40%) were learned Primary school (Grade 1-6) and the rest 7(14%) Secondary (Grade 7-12) and above. In Bahir Dar town, the major mule production constraints were feed shortage, which accounted 32(64%) of the respondents, and prevalence of disease, which accounted 14(28%) of the respondents and rest 4(8%) were exposed to scarcity of water and labor. Mule owners were got feed from different sources, the major once were crop residues (Teff residue from Teff milling), which was used by 20(40%) of the respondents and 22(44%) of the respondents used grazing during dry and wet season respectively. The major source of water in the study area ranked from higher to lower during dry season are pipe water ,rain ,river, pond and spring water, the respondents used 63.8%,24.3%,10.2 %,1.7% respectively. On the other hand, the major source of water during wet season from higher to lower rank were rain, pipe water, river, pond and spring water, when we arrange them in proportion they used 42.86%, 38.9%, 9.52%, 7.14%, 1.58% respectively. In addition to, the water sources mules get water twice a day. The study showed that 35(70%) of the mules were exposed for external injuries, higher prevalence was recorded in young animals than in old animals. When we compared the external injury with educational level of the respondent we get the degree of freedom=2 and ($X^2=2.348$) which was less than table value (5.991), so, there was no statistically significant difference. In the study area, 84% of the respondents kept their mules in a separated house from the family house, but 16% housed their mules in its residential house together with. The study revealed that intensity of injuries was highly associated with improper design and utilization of harness. And also, food shortage, disease and related problems (e.g. injuries, acute illness) are major constraints to their performance. Total animal welfare in the area was poorly practiced.

Keywords: Welfare, Ethiopia, Management, External injuries, Prevalence.

1. Introduction

Ethiopia's estimated livestock population of about 153.27 million in 2010-2011 was believed to be Africa's largest. There are approximately 52.13 million cattle, 24.2 million sheep, 22.6 million goats, 1.69 million horses, 6.4 million donkeys, 0.37 million mules, 0.99 million camels, and 44.89 million poultry (CSA, 2011). According to CSA (2005) farmers in Amhara has 9,694,800 head of cattle (representing

25% % of the national), 6,390,800 sheep (36.7% of the national), 4,101,770 goats (31.6% of the national), 257,320 horses (17% of the national), 8,900 mule (6% of the national), 1,400,030 asses (55.9% of the national), 14,270 camels (3.12% of the national), 8,442,240 poultry of all species (27.3% of the national), and 919,450 beehives (21.1% of the national).

The world equine population estimates about 114 million: 59 million horses, 43.6 million donkeys and 11 million mules FAO (2009). There are more horses in the world than donkeys. On the other hand, 90 million equines in the developing world, with highest population concentration in Central Asia and North and East Africa (FAO 2003). Over 95% of all donkeys and mules and 60% of all horses are found in developing countries (Fielding 1991), where they are kept mainly for work. Ethiopia possesses approximately half of Africa's equine population with 37%, 58%, and 46% of all African donkeys, horses, and mules, respectively (donkey Sanctuary Ethiopia, 2011).

Amhara region is a home for about 2 million donkeys, 124 thousand mules 300 and thousand horses. There are about 11 donkeys per square km of Amhara land. There is one donkey for every two households in the community. This ratio is much higher in the rural community, three donkeys per every five household (donkey Sanctuary Ethiopia, 2011).

According to Howe and Garba (1997), pack animals in remote parts of the country offer the only realistic way of obtaining returns from agriculture above mere subsistence. In Ethiopia, the use of equines for transportation will continue for money years to come because of the rugged terrain characteristics inaccessible for modern road transportation facilities as well as the absence of well-developed modern transport networks and the prevailing low economic status of the community.

In addition, equines are important animals to the resource-poor communities in rural and urban areas of Ethiopia, providing traction power and transport services at low cost. The use of equines in door-to-door transport service also provides urban dwellers with the opportunity of income generation. Therefore, the health and welfare of equines should be of crucial importance to Ethiopia (Helen B., 2002).

