

Health and Welfare Related Assessment of Working Equine in and Around Batu Town, East Shoa, Central Ethiopia

Salim Usman¹, Haimanot Disassa¹, Tadele Kabeta¹, Tilahun Zenebe¹ and Girma Kebede¹

¹Wollega University, School of Veterinary Medicine, Nekemte, Ethiopia
girmakebede27@yahoo.com

Abstract: A cross-sectional of study was conducted between November, 2014 to April, 2015 with the objective of assessment of the health and Welfare related problems and management activities using observational (animal based) study and indirect (questionnaire survey) to evaluate welfare and health status of equine in and around Batu town area. Out of the total 384 studied (observed) equids, 66.93% were draught, 25% were pack and 8.12% were riding animals. Forty-five percent (45%), 42% and 15% revealed a thin, medium and good body condition score, respectively. The wound prevalence in the present study area was 37.9% and distribution of wound on the animals body showed that 14.3%, 11.2%, 7%, 4.4% and 1% at wither and back, varied body part, and tail region, limbs and head regions, respectively. Lesions resulting from limb tethering (94.5%), lameness (89.2%), lesions affecting the lips (88.5%), girth/belly (81%), wither/spine (78.7%) and breast/shoulder (62.8%) were most frequently observed. Tail/tail base (79%), ribs/flank (81%), breast/shoulder (84.5%) and hind quarter (70.7%) lesions were significantly associated with pack type of work ($p < 0.05$), whereas lip lesion (89.7%) and lameness (91%) were associated with draught type of work ($p < 0.05$). Poor/thin body condition significantly associated with wither/spine lesions ($p < 0.05$). According to respondents, the average daily working time was 5 h with an average burden of 70 kg of goods and 3 persons. The average water supply at a time amounted to 5.75 ± 2.7 liters. The average amount of provided feed was 12.2 ± 3.4 kg twice daily. Shelters were provided for majority of working equids at home, but only for a few experienced individuals were provision of shelter to equids at work sites. In conclusion, although owners/users take care of their animals, management constraints like feed shortage, traditional health care, lameness, wound, overworking, overloading, housing problems and different cruelties on the animal together with the occurrence of physical injuries and general maltreatment were prevalent. A comprehensive equine health and welfare promotion program is important to alleviate the problem.

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1. Introduction

The equine population of the world was reported to be 122.4 million with 40 million donkeys, 15 million mules and 43.3 million horses. In the distribution pattern, 98% of all donkeys, 97% of all mules and 60% of all horses were noted to be found in developing countries (Fielding, 1991). 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 (Starkey and Starkey, 1997). Ethiopia possessed approximately half of Africa's equines population with 37%, 58% and 46% of all Africa, donkeys, horses and mules, respectively (FAO, 2003). Recent information regarding the contribution of draught animal power to the economies of developing countries is scarce, although in 1998 it was estimated that working animals, including horse, produced 75% of traction energy in the developing world (OTA, 1998) and it has been suggested that more than half of the world's population depends on animal power as its main energy source (Wilson, 2003). Today, draught animals

and humans provide an estimated 80% of the power input on farms in developing countries (Pearson, 2005), but traction animals are often neglected in the allocation of resources such as food, shelter and appropriate equipment, because members of the poorest section of the society, who cannot afford motorized transportation.

According to recent CSA (2014), there are about 2.03 million horses, 7.43 million donkeys, 0.4 million mules, and about 1.16 million camels in the sedentary areas of the country. Despite their invaluable contributions, equines in Ethiopia are the most neglected animals, accorded low social status, particularly the male working equines. Horses involved in pulling carts often work continuously for 6 to 7 hours/day, carrying 3 to 4 persons (195–260 kg) in a single trip. They are provided with grasses during the night and allowed to graze on pasture in the town fringe during the day. Donkeys often are involved in more multipurpose activities than horses. They transport goods to and from markets, farms, and shops, traveling long distances. They also pull carts

carrying heavy loads 3 to 4 times their body weight. They work from 4 to 12 hours/day, depending on the season and type of work. Unlike horses, donkeys are not provided with feed supplements. Some methods of hobbling to restrain cause discomfort and inflict wounds (Alujia and Lopez, 1991; Mohammed, 1991) and poorly designed harnesses or yokes that may be heavy and ragged have an effect on the animal's health and safety. In addition, from the animals in Ethiopia, donkeys are the major mode of transport. They transport at least 12 different commodities including food to remote areas during war and peace as well as guns and ammunition during war. Some rural Ethiopians recall that in famines of the past they survive by someone bringing in food on donkeys (Marshal *et al.*, 1997).

