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Assessment of Risk Factors Associated with Poor Body Condition in Working Donkeys in Adami Tulu Jido Kombolcha District, East Shewa, Ethiopia

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Abstract: A cross-sectional study was used to assess the major risk factors associated with loss of body condition in 400 working donkeys of Adami Tulu Jido Kombolcha District. Direct physical observation, semi-structured interview, focus group discussion and coprological examination were used to collect information on potential risk factors. The prevalence of animal observed with poor and moderate body condition score was 27.8 and 39.8%, respectively. Out of the total hypothesized risk factors, overloading (P = 0.002), more than six working hrs/day (P = 0.005), old age group (P = 0.023) and helminth parasites infection (P = 0.049) were significantly associated with donkeys having poor body condition on multivariable logistic regression analysis. Significantly (P = 0.013, OR = 1.9) high mixed parasitic infection were also observed in animals having lower body condition score. Discussion held with key informant groups' revealed overworking, shortage of feed and old age of animal as the major causes of poor body condition. High prevalence of body condition loss was observed in the present study area and this could indicate that donkeys were subjected to multiple management and health constraints that affect their welfare. Hence, training animal owners and users on proper management system may be important to alleviate the existing problems.

Key words: Adami Tulu Jido-Kombolcha · Ethiopia · Working Donkey · Welfare Assessment

INTRODUCTION

Ethiopia is among the nation that possesses the largest equine population in the world. According to Central Statistical Agency (CSA) survey report, the country's horse, donkey and mule population is estimated to be 2.03, 7.43 and 0.4 million, respectively [1]. This number of donkey is the first largest donkey population in the world that is nearly equivalent to 40% of donkeys in Africa and accounts for approximately 11% of the world populations [1]. Working donkeys play a central role in the livelihood of many people across the world. In developing countries, these animals have significant role in local transportation and agricultural production [3, 4]. Despite their great contribution in the livelihoods of mankind, donkeys are often invisible to others, their power source is undervalued and they are given lower value than other species of livestock in a large part of the world [6, 7]. Besides this, the welfare of donkeys may be compromised in a variety of ways throughout their working life as these animals usually put to work for longer hours in uncomfortable working environment [9].

Animals' welfare status can be assessed either directly using animal based parameters or indirectly based on evaluating the adequacy of the inputs and management practices that the animal receives [10]. Body condition score (BCS), which is one of the physical welfare measurement components is used as an indicator of donkey's management condition and its well-being [3]. Donkey's can loss their body condition due to multiple reasons [11]. Literature showed that loss of body condition can be a result of risk factors such as: lack or inadequate feed, uncomfortable working environment, parasites infection, age and dental problems [12]. In Ethiopia, there is the scarcity of information on major risk factors contributing to poor body condition in working donkeys. Therefore; the primary objective of the current study was to identify the major risk factors associated with poor body condition in working donkeys of the study area.

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MATERIALS AND METHODS

Description of the Study Area: The study was conducted in Adami Tulu Jido Kombolcha district (ATJKD), East Shewa, Ethiopia, which is situated about 165 km south-east of Addis Abeba. The district is located at the geographic co-ordinates between 7°35'and 8°05' North latitudes and 38°20' and 38.5°5' East longitudes with an elevation range of 1500 to 2000 m.a.s.l [13]. The study area has sub-humid, semi-arid and arid agro-ecological zones and characterized by sandy loam soils covered with scattered dry land acacias [14]. The minimum and maximum temperature received is 12°C and 28°C, respectively. Rainfall distribution is bimodal and the mean annual rainfall of the area is about 800 mm [13]. The livestock populations of the district were estimated to be 441, 579, out of which 28889 of them are equine [15].

Study Animals: Donkeys comprise around 90% of the total equine populations of the current study area and they are kept for cart, pack transport or dual (mixed) tasks. Pack donkeys are those used for transportation of goods by pack, cart donkeys are animals mainly used for the transport of goods and people by cart and those involved in both types of work are said to be dual purpose donkeys [3]. Therefore; donkeys' engaged in diversified work types constituted the study population. In this study, pregnant female donkeys were not considered as the study animals.