Despite technological advancement in transportation industry, equines, donkeys in particular remain the backbone of rural transportation in the region. Donkeys are mainly used for transportation of farm products from farmstead to home, to and from market, grain to and from grinding mill houses, fire wood and charcoal for household use or sale, stone and blocks for construction, water for manual-irrigation like growing cash crops including chat, fertilizers, seedlings, aid-supplies, for ploughing and as cash income for the family. Mules in the urban settings are

used for carting with horses. Cart mules are common in Bahir Dar city. The livelihood of more than 500 households in Bahir Dar town entirely depends on cart mules (donkey Sanctuary Ethiopia, 2011).

According to Alujia and Lopez (1991), donkeys start working at the age of one year, but there is no training for donkeys to start working while horses and mules were provide limited traditional training. Despite their uses, the husbandry practices of working equines are poor. Some methods of hobbling to restrain equines cause discomfort and inflict wounds (Mohammed 1991) and poorly designed harnesses or yokes that may be heavy and ragged have an effect on the animals health and safety. In addition, animals are suffering from lack of shelter from sun, rain or biting insects at markets or working sites. Moreover, donkeys and horses, unlike oxen low priority are given when it comes to feed allocation. In many cases, much attention by local communities, professionals and institutions is direct towards cattle than equines, because of meat and milk provision.

In addition to this, donkeys and horses working in the area experience long working hours and difficult conditions. Animals are often engaged in work for long hours and when get free, they are left to browse and feed on garbage. These have a potential to affect negatively their welfare and quality of life. This was justified by low number of donkeys presented annually to the clinic compared to other domestic animals, 270 donkeys vs. 20,000 head of other domestic animals, between 1987 and 1988 (Yilma et al., 1991).

This misuse, mistreatment 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 (Solomon M. and Rahmeto A., 2010). However, in countries where animal welfare is in practice, the life expectancy of equine reaches up to 30 years (Svendsen 1981; Fred and Pascal 2006).

Therefore, the objective of this project was to identify different sound welfare and management practices of working equine in Bahir Dar town.

1.1 General objective

❖ To assess carting equine welfare and management practice in Bahir Dar town.

1.1.1 Specific objectives

- To study the housing of the carting equine.
 - To study the health condition of the carting equine.
 - To assess the common disease occurred frequently.
 - To identify different feed source and feeding system for carting equine.
- To identify the types of harness used for carting.

2. Materials and Methods

2.1 Descriptions of the study area

This study was conduct in Bahir Dar town, the capital city of Amhara region, Ethiopia. The town is located approximately 578 km north-west of Addis Ababa, having a latitude and longitude of 11°36' N 37°23' E/ 11.6°N 37.383°E/ 11.6 °N; 37.383°E and an elevation of 1840 meters above sea level. The temperature is between 20°C / 68.0°F and 30°C / 86.0°F and 820 to 1250 mm. The area receives an average annual rainfall ranging about 820 to 1250 mm.



Figure- 1Maps of Bahir Dar town

2.2 Study population

Carting mules and the households keeping this animal in Bahir Dar town of the Amhara region are the study population. About 10% of the study population will be interviewee. Cart mules are common in Bahir Dar city. There were more than 500 households in Bahir Dar town entirely depends on cart mules (donkey Sanctuary Ethiopia, 2011). We followed random sampling technique, while we randomly select cart pulling mule owners for interview purpose.

2.3 Data Collection and Analysis

A semi-structured questionnaire was developed to collect data, including age, management practice, injury management, and fate of injured animals. Animals were examined physically, and any grossly

visible injuries were characterized and causes identified. For the sake of clarity, injuries were defined and any visible skin/tissue damages and located on any part of the body. Therefore, the owners of carting mules were interviewed and the mules were observed physically. Survey data was analyzed by descriptive statistics and analytical method such as Chi-square was used.

3. Results

3.1 Carting mule owners family education Background

The survey was carried out on 50 cart pulling mule owners, who have different family size and illiterate level. The overall results of our study were discussed follow.