Feed shortage and disease are the major constraints to productivity and work performance of equines in the region. They are brutally treated, made to work overtime without adequate feed or healthcare. They are suffering from lack of shelter from sun, rain or biting insects at markets or working sites. These have a potential to negatively affect 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 such as cattle, between 1987 and 1988 (Yilma *et al.*, 1991). This misuse, mistreatment and lack of veterinary care for the animal have contributed enormously to early death, majority of which currently have working life expectancy of 4 to 6 years. 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).

The increasing human population, demands for transport of goods to and from far, remote areas, and construction activities around the towns are making equines highly demanded animals. Though often been described as sturdily animal (Play significant role) in the farming system they are livelihoods of farmers, but the health and welfare problems are a visible constraints. Studies to elucidate the magnitude of this problem are lacking. Such information would be useful for designing strategies that would help improve equine health and welfare.

Therefore, the objectives of this study:

- To identify health and welfare status of equines in and around Batu town
- To assess diversified use of equines in the study area.

2. Materials and Methods

2.1. Study Area Description.

This study was conducted from November 2014 to April 2015 in and around Batu town, East Shoa,

Oromia regional state, central Ethiopia. Batu is found in Adami Tullu Jido Kombolcha district which is a part of Rift Valley that lies 165km south of Addis Ababa. The district is located between 38°20' and 38.5°5' E and 7°35' and 8°05' N. Geographically, the area is located at an altitude of 1500 to 2000 meters above sea level. It receives mean annual rainfall of 760 to 1000 mm. the average annual temperature ranges from 22 to 28°C. and relative humidity of 60%. The agro-ecological zone of the district is semi-arid and sub-humid in which 90% of the area is lowland while the remaining 10% is intermediate (Kebede, 2010). The total human population of Adami-Tulu Jiddokombolcha district is about 111,926 out of which, 72% live in the rural area while 28% are urban dwellers. The total land area of the district is estimated to be about 75,223 ha, of which, 36,661 ha is used for crop production, whereas, 17,113 ha is used for grazing. According to census data collected by district's agricultural office in 2005/2006, there are about 189,870 cattle, 85,365 goats, 11,330 sheep, 17,356 donkeys, 256 mules, 1,442 horses and 80,270 poultry in the study area (Ebro *et al.*, 1998).

2.2. Study Animal and Sampling Procedure

A cross-sectional study was conducted on 384 working equids (Donkeys, horses and mules) found in markets (Batu, Adami Tulu and Bulbula) and along the roads in Batu. In each group an appropriate *kebelle* was assigned and to each *kebelle* appropriate sample was allocated. Then direct observation was conducted on randomly selected animals and indirect assessment was made by interviewing randomly selected animal owners.

2.2.1. Observational Study

The observation was carried out at the working site during daytime. Initially, general information was recorded for each animal including their kebeles, work type and species. In the randomly selected areas almost all available donkeys, horses and mules were physically examined for lameness, body condition score, wound and demeanor were recorded. The examination of each animal took between five and ten minutes without causing major interruption of routine work.

Body Condition Score: The scoring of body condition of the selected animals was recorded based on the criteria described by Pritchard *et al.* 2005. Body condition assessment was done by looking the animal from both sides and the hind quarter without touching the animals and scored as 1, 2, 3, 4 and 5 for very thin (Poor), thin (Moderate), fair (Ideal), fat and obese, respectively. However, for the purpose of data analysis, body condition 1 to 5 were assigned to three distinct groups: Categories 1 and 2 were grouped as "thin or poor", category 3 was defined as "medium"

and body condition scores 4 and 5 were categorized as "good".

Lesions and abnormalities: Assessment carried out at field level and market on the daytime. Body lesions were then recorded with regard to anatomical location as back sore, tail sore, girth sore, bit sore and other sore (Mixed) among the three species of animal (Donkey, horse and mule). Lesions of any size and severity at the external corners (commasures) of the mouth, where the bit would lie, were considered as lesions of the lips. Scars, hairless skin and broken skin were also regarded as labial lesion. Absence of lesions was scored with '0' and presence of lesions with '1, 2, 3 and 4'. Lesions on the limbs were considered as being caused by tethering/hobbling, if any kind of hair loss, scars, healed or fresh lesion were present along the limb. Eye abnormalities were scored with "1" if excessive lacrimation, blindness, opec color, or other clinical aberrations were observed. Apparently healthy eyes received score '0". Wounds of the skin and deeper tissues were assessed according to the area, depth and location.