Study Design: A cross-sectional study design was conducted from April 2016 to November 2017 to address the objective of the present study. Potential risk factors associated with poor body condition were taken into account while the data collected from the study units.

Sample Size and Sampling Techniques: Since there is no information on previous prevalence of poor body condition for the present study district, an assumption for the sample size determination was made based on the formula given by Thrusfield and expected prevalence of 50% [16]. Additionally 95% confidence level and 5% absolute precision was considered.

The formula used for sample size determination is:

$n = Z^2 x P (1-P)/d^2$

where:

n = the required sample size
Z = confidence level (regular value = 1.96)
P = expected prevalence (50%) and
d = desired absolute precision (0.05).

Based on the above calculation, the sample size was 384, but 400 animals were included in the study. Prior to sampling, this number of study animals proportionally distributed to the donkey population of the selected study sites. Accordingly, 150, 130 and 120 donkeys were included in this study from Batu town, Gerbi wudine and Werja weshegula peasant associations (PAs), respectively. Simple random sampling technique was used to select two PAs, one urban study sites and one sub-village from each PA. Individual animals were sampled at public gathering areas like watering point and at working sites using systematic random sampling. The sampling interval is computed as the study population size divided by the required sample size.

Data Collection Tools: Direct physical observation data was collected from randomly selected study animals. Prior to the assessment, consent was obtained from animal's owners by introducing the objective of the study. Initially, general information of each animal including their kebeles, sex and work type was recorded on the format developed for this purpose.

Body Condition Score: Body condition scoring of each study animal was d one based on the protocol developed by The Donkey Sanctuary and described on scale of one to five as very thin, thin, ideal, fat and obese [17]. Working donkeys conducted in the present study had body condition category of 1 (very thin), 2 (thin) and 3 (ideal) and no donkey with body condition category of 4 (fat) and 5 (very fat) was observed. Visual inspection and manual palpation of the specific anatomical sites (neck, shoulders, withers, ribs and belly, back and hindquarters) of the animal from all sides were techniques used for assessment of donkey's body condition.

Age Estimation: Age of the animals was estimated by observation of the animal's front teeth (incisors) (i.e. by dentition) [18]. Accordingly, the study populations were categorized into three age groups as young (≤ 3 years), adult (3-10 years) and old (≥ 10 years). The classification of animal age is based on age of first work and productive age [19].