Table 1. Level of literacy of the family in mule owners in Bahir dar town

Level of Education	Proportion in No.(n=50)	Proportion in % (n=50)
Illiterate	23	46
Primary school (1-6)	20	40
Secondary (7-12) and above	7	14
Total	50	100

From the respondents 23(46%) were illiterate, 20(40%) were Primary school (Grade 1-6) and the rest 7(14%) Secondary (Grade 7-12) and above table 1.

3.2 Management practice

3.2.1 Share of responsibility in mule management

Table-2 Share of responsibility in mule management of mule in Bahir dar expressed as a proportion.

Activities	Percentages							
	Husband (n=50)		Wife (n=50)		Children (n=50)		Total	
	No.	%	No.	%	No.	%	No.	%
Feeding	32	64	8	16	10	20	50	100
Herding	22	44	10	20	18	36	50	100
Carting	44	88	0	0	6	12	50	100
Barn cleaning	16	32	22	44	12	24	50	100
Watering	36	72	8	16	6	12	50	100

In carting mule management, Husbands (Head of the house) were more responsible which taken 32(64 %), 22(44%), 44(88%), 36(72%) and 16(32%) of Feeding, Herding, Carting, watering and barn cleaning respectively done from the total management works; wife were the next they done 22(33%), 10(20%), 8 (16

%), and 8(16%) barn cleaning, Herding, Feeding, and watering respectively, but they were not participated in carting activity; whereas Children were covered 18(36 %), 12(24%), 10(20%), 6(12%) and 6(12%) of Herding, barn cleaning, Feeding, Carting, and watering respectively of those activities table 2.

3.2.2 Feed source and feeding system

In our study area mule owners used different source of feed for their mules. The major source of feed are

grazing lands, hay, crop residue (Teff residue from the milling), industrial by products, grass cut and carry.

Table 3. Feed resource and feeding system of mule in Bahir dar town expressed as a proportion.

Sources of animal feeds	Dry Season (n=50)		Wet Season (n=50)	
	No.	%	No.	%
Crop residue	20	40	12	24
Hay	10	20	5	10
Industrial by product	7	14	4	8
Grass cut and carry	7	14	7	14
Grazing	6	12	22	44
Total	50	100	50	100

When we observed feed sources for mules during the dry season 20(40%) of the mule owners used crop residue (teff residue from teff milling), 10(20%) of the respondents used hay, 7(14%) used industrial by product, 7(14%) used grass cut and carry, 6(12%)

used grazing lands; whereas, in the wet season 22(44%), 12(24%), 7(14%), 5(10%) and 4(8%) of the respondents were used grazing lands, crop residue, grass cut and carry, hay; and industrial by product respectively table 3.

3.2.3 Water source and watering system

The major source of water in the study area ranked from higher to lower during dry season are pipe water ,rain ,river, and pond water, the respondents used 35(70%), 10(20%), 4(8 %), 1(2%) respectively. On

the other hand when we seen the major source of water during wet season from higher to lower rank were rain, pipe water, river, pond and spring water, when we arrange them in proportion they used 25(50%), 17(34%), 4(8%), 3(6%), and 1(2%) respectively table 4.

Table 4. Water source and watering management of mule in Bahir dar tow expressed as a proportion.

Source of water	Distance	Dry Season (n=50)		Wet Season (n=50)	
		No.	%	No.	%
Pipe water	At home	35	70	17	34
Rain	Around home	10	20	25	50
River	Around home	4	8	4	8
Pond	Around home	1	2	3	6
Spring water	Around home	0	0	1	2
Total		50	100	50	100

The frequency of watering of mule per day in proportion were 90% of the mule owners provides water twice per day, 4% of mule owners provides once

per day, while 6% of owners provides three times per day table 5.

Table 5. Frequency of watering in Bahir Dar town expressed as a proportion

Frequency of watering	Proportion In No.(n=50)						Total	
	Twice a day		Three times		Once a day		No.	%
	No.	%	No.	%	No.	%		
Frequency of watering	45	90%	3	6%	2	4%	50	100

3.2.4 Housing system

In the area where we conducted the survey the most common type of housing system is that separate barn

and family house. As the survey indicated 84% of respondents used separate barn and 16% of mules share a house with the owner or uses family house table 6.