Behaviors of the Animal: The behaviors of all animal sampled were assessed as depressed, severely depressed, alert and friendly approach which involve an observation of general alertness versus unresponsiveness to the environment to correlate these behaviors with physical problem.

Type of work: Based on the types of work animals were categorized as draught, pack and ridden. "Draught" animals are those used for transport of goods and people by carts. "Pack" animals were equids used for the transport of goods by pack. "Riding" animals are those used by owners for non-tourist riding (Pritchard *et al.*, 2005).

2.2.2. Indirect Welfare Assessment

Semi-structured questionnaire was developed to collect data on the major constraints in utilizing donkeys, veterinary service program and disease management system. These were obtained by interview made with randomly selected 384 equine owners to generate some information which was missed during direct assessments of the animal.

2.3. Sample Size and Sampling Method

The total numbers of equines for the study was calculated based on the formula given by Thrusfield (2007) simple random sampling method. By rule of thumb where there is no information for an area it is possible to take 50% prevalence. In this study 50% prevalence with 5% desired level of precision and 95% of confidence interval are used to calculate the sample size using the following formula.

$$N = 1.96^2 \frac{P_{exp} (1 - P_{exp})}{d^2}$$

Where: N=required sample size, P_{exp}=expected prevalence, d=desired absolute precision. Accordingly, the calculated sample was 384 equines.

2.4. Data Management and Analysis

In each site, the raw data were collected according to species and were recorded by hand and the results (Welfare and health parameter) were managed into Microsoft excel and then descriptive statistics and 95% confident interval were used to summarize the proportion. Each observation was compared with assumed risk factors, to analyze the association of risk factors with each observation. The STATA-11 software and level of significance was considered when "P < 0.05".

3. Results

Among the studied equid (donkeys, horses and mules), 47.66% were donkeys, 40.89% were horses, and 11.5% were mules. Most horses were kept for draught (carting) purposes (79.6%) followed by mules (66%) and donkeys (56%). Draught type of work included transportation of people and goods using handmade carts. The majority of horses revealed a thin body condition (45%) and only 23.5% of them were in good body condition. In general, 67% and 25% of working equids were involved in draught and pack type of work, respectively and only 8% are used for riding. From these, 43.23% revealed a poor body condition as shown in Table 1.

Table 1. Species of working equines, work types and body condition score proportion

Species	Work type proportion		Body condition score category proportion		
	Draught (%)	Pack (%)	Thin (%)	Medium (%)	Good (%)
Donkeys(n=183)	103(56.2)	80(43.72)	84(45.90)	61(33.33)	38(20.77)
Horses(n=157)	125(79.62)	14(8.92)	72(45.86)	49(31.21)	36(22.93)
Mule (n=44)	29(65.91)	2(4.55)	16(36.36)	19(43.18)	9(20.45)
Total (384)	257(66.93)	96(25.00)	172(44.79)	129(33.59)	83(21.61)

At species level there was a significant difference (p<0.01) observed between horses and, where more donkeys (56.2%) were used for packing than horses (8.9%) and mules (4.5%). Variations in body condition

were also recorded among animals with different age categories and work type. Concerning work type, draught animals showed high proportion of thin body condition (44.7%) compared to pack (29.1%), ridden

(23.8%) and other (22.1%) animals as shown in Table 3. From the total sample 38.4% of equine were found with wound on different body parts. Bit sore and back sore were found in both species, though the proportion was higher in horses (3.4% and 31.5%) than in donkeys (0.3% and 16.2%). Four percent and 11.4% of donkeys and 0.8% and 5.6% of horses had tail/tail base lesion.

All working equids were analyzed in relation to the assumed risk factors or problems encountered. Comparisons made between risk factors and species,

work type and body condition score are shown in Tables 2, 3 and 4. Species comparison was only made between donkeys and horses, with mules being omitted due to their small number. As shown in Table 2, limb tethering, lameness, lip lesions, girth/belly lesions and wither/spine lesions were observed for the vast majority of animals. Lameness, tail/tail base and belly/girth lesion were significantly associated ($P < 0.05$) with donkeys as compared to horses.