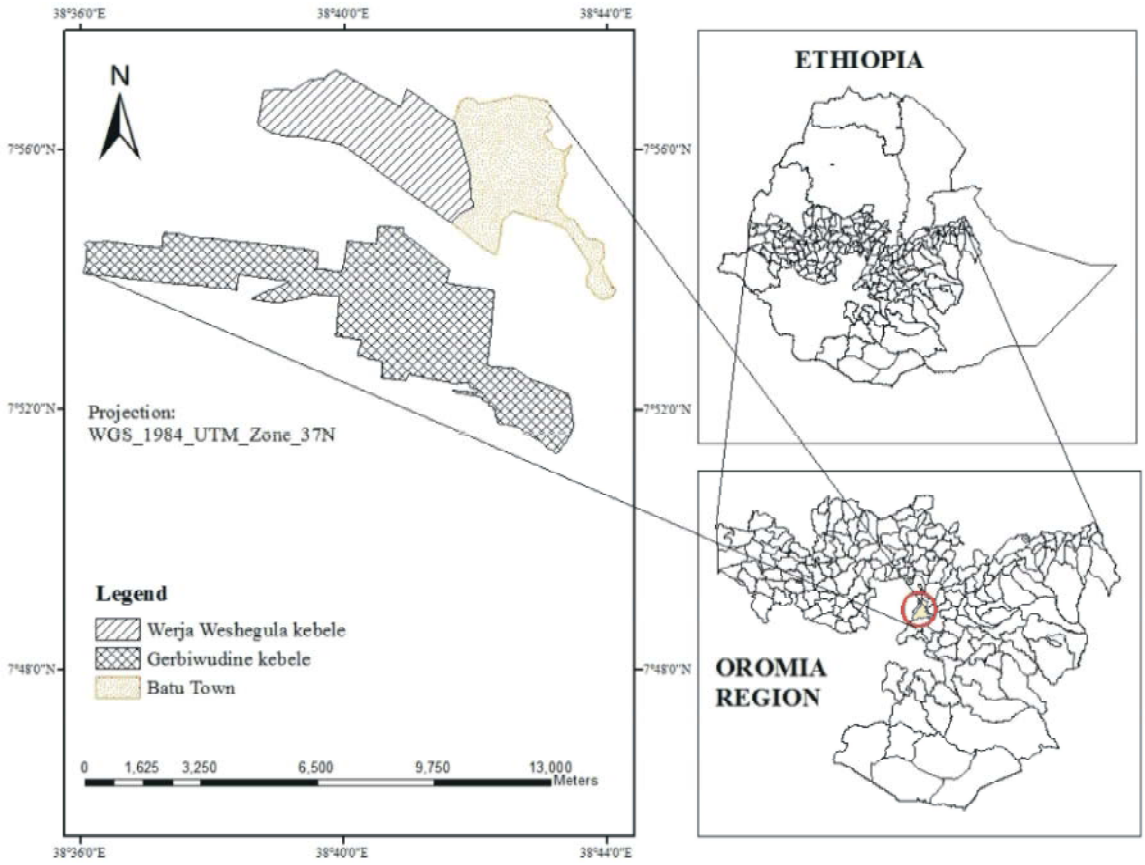

Fig. 1: Map of the study area

Dental Examination: All sampled animals were physically restrained using halter and mouth gag was placed in oral cavity in order to thoroughly examine mouth, avoid chewing and tongue motion that might be interfere with identification of teeth abnormalities. All aspect of the teeth was inspected for any abnormalities and recorded [20].

Wounds and Other Health Problems: Skin lesions were recorded with regard to its number, severity and anatomical location and categorized based on the size and depth of injuries, complication of wound and tissue hypertrophy as severe, moderate and mild [21]. Musculo-skeletal problems assessment was carried out for each study animals while in standing position and in motion. Each limb was assessed for lameness and lameness grading was performed based on the guidelines described by American Association of Equine Practitioners (AAEP) system [22]. The presence of any external parasites infestations were also recorded for each selected donkey.

Face to face interviewee with pre-tested questionnaire having both open and close questions was made with donkey owners. Every randomly selected owner was interviewed to get information regarding his/her general experience on donkey management practice such as: feeding and watering practice, working condition, harnessing and housing condition. Focus group discussion (FGD) was designed to collect information on the major welfare problems associated with donkeys' loss of body condition from the community on the basis of their indigenous knowledge. Group composition included different community members by sex, level of education and social status. Six FGDs were conducted in selected areas and in each study site, discussion was held with eight key informants. A check list which comprised of simple ranking, proportional piling and interview with key informants through open questions was planned.

Probing questions were asked in order to fill gaps and to check for internal consistency within the individuals. Lists of risk factors were written on cards and participants

were asked to organize or rank the cards based on certain specified criteria (simple ranking). Proportional piling was used to prioritize risk factors associated with poor of body condition in donkeys by numbers and their relative importance. This was done by drawing circles on cardboard papers and participants then made to assign 100 counters to the circles that represent the mentioned causal factors. The same procedures were repeated for each selected study site.

Besides, the level of agreement among the scores of six informant groups was assessed using Kendall's coefficient of concordance (W) according to published guidelines on the interpretation of W and the P-values assigned [23].

Fecal samples were collected directly from rectum in icebox using plastic gloves and transported to parasitological laboratory for coprological examination. Each sample was labeled with code referring to the animal number, date, sex, age, BCS and place of collection. Samples were kept in refrigerator at 4°C if immediate processing was not possible.

Qualitative and quantitative fecal analysis: Qualitative fecal analysis was conducted to differentiate the types of parasites and their relative occurrence using sedimentation and floatation technique [24]. Fecal smears then examined microscopically for the presence of parasite ova. Sodium chloride solution was used as a flotation fluid for this study. Quantitative fecal analysis was performed using McMaster technique to determine the fecal egg count of nematode parasites and expressed as the eggs per gram (EPG) of feces. The intensity of infection obtained from the number of EPG of faeces was categorized as mild, moderate and severe if their fecal egg counts are < 500, 500-1000 and >1000, respectively [25].