Table 6. Housing system and house management in Bahir Dar town expressed as a portion.

House structure and management	Proportion In No.(n=50)				Total	
	Separate barn or shelter		In family house		No.	%
	No.	%	No.	%		
House structure	42	84%	8	16%	50	100

Table 7. Frequency of house cleaning in the area expressed as a proportion

House structure and management	Proportion In No.(n=50)				Total	
	Once a day		Twice a day		No.	%
	No.	%	No.	%		
Frequency of house cleaning	48	96	2	4	50	100

We had also conducted survey, which tells about the frequency of house cleaning and we had got the following results, 48(96%) of owners cleaned mules house once a day but 2(4%) of owners cleaned twice per day table 7.

3.2.5 Disease

There are different parasites that are endo which are found inside the mule and ecto which are found outside of the mule. In Bahir Dar town we have majorly found parasites 24(48%), 13(26%), 5(10%), 3(6%), 3(6%), 2(4%), Epizootic lymphangitis, Anthrax, fascioliasis (liver fluke), foot root, colic, bloat respectively table 8.

Table-8 Common mule diseases in Bahir Dar town, according to its importance

Activities	No.	Percentages (n=50)
Epizootic lymphangitis	24	48
Anthrax	13	26
Fascioliasis	5	10
Foot root	3	6
Colic	3	6
Bloat	2	4
Total	50	100

3.2.6 Physical examination result

Through physical examination among the 50 mules, 35 (70 %) of them were faced injury on different parts of their body 9(18%), 7(14%), 7(14%), 6(12%), 4(8%), 1(2%), 1(2%) chest and back, back/wither/

shoulder and back, shoulder, chest, chest and belly, and belly respectively; however, the rest 15(30%) of cart pulling mules were free from any type of injury table 9.

Table-9. Carting mule injuries with corresponding body parts in Bahir dar

Parts of the body to be injured	Frequencies	Prevalence (%)
Chest and Back	9	18
Back/wither/	7	14
Shoulder and back	7	14
shoulder	6	12
chest	4	8
Chest and belly	1	2
Belly	1	2
Total	35	70

All numbers are in proportion with this data with degree of freedom $(2*1) = 2$, the injury was compared with educational level of the respondent. There was no statistically significant difference at alpha 0.05, when

$(X^2=2.348)$ which was less than table value (5.991) table 10.

Table-10. Relationships between carting mule injuries with educational level of the respondents

Educational level of the respondents	Injury level				Total	
	Injured		uninjured		No.	%
	No.	%	No.	%	No.	%
Illiterate	18	36	5	10	23	46
Primary school	12	24	8	16	20	40
Secondary school	5	10	2	4	7	14
Total	35	70	15	30	50	100

3.2.7 Harnessing

Harnessing was crucial and important management practice in cart pulling mule activities. In Bahir Dar town, we had seen that different harnessing system of cart pulling mules these were saddle all (50) of the respondents used made from Metal and wood, breast band which was 45(90%) made from Rubber (old tyre) and 5(10%) made from Canvas , breaching strap,

which were 33(66%) of the respondents used made from rope with plastic pipe and of the respondents used made from rope with close, and all (50) of the respondents used padding materials made from Sisal sac and old blanket, which were made from different materials table 11.

Table-11. Type of harness for carting mule in Bahir Dar town

Types of harness	Materials it made	Sources	Parts on the body	No.	Percentages (n=50)
Saddle	Metal and wood	purchased	Back/wither/	50	100
Breast band	Rubber (old tyre)	purchased	Breast	45	90
Breast band	Canvas	purchased	Breast	5	10
Breeching strap	Rope with plastic pipe	purchased	To hind quarter	33	66
Breeching strap	Rope coiled with cloth	purchased	To hind quarter	17	34
Padding	Sisal sac and old blanket	Purchased from home	Under pack saddle /back/	50	100

3.3 Production constraint

In Bahir Dar town, most of the respondent had faced different constraints in their mule production these constraints were shown in the following table.