Table 2. Lesions and health parameter of working horses, mules and donkeys

Parameter		Mule(n=44)	Donkey(n=183)	Horse(n=151)	Total(n=384)	P-value
Wound types	Wither and spine	40(90.9)	172(93.99)	144(91.82)	366(95.31)	0.355
	Girth and bally	41(93.2)	173(94.53)	135(85.09)	349(90.88)	0.426
	Hind leg lesion	36(86.26)	156(85.25)	132(84.18)	324(84.37)	0.736
	Knee lesion	39(89.7)	155(84.70)	123(84.79)	317(82.55)	0.237
	Fore leg other than knee	38(86.26)	156(85.25)	132(84.18)	326(84.89)	0.437
	Lip lesion	42(95.45)	171(93.44)	146(92.99)	359(93.48)	0.304
	Tail and base lesion	37(84.09)	156(83.25)	129(82.17)	322(83.85)	0.259
	Total	89.4	88.6	86.5		
Non wound types	Lameness	21(47.73)	119(67.13)	101(64.33)	241(62.76)	0.023
	Ocular problems	8(18.18)	51(27.87)	42(26.75)	101(26.30)	0.198
	General attitude	30(69.18)	142(77.60)	120(76.43)	292(76.04)	0.241
	Behavior of animal	29(65.91)	34(18.58)	23(14.65)	86(22.39)	0.000

As indicated in Table 2 the general health problems of working mules, donkeys and horses have showed that 89.4, 88.6 and 86.5% respectively were found with the skin problems, 62.8% with lameness and 26.3% with eye abnormalities besides, animals with poor health problems may also fall to express their normal. Behavioral and physiological needs as well.

The present study has revealed that 76.04% and 22.4% of the equines had depression and hyperesthesia, respectively. The reason for the occurrence of such health problems could be due to donkeys are the most neglected animals in Ethiopia receiving less attention by owners.

Table 3. Lesions and health parameter of working equids in relation to the type of work

Parameter	Work type proportion			p-value
	Pack (96)	Drought(257)	Riding(31)	
Lesion on skin and/or deep tissue				
Wither and spine	92.71	94.16	80.65	0.062
Tail/base	81.25	84.15	95.16	0.453
Girth/belly	91.77	91.15	88.57	0.330
Ribs/flank	79.17	84.44	90.01	0.279
Hind quarter	82.21	85.99	91.38	0.331
Knee	89.58	83.66	91.23	0.399
Hock	69.79	64.59	93.75	0.016
Fore leg other than knee	67.71	62.87	92.24	0.036
Hind leg other than hock	49.96	49.03	93.26	0.230
Observation of health				
Lameness	65.21	67.32	88.91	0.082
Ocular problem	25.00	28.02	9.19	0.597
Lip lesion	91.62	94.55	75.68	0.476

As shown in Table 3, only a few factors were significantly associated with work types. Lip lesions, lameness and abnormal gait showed a significant association with draught type of work. Tail/tail base, ribs/flank, breast/shoulder and hindquarter lesions were significantly associated with pack animals. A further analysis was made in regard to the risk factors and the type of work on species level. Wither/spine, tail/tail base, ribs/flank and breast/shoulder lesion were significantly more associated ($P < 0.05$) with pack donkeys than draught donkeys; whereas lip lesion,

abnormal gait and lameness were predominantly seen in draught donkeys (Table 4). However, it was difficult to compare draught horses with pack horses because of the diverging sample size. Yet, the proportions of the few lesions seen in draught horses were very high. Even so, wither/spine, lip lesion, limb/tethering lesion were more often associated with draught horses than other factors. Wither and spine lesion occurred significantly more frequently in thin equids that is, with a percentage of 81.8 when compared to others ($P < 0.05$ as shown in Table 4).

Table 4. Proportion of lesions and health parameters for different types of work in donkeys and horses

Parameter	Donkeys		Horse		p-value
	Draught (n=103)	Pack (n= 80)	Draught (n=125)	Pack (n= 14)	
Lesion on skin and/or deep tissue					
Wither and spine	98	74	117	13	0.001
Tail/base	89	67	105	9	0.030
Girth/belly	97	76	109	10	0.004
Ribs/flank	90	63	103	11	0.653
Hind quarter	89	67	108	10	0.086
Knee	81	74	108	10	0.072
Hock	58	56	87	9	0.008
Fore leg other than knee	68	55	75	8	0.050
Hind leg other than hock	54	40	61	5	0.033
Observation of health problems					
Lameness	75	44	83	8	0.049
Ocular problem	29	22	36	2	0.631
Lip lesion	95	71	114	12	0.031

According to 92% of the respondents, the average labor time per equid and day amounted to 5 and >5 h, with an average of 75 kg and three travelers being transported over an average distance of 25 ± 2 km. The mean working span of carthorses amounted to 4.4 ± 0.8 years. Experience of provision of water at working site was 52.8% although the amount of water given to a single working equid per day varied according to respondents. The average amount of water per supply was 5.75 ± 2.7 L. Feed mainly consisted of cereal and other plant by-products such as wheat bran, maize residue, chopped sugarcane, and green grass. According to animals' owners, 62.8% fed mixtures of concentrates and green grass was as 37.2% of respondents reported to provide only green grass. The majority of the respondents fed at different frequencies. Thirty-three percent of respondents provided feed once a day, whilst 25 and 42% of the respondents fed twice and thrice daily, respectively.