Data Management and Analysis: All collected data were entered into Microsoft Excel, filtered for any invalid entry, properly coded and then transferred to Statistical Package for Social Sciences (SPSS) version 20 for statistical analysis. Descriptive statistics like percentage was used to estimate the proportion of BCSs and risk factors. The association between risk factors and BCS was analyzed using Ordinal logistic regression. Conventionally, risk factors having P-value less than 0.20 on uni-variate analysis were included in the multivariable logistic regression. In all the analyses, confidence level was held at 95% and $P < 0.05$ was considered as significantly different. In addition, the level of agreement among six informant groups of FGD was assessed using Kendall's coefficient of concordance (W) and agreement was categorized as Weak' for $W < 0.26$, $P > 0.05$; 'Moderate' for $W = 0.26$ to 0.38; $P < 0.05$ and 'Strong' for $W > 0.38$, $P < 0.01$.

RESULTS

Direct Physical Observation Results: In the current study, body condition assessment was made for 400 working donkeys. Donkeys from Batu town comprise 37.5% of the total study populations and 62.5% of them were selected from Gerbi wudine and Werja weshegula PAs. The proportion of animal sex, age group and work type incorporated in this study is described in Table 1.

Out of the total study animals examined for BCS, 67.5% (270) of working donkeys were observed with loss of body condition, of which 41.1% of donkeys were poor (very thin) and 58.9% of them had moderate (thin) BCS. Donkeys' from Batu town accounts for the highest (42.3%) proportion of poor body condition. The majority of donkeys' found in this area were kept for cart pulling purpose, whereas the activities performed by those donkeys from rural PAs was almost similar (Table 1). As indicated in table 2, there was no significant association ($P > 0.05$) between BCS and donkey's work type. Young, adult and old donkeys were included in this study at the proportion of 5.5%, 52.5% and 42%, respectively. Body condition score showed significant variation with respect to old age group of animals.

The current study result showed that from the total animals examined for oral cavity, twelve different types of dental abnormalities were encountered in 110 (27.5%) donkeys. With regard to their proportion, calculus 59 (28.5%), gingivitis 30 (14.5%), overgrowth 25 (12%), hook teeth 23 (11.1%), dental loss 21 (10.1%), fractured teeth 15 (7.2%), buccal ulcers 11 (5.3%), diastema 7 (3.4%), decay 6 (2.9%), under bite 5 (2.4%), tartar 4 (1.9%) and displaced teeth 1 (0.5%). 54.5% of donkeys carried two and three mixed dental health problems events. There was statistically insignificantly difference ($P>0.05$) between BCS and overall prevalence of dental abnormalities (Table 2).

The overall prevalence of wound was 33.3%. External injuries were observed on different parts of animal body and their prevalence was recorded as follows: back sore (11.4%), breast/shoulder (10%), girth sore (13.9%), head (1.5%), hind quarter (9%), lips lesion (16.4%), neck (3%), ribs (9.5%), tail base (11.9%) and wither (13.4%). Among wounded donkeys, 55 (41.4%) of them had mixed type of lesions. 10.5%, 18.1% and 71.4% of donkeys had severe, moderate and mild wounds lesions, respectively. As shown in table 2, BCS was not significantly varied ($P>0.05$) with respect to the occurrence of wound.