Table-12. Major production constraints in the area expressed as a proportion.

constraints	Percentages (n=50)	
	No.	%
Shortage of feed	26	52
Health problems	18	36
Water scarcity	3	6
Scarcity of labor	3	6
Total	50	100

From the respondent 26(52%) of mule owners had faced to shortage of feed which was the primary challenge, next to the feed 18(36%) of mule owner had faced health problem, 3(6%) faced to water scarcity and the rest 3(6%) faced to scarcity of labor. However, few of them were challenged with water and labor scarcity table 12.

3.4 Welfare issue and mule management intervention in the area

An animal welfare is defined as the overall sum of animal husbandry and management practice. When we observed in the area most of the mule were prone to poor animal welfare, such as most of them are injured, exposed to malnutrition and not threaten (personal observation).

The only organization that work to improve the welfare of mule in the area was donkey sanctuary Ethiopia Bahir Dar project, which help the owner by providing medicine, training and also promote animal welfare issue using different media.(personal contact)

Discussion

During our study period one of the most important component of cart pulling mules management that we have observed was feed source and feeding practice in the study area .As we have tried to show on the result part of this paper the most important source of feed were crop residue, which was Teff residue from Teff milling, which hold 20(40%) of the respondents used. Owners used this crop residue mostly in dry period than wet season because of this time the grazing areas were dried and they were easily Accessed to this feed. Next to this, 10(20%) of the respondents used hay for their mules feed source during the dry period because it was accessed at this time next to Teff residue. In a similar way 22(44%) of the respondents used grazing land for their mule as a feed source which are found in the margin of road and around the rivers and with in the residential houses. This was mostly accessible during the wet season. Other feed sources in area were purchased cut grass, which accounted 7(14%) and industrial by products which holds 4(8%).However, most of the respondents were not interested to feed their mules industrial by products and kept it as the last choice for their mule, since they believed that, if the mule ate these industrial by product they were exposed to a some disease injury and some of them believed that the mule became fatten as a result they were not be active during carting operation. These abused the welfare of the mule which they have freedoms from hunger and malnutrition (FAWG, 1993).

On the other hand, working mules' loss much energy during their working period and they were also not get enough time to ate as much feed as to fulfill their nutritional requirement to produce enough amount of energy to replenish their lost energy. In addition to these most of the feed sources in the area, were a source of roughage, which was not provided sufficient nutrients.

Similarly, according to Duncan (2005), working animals should have additional or high nutrient containing feed to replenish their lost energy during their working time. The other author, Hammond (1997), also studied mule in a good condition can

better withstand disease and injury and was better equipped to fight parasite infection.

Carting mule owners used different feeding materials for feeding their mules. Most of them used plastic sheet laid on the ground mostly for feeding Teff residue and cut grass, they also used feeding trough made of wood and stone for feeding of cut grass and hay. Some of the respondents used basket and plastic tree for feeding industrial by product and they put the grass on the ground null.

When we observed the water source and watering system in the area, most of the respondents 35(70%) used pipe water as a water source during the dry period due to they were lived in the town, they were less accessed to river, and during wet season most of the respondents 25(50%) used rainwater because of at that time rain was available. However, 10(20%), 4(8%), 1(2%) of the respondents which had not accessed to pipe water used rain ,river, and pond water respectively as other sources of water during dry period; and 17(34%), 4(8%), 3(6%), and 1(2%) of the respondents pipe water, river, pond and spring water respectively used as water sources. According to Pearson, (1998), Water constituent about 65-70% of the body weight of adult equine, water is vital to the life of animal, water is taken without feed to act as a fluid medium for and propulsion though GIT.

When we seen the frequency of watering which indicated in table 5, per day 45(90%) of the respondents gave water twice per day, 3(6%) of the respondents once a day and the rest 2(4%) three times per day. However, according to Bradly (1981), the daily water requirement of equines ranges from 20 to 70 liters depending on the environment and the physiological condition of the animals. The cart pulling mule owners tried to partially fulfill the welfare issue that freedom from thirst (FAWC, 1993).