Table 1: Proportion of animal sex, age and work type among selected study sites

Variables	Category	Number of animals	Study sites		
			Batu town (n = 150) (%)	G/wudine PA (n = 130) (%)	W/weshegula PA (n = 120) (%)
Sex	Female	129	31 (20.7)	60 (46.2)	38 (31.7)
	Male	271	119 (79.3)	70 (53.8)	82 (68.3)
Age	Young	22	8 (5.3)	5 (3.8)	9 (7.5)
	Adult	210	80 (53.4)	57 (52.3)	62 (51.7)
	Old	168	62 (41.3)	68 (43.9)	49 (40.8)
Work type	Cart	201	105 (70.0)	49 (37.7)	47 (39.2)
	Pack	118	26 (17.3)	34 (26.1)	45 (37.5)
	Mixed	81	19 (12.7)	47 (36.2)	28 (23.3)
BCS	Good	130	42 (28.0)	45 (34.6)	43 (35.8)
	Moderate	159	61 (40.7)	47 (36.2)	51 (42.5)
	Poor	111	47 (31.3)	38 (29.2)	26 (21.7)

Table 2: Logistic regression analysis of risk factors in association with body condition scores

Risk factor	Category	Number of observations	Body condition scores						
			Good	Moderate			Poor		
			%	%	P-value	95%CI	%	P-value	95%CI
Sex	Female	129	33.3	37.2			29.5		
	Male	271	32.1	41.0			26.9	0.887	0.68 - 1.65
Age group	Young	22	63.7	22.7			13.6		
	Adult	210	39	39.1	0.052	1.10 - 6.80	21.9		
	Old	168	20.2	42.9			36.9	0.001	2.68 - 7.78
Work type	Cart	201	31.8	39.3			28.9	0.272	0.70 - 1.84
	Mixed	81	30.9	37.0	0.223	0.65 - 2.18	32.1		
	Pack	118	34.7	42.4			22.9		
Setting	Urban	150	28	40.7			31.3	0.106	0.90 - 2.17
	Rural	250	35.2	39.2			25.6		
Dental problem	Present	110	27.2	44.6			28.2	0.365	0.87 - 2.28
	Absent	290	34.5	37.9			27.6		
Wound	Present	133	26.3	42.1			31.6	0.068	0.98 - 2.45
	Absent	267	35.6	38.6			25.8		
Musculo-skeletal problems	Lameness	69	39.1	37.7			23.2	0.182	0.41 - 1.20
	Hoof overgrowth	10	40	20.0			40.0	0.845	0.20 - 2.58
External parasites infestation	Present	20	30	40.0			30.0	0.779	0.42 - 3.01
	Absent	380	32.7	39.7			27.6		

CI = Confidence Interval

Table 3: Logistic regression analysis of risk factors in association with body condition scores

Risk factor	Category	Number of study animals	Body condition scores						
			Good	Moderate			Poor		
			%	%	P-value	95%CI	%	P-value	95%CI
Type of animal feed	Grazing only	190	26.9	44.7			28.4	0.112	1.23 - 2.91
	Supplemented	210	37.7	35.2			27.1		
Status of load transported	Overloading	228	17.1	48.7			34.2	0.001	3.45 - 8.60
	Fair	172	52.9	27.9			19.2		
Length of working hours per day	< 6 hrs	178	43.3	36.5			20.2		
	≥ 6 hrs	222	23.9	42.3			33.8	0.001	2.21 - 5.30
Number of working days per week	1 - 4 days	183	35.5	41.5			23.0		
	5 - 7 days	217	29.9	38.3			31.8	0.067	1.17 - 2.71
Distance covered per trip	≤ 4 km	110	40.9	35.5			23.6		
	4 - 8 km	162	29.7	40.7	0.064	0.99 - 2.73	29.6		
	> 8 km	128	28.3	42.8			28.9	0.078	0.99 - 2.92
Fitness of harness	Fit to animal	120	34.2	35.8			30.0		
	Ill-fitted	280	31.8	41.4			26.8	0.938	0.71 - 1.75
Housing condition	Good	324	43.9	28.6			27.5		
	Poor	76	26.3	44.7			29.0	0.358	0.82 - 2.52

CI = Confidence Interval

In this study, 19.8% of working donkeys had musculo-skeletal problems, where hind limbs observed with high degree of lameness (75.4%) than forelimbs. External parasites infestation such as ticks, lice, flea and mixed infestation of these parasites were noticed in 5% of study animals. Body condition score was significantly associated (P>0.05) neither with musculo-skeletal problems nor with external parasites infestation (Table 2).

Semi-Structured Interview Results: The present semi-structure interview indicated that scarcity of feed and lack of grazing land were the major constraints associated with animal feed. 77.3% of animal owners from Batu town and 37.6% of owners from rural PAs provided supplementary feed on top of grazing. The average amount of daily given feed was mounted to 6.5 ± 2.7kg, where the majority of owners (50.5%) provided feed once a day, whilst 33.3% and 16.2% of the respondents fed twice and thrice daily, respectively. The amount and even overall provision of supplementary feed in the present study area is usually determined by workload, income and awareness of the owners. Green grass, crop residuals and little cereal by-products were the most common feeds found in the area. Almost all of the respondents agreed that feed availability is affected by season. As indicated in table 3, BCS was not significantly differs (P<0.05) with animal feed type.

All respondents agreed on daily provision of water; however the amount and frequency of water given per day varied. The majority of owners provided water once per day (57.2%), followed by twice (36.8%) and thrice (6%). The average amount of water supply per day was mounted to 7.1 ± 1.8 liters. Moreover, 6.8% and 12.8% of owners provided feed and water at working sites, respectively.

According to this questionnaire result, 324 (81%) respondents provided donkeys with shelter of different quality at home. On the other hand, 21 (5.3%) owners of Batu town provided shelters at the working site, while none of the rural respondents did show up the importance of provision of shelter at working sites. Most of the donkeys have common house with other livestock. Most harnesses (77.3%) were made up of synthetic materials were made up of synthetic materials like rubber inner tube of tyres, nylon and plastic ropes adjusted with nails. There was statistically significant variation among BCSs (P>0.05) with both housing and harnessing condition (Table 3).

The average of labour time per day and working days per week of donkeys in the present study district were mounted to 5.4 ± 1.5 hours and 4.3 ± 1.4 days, respectively with an average weight of 158 ± 99kg pulled/carried per trip over an average distance of 13.7 ± 5.8km. As shown in table 3, BCS showed significant association (P<0.05) with respect to the status of load transported by donkeys and length of working hours/day, but not with the distance travelled and number of working days/week.

Focus Group Discussion Results: Indirect assessment through FGD revealed that health problems, lack or inadequate feed, overworking, poor attitude, wound, poor harnessing and housing problem were the major animal welfare problems in the study area. Prioritizations of risk factors by proportion were also done by participants of FGD. Accordingly, overworking (22.8%), shortage of feed (21.3%) and animal age (18.2%) were the most important risk factor followed by health problem (17.5%), dental abnormalities (9.8%) work type (4.5%) and wound (4.2%). Whereas, housing problem was the least (1.7%) ranking risk factor. In addition to this, assessment made on the level of agreement among six informant groups revealed strong agreement on housing problem (Table 4).

Coprological Examination Results: Qualitative fecal examination of 400 working donkeys' revealed 82.5% prevalence of helminth parasites. Thirteen different species of parasites consisting of 10 (76.9%) nematodes, 2 (15.4%) trematodes and 1 (7.7%) cestodes were identified during fecal examination. The relative proportion of these GIT parasites was recorded as follow: 75.5% *Strongyle species*, 22.7% *Parascaris equorum*, 18.8% *Triodonthophorus tencollis*, 17% *Trichonema spps*, 14.9% *Trichostrongylus axei*, 10.6% *Dictyocaulus arnifieldi*, 8.5% *Oxyrus equi*, 7.3% *Fasciola hepatica*, 7% *Anoplocephala perfoliata* and 5.2% *Gastrodiscus aegyptiacus*. Mixed infections were detected in 237 (71.8%) donkeys, where infections with two species of helminthes were more common (64.5%) than infections with three (26.2%) and four (9.3%) species of helminth.

Quantitative fecal examination result of this study showed that the mean EPG count of worm was 1225 with a range of 225 to 2440. 61.9% of donkeys were severely infected, 29.9% had moderate and mild infection was seen in 8.2% of donkeys. As shown in Table 5, BCS was significantly varied (P<0.05) with both overall prevalence of helminth parasites and mixed parasitic infection, but not (P>0.05) with the parasitic intensity level.