Nevertheless, not fully satisfy the mules because they worked all the day and loss much water during the daytime. Moreover, most of them got water at the morning before they went to work and at the afternoon when they back to home after 1-2 hours rest, but it was not enough and some of them not got fresh water. On the other hand, according to Brennan (2001), water should be available *ad lib* all the day and in the house. 42(84%) of the respondents used separate barn, but 8(16%) of them shared family house for their mules in the study area, which were not have feed and water trough and not had enough ventilation . However, according to Lund et al. (2006), be housed in stabling

provides protection for equines and convenience for its owners stable has also an advantage of easier to monitor and control the equine food and water intake when it is inside.

In Bahir Dar town 48(96%) of mule owners cleaned mules house once a day and 2(4%) of mule owners cleaned twice per day, and the floor was also prepared from materials which were difficult to cleaned. However, it must allow for hygiene includes the regular cleaning of feed and water containers and the removal of faces. Stable hygiene is vital tool in the control of ecto parasites and other disease (Brennan, 2001).

Health is a natural state of equine to do three fundamental things to survive, to nourish it and to reproduce. These three things are key points, which are characteristics of health of equine. Main et al, (2003). During our study period, we observed different types of mule disease, which affect the health status of them. Among those diseases epizootic lymphangitis was the most commonly occurring and fatal in Bahir Dar town which accounted 24(48%) of the respondents. Next to this Anthrax13 (26%),

fascioliasis (liver fluke) 5(10%), foot root 3(6%), colic 3(6%) and bloat 2(4%) were observed in Bahir dar town.

In a similar manner, according to the Brooke (2007), working equines are prone to painful, debilitating and often fatal illnesses and conditions such as epizootic lymphangitis, tetanus, and parasitic infections and colic. In addition to these mules that were worked under difficult environmental conditions including intense heat ,difficult train and often in appropriate equipment with in adequate food and water resulting in exhaustion, dehydration, malnutrition, lesion and hoof problems.

During our study almost all of the respondents were treated their mule in modern way when they affected by disease. Except few respondents, the majority of them were not vaccinated their mules' .Similarly, according to Freeman et al. (1999); it's natural for most peoples to spend money on visible disease condition. This includes lameness, saddle sores, some external parasites and skin disease. Many equine owners tend to threat health at later stage of development of disease rather than in the early stage.



Figure-2 Epizootic lymphangitis disease effect

One of major problems of cart pulling mules were faced in Bahir Dar town was mechanical injuries, associated wounds and concurrent disease. The result of this study indicated that external injuries were recorded at a prevalence rate of 35(70%). However, other research that was done by Pearson et al. (2000), reported from central Ethiopia at a prevalence rate of

44%. However, There was no statistically significant difference, when ($X^2=2.348$) which was less than table value (5.991). There was no relation between injury level on the cart-pulling mule and educational level of the carting mule owners, which was indicated at table 10.

In Bahir Dar town, intensity of injuries was highly associated with improper design and utilization of harness, and poor feeding and other managements. In a similar study done by Pearson (2000), injury also might be associated with the degree of natural padding in which animals that have little natural padding, absence of supplementary food, improper management and other associated factors are more prone to injuries than that of better condition (personal observation).

26(52%) of the respondents showed that feed shortage were their mule production constraint, 18(36%) should faced health were their mule production problem, 3(6%) responded water scarcity was their mule production problem and the rest 3(6%) showed scarcity of labor were their mule production problem in the area. The target groups were lived in urban area and they were difficult to got enough land for grazed their mules and the cost of industrial by product and Teff left over became higher and they were not tolerate this cost. So, they were faced to shortage of feed.

Other respondents told that disease became mule production problem in the area, because of different fatal diseases like epizootic lymphangitis, Anthrax and colic, which kill their mules at rapid rate and their lack of awareness about treatment and vaccination lead their mules to be diseased.

Thin animals have little natural padding, there for they needs better padding to prevent the occurrence of some injuries. The study also revealed that the occurrence of external injuries varied in different parts of the body, the frequency and percent of prevalence rate on wither(back)and chest, wither(back), wither and shoulder, shoulder, chest, belly and chest and belly, 9 (18%),7 (14%), 7 (14%), 6 (12%), 4 (8%), 1(2%), and 1 (2%),respectively. The result of this study indicated that mules were more injured on their back(wither) due to more pulling load concentrated on it and owners not use enough and convenient amount of padding materials over its back.