In order to determine the most important explanatory variables predicting the outcome variable, risk factors with P<0.20 on univariable were further analysed using multivariable logistic regression. Consequently, four risk factors namely: old age group, overloading, more than six

Table 4: Level of agreement among the scores of six focus group discussions

	List of risk factors							
Level of agreement based on the median rank	Age	Dental problem	Disease	Housing problem	Feed shortage	Work load	Work type	Wound
Median	3	5	4	8	2	1	6	7
Kendall coefficient of concordance (W)	0.001	0.044	0.001	1.000	0.223	0.325	0.165	0.352
P-value	1.000	0. 102	1.000	0.001	0.120	0.046	0.667	0.014

Weak' agreement for W<0.26, P>0.05; 'Moderate' for W=0.26 to 0.38; P<0.05 and 'Strong' for W>0.38, P<0.01.

Table 5: Association of BCS with prevalence of helminth parasites, infection level and intensity of parasite

			Body condition scores						
			Good	Moderate			Poor		
Risk factor	Category	Number of study animals	%	%	P-value	95%CI	%	P-value	95%CI
Helminth parasites infection	Present	330	29.7	41.5			21.5	0.020	1.178-3.374
	Absent	70	45.7	31.4			22.9		
Type of infection	Single	93	39.8	38.7			21.5		
	Mixed	237	25.7	42.6	0.026	1.148-3.166	31.7		
Level of parasitic intensity	Mild	27	51.9	29.6			18.5		
	Moderate	99	24.2	46.5	0.594	0.525-1.768	30.3		
	Severe	204	29.4	41.2	0.256	0.859-3.087	29.4		

CI = Confidence Interval; Mild <500 EPG, Moderate 500-1000, Severe >1000

Table 6: Multivariable logistic regression analysis of risk factors in association with BCS

			Body condition scores						
			Good	Moderate			Poor		
Risk factor	Category	Number of study animals	%	%	P-value	95%CI	%	P-value	95%CI
Age group	Young	22	63.7	22.7			13.6		
	Adult	210	39	39.1			21.9	0.054	0.984 - 6.471
	Old	168	20.2	42.9			36.9	0.023	2.384 - 5.877
Status of average load transported	Overloading	228	17.1	48.7			34.2	0.002	3.010 - 9.089
	Fair	172	52.9	27.9			19.2		
Length of working hrs/day	< 6 hours	178	43.3	36.5			20.2		
	≥ 6 hours	222	23.9	42.3			33.8	0.005	1.270 - 3.710
Helminth parasites infection	Present	330	29.7	41.5	0.049	1.003-3.512	21.5		
	Absent	70	45.7	31.4			22.9		
Type of infection	Single	93	39.8	38.7			60.2		
	Mixed	237	25.7	42.6	0.064	1.284-4.616	31.7		

CI = Confidence Interval

working hours/day and helminth parasites infection were found to be significantly associated with BCS. Multicollinearity was checked for each variables based on their correlation coefficient (Table 6).

DISCUSSIONS

The results of this study demonstrated that loss of body condition was highly prevalent (67.5%) at 0.630 - 0.720 95%CI among the working donkeys of the study area showing their inhumane suffering due to scarcity of feed, high work burden and inappropriate management conditions. The current prevalence was markedly higher than the findings of 36.5% reported from Hawassa town, 29.2% in and around Nekemte town, 37.2% in Mekelle city and 39.1% in Wolaita Soddo zuria district [9, 26-28]. On the other hand, this finding was lower than the previous results of 79%, 76.4% and 79.4% reported from

Yilmana Densa district, in and around Bahir Dar town and in Merawi District of Northern Ethiopia, respectively [29-31]. This variation in prevalence of poor body condition among localities might be due to difference in availability of feed and feeding practice, working condition, status of the animal health care, sample size and sampling technique.

The average age of donkeys' included in this study was 8.8 years. Older donkeys had high prevalence (79.8%) of poor body condition as compared to adult (61%) and young (36.4%) age group. Body condition score was significantly associated ($P<0.05$) with respect to animal age. In agreement with this result, high prevalence of weight loss in older donkeys was also reported from various areas [32, 33]. This may be due to decreased feed intake, inefficient feed digestion and utilization together with dental abnormalities which could be possibly occur while an animal become aged. Furthermore; older animals have an increased likelihood of developing systemic health problems like renal and hepatic failure that cause general dullness and weight loss in animals [32].