Almost all of the respondents used similar harnessing materials, which made from different materials. Back saddle made from metal and wood but it is made of poorly designed, it was put on the back and strongly tied to the body by plastic rope and rubber, which might be predisposed to persistent irritation and injuries and this would also associated with the padding material which were use under the back saddle was old blanket and sisal sack.

Other harnessing material that we observed during our study period were breaching strap which was made of rope but the owners used it coiled with cloth or insert it in the plastic pipe which is important to reduce the sharp edge of rope that causes injury at the tail and belly region.

The third type of harnessing material, which we observed, was breast band some of the respondents used breast band made from rubber (old type) and the rest used made from canvas. For all respondents the source of harness was purchased from the market of a complete harness equipment costs around 100 Ethiopian birr.

According to Biffan and Wolde Meskel (2006), report old donkeys are more exposed to external injury than young one. Similarly, in our study most of the mules were aged because the owners purchased and used them after they were practiced well in packing activities. In addition to this, we observed the presence of injury were higher than uninjured mule.

In Bahir Dar town, the maximum load that mules pull is 4-12 quintals per journey without any kind of distance limitation. Some of the owner loaded the mule up to 1200kg of load; these lead the mules to be exhausted, stress and suffered the welfare of the animal. Above 1000kg cart, pulling mule is already considered (Wilson, 2003).

From those mule owners that we had collected data 23(46%) of them were illiterate, 20(40%) were learned primary school and 7(14%) were learned secondary school this indicated that the number of literate or educated owners are greater than illiterate (uneducated). However, there were no

5. Conclusions and Recommendations

5.1 Conclusions

Equine transport plays a vital role in urban parts of Ethiopia like Bahir Dar town in alleviation of poverty, but development programs and research works have ignored equine.

In Bahir Dar, town carting mules were widely used in transport of various goods. This study revealed that carting mules were a sole livelihood for large proportion of cart mule owners and owners got substantial amount of money per day.

Housing system in the area was separated from family house but it does not include the necessary bedding material and feeding and watering trough at the night and not easy to clean.

Feed sources are more of roughage mostly teff residue from teff milling and not enough to fulfill their daily nutrient requirements for maintenance and working. Therefore, mules were exposed to malnutrition; affected by different types of disease and injury easily. For feeding their equine, they used different materials mostly plastic sheet over the ground.

Cart mule owners in Bahir Dar town used water sources mostly from pipe and rainwater during dry and rain season respectively. Therefore, the quality of water especially from rain source is low and it causes different disease.

Mules in the area were affected by different fatal disease mostly epizootic lymphangitis that was occurred in the area mostly followed the rainy season and there was other diseases were economically important in the area such as colic, faciolla and black legs were found.

Injuries also were important in the area due to poor harnessing materials, over load and malnutrition. The major body parts that exposed to injury were withers, chest, shoulder and belly because of these parts had a direct contact with the harnessing materials.

Cart mule owners used almost all similar harnessing materials for carting among these pack saddle which were made of metal and wood; breeching strap made from rope coiled by cloth or used inside the plastic pipe and the other made from rubber (old car tyr) called breast band.

Generally we observed the welfare of mules were poorly practice due to the owners less aware about the welfare concept, so they abuse the welfare of the mule on one way or in another.

5.2 Recommendations

Based on the study result, the following recommendations were forward for future research and development activities:

✚ The research and development organizations should do works on mules to improve their nutrition, housing and health conditions.

✚ The available poorly designed harnessing materials should replaced by improved harness.

✚ Different NGOs, which working on animal welfare, do works on mule owners to change their attitude towards keeping their mules welfare by preparing different practical training.

✚ Future study do on mule management and welfare should be on participatory approach than direct questionnaire survey.

✚ For future students' study and research on working animal welfare and management reference materials should available in the library.

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