The present semi-structured interview made with donkey owners showed that donkeys serve as a main source of draught power throughout the year, subjected to high work burden in order to assure their owners' daily income. Similar findings were also reported by different researchers [9, 26-28, 34]. Statistically significant variation in BCS ($P<0.05$) was observed with overloading and length of working hours per day. This association could be due to excessive exertion of the working animals, a negative energy balance that occurs when more energy is out than in and this can result in decline in metabolism, reduction in bone mass, reduction in physical performance and lead to weight loss. The observed association of poor body condition with overworking of donkeys was agreed with the findings other researchers who found work load as the major causes of poor body condition in working donkeys [36].

Discussion made with key informants of FGD indicated that diseases, lack or inadequate feed, overworking, wound, poor harnessing and housing problems were the major welfare constraints of donkeys' of the study area. The result of simple ranking and proportional piling also indicated that overworking, shortage of feed and animal age were the major causes of poor body condition in working donkeys, comprising 62.3% of the total contribution of risk factors. These risk factors were also found to be significantly associated with BCS on analysis made with data obtained from physical observation and questionnaire survey. This indicates that the awareness of community toward animal welfare problems is good in the area.

The coprological examination result of this study revealed 82.5% an overall prevalence of helminthes parasites with 0.788-0.862 95%CI. The current finding was close to 77.3% and 78.5% previously reported prevalence [37, 38]. However, it is relatively lower than 96.9%, 88.2%, 97.1%, 100% and 93.8% previously reported prevalence [39-43]. High overall prevalence of helminthes parasites observed in the present study district might be due to the nature of the grazing area, absence of deworming practice and owners' lack of awareness on animal health care. Similar scenario was also reported from various areas [39, 41, 44].

The present fecal examination result revealed that donkeys with poor body condition had significantly higher overall prevalence of helminthes parasite prevalence and concurrent infection. In line with this finding, study results shows that high prevalence of helminthes parasites was reported in animals with poor body condition than well-conditioned [37, 39, 40, 43, 45, 46]. The observed association between poor body condition and parasitic infection could be due to the fact that helminthes parasites compete with hosts directly for the nutrients inside the digestive tract, suck blood, cause tissue damage to the intestinal lining, depressed level of minerals activities of some intestinal enzymes, causing diarrhea, induce pain and suffering the animals, resulting in anorexia, reduced feed intake and interferes with nutrient absorption leading to reduced body weight or retarded weight gain in animals [47, 48].

CONCLUSION

In current study district, working donkeys were experiencing multiple welfare problems. Besides to this, high prevalence of poor body condition was observed in donkeys of this study site. Management problems associated with using animal for prolonged working hours and days and inadequate feed were found to be the major contributing risk factors to poor body condition in working donkeys. This may indicate that such management constraints might be the consequence of negligence, lack of awareness and economic status of donkey owner's. Hence, training animal owners on proper management may be necessary to reduce the existing problems and could helps working donkeys to maintain an ideal BCS.

High prevalence of helminthes' parasites and its significance association with poor body condition was also confirmed in this study. This association may suggest that helminthes parasites play a great role in affecting the health and welfare of donkeys. Therefore; improving animals' management system, treating animals with the appropriate anthelmintic and targeted deworming approaches helps to reduce contamination of grazing sites and the influences of helminthes infection which in turn improves the body condition of donkeys.

On the other hand, animal's age is an important intrinsic risk factor with a significant effect on BCS of animal. From this, it can be concluded that proper management and health care are needed for donkeys. Moreover, the occurrence of wound also suggests profound compromise in welfare of the animals. As a result, management practices made by donkey owners or users should be tuned in consideration of the factors associated with skin injuries in order to ensure better animal welfare and productivity and to prevent weight loss in working donkeys.

Discussions held with key informants provided relevant information on the major contributing risk factors to poor body condition of working donkeys. This suggests that the indigenous knowledge of the community is paramount for animal welfare assessment.

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