Obtained data indicated that 79% of respondent provided shelter at home, whereas only 38.5%

provided shelters of various qualities at the working site. Shade is usually provided by trees surrounding the market/working site. The floor of this natural shelter usually consists of tamped soil. The type of harness used by the respondents was made of products like rubber adjusted with nails.

Assessment through interview with owners showed that the major constraints of donkeys were lack of management, harnessing problem, overloading and over working, disease and veterinary services and nutritional problem (shortage of balanced feed) with a proportion of 28.9%, 23.7%, 18.4%, 18.4% and 10.5%, respectively. The present study also showed that 31.6% of the diseased donkeys were taken to the nearby veterinary clinics, 10.5 % were treated traditionally, 57.9% did not get any help from their owner and forced to work regardless of the disease. This agrees with Mohammed (1991) that low number of donkeys in Ethiopia presented annually to the clinic compared to other domestic animals (for example, 270 donkeys compared to 20,000 head of other domestic animals in

1987-88) and when presented, the donkeys are in an advanced stage of illness, often have been given a

number of traditional treatments first (Table 5).

Table 5. Owners' Responses on Management of the health, and External Injuries

Owners' Responses	Donkeys (%)	Horses (%)	Mules (%)	Total
Take to nearby health center	134(73.22)	122(77.71)	31(70.45)	287(74.74)
Treat with medications purchased from local	18(9.8)	16(10.19)	4(9.09)	38(9.9)
Take to local healer	23(12.6)	17(10.8)	3(6.82)	43(11.2)
Do nothing	51(27.87)	34(21.66)	9(20.45)	94(24.48)

4. Discussion

The objective of this study was to address equids health, management and welfare problems at study area. The identified problems are important for intervention and policy makers to alleviate/minimize the existing problems.

In Batu town, almost all equids (92%) are kept to transport people and goods in order to assure their owners' daily income. This observation is in agreement with reports by Mekuria *et al.* (2013) and Pritchard *et al.* (2005) describing that equids are mainly kept for transport purposes and only rarely as source of meat or milk. The working equid population of Batu mainly consists of an almost equal number of donkeys and horses which indicates that these species are fully integrated in the owners' daily life. The relative small number of encountered mules may be explained by their sometimes difficult behavior which makes them less attractive as working equids despite their sturdy nature and endurance.

The study revealed different welfare problems, most of them were lesions at different body sites of equids. Donkeys showed significant association with abnormal behavior (depression and indifferent), lameness and abnormal gait and tail/tail base lesions ($P < 0.05$). This might be due to over loading, over working, and trauma induced by poor harness material. Further analysis indicated that lesions of wither/spine, tail/tail base, ribs/flank, breast/shoulder showed significant association with pack type of work; whereas hook and forelegs lesions, were associated with draught type of work. Similar finding were reported by Dennison *et al.* (2007) where pack donkeys had a significantly higher proportion of tail/tail base lesions than draught animals. It is also supported by Mekuria *et al.* (2013), Pritchard *et al.* (2005) and Swann (2006) that the chance of tail/tail base lesion occurrence is very high when pack animals frequently cope with long distances. In addition, it was reported that lip lesions predominantly occur (72.6%) in horses and for draught type of work and less frequently develop in donkeys and more general in pack animals.

Within the horse group, it was difficult to compare the effects of draught and pack type of work because of the uneven ratio between draught ($n = 125$) and pack horses ($n = 14$). However, it could be shown that the draught type of work is likely to induce lameness, wither/spine, lip lesion and hobbling lesion, in 73.5, 81.2, 89.2 and 94.9% of horses, respectively. This finding is suggestive for a direct correlation between health problems and the type of work. Especially lip lesions were significantly associated with the bit type used for leading/braking of draught animal. Lameness was associated with continuous movement in various landscapes and on bumpy roads. This finding is supported by Dennison, *et al.*, (2007), Pritchard *et al.* (2005) and Swann (2006).

Observations of lesion in relation to work type in equines were also analyzed. Accordingly, tail/tail base, girth/belly and hindquarter lesions were significantly associated with pack type of work ($P < 0.01$). The causes for the development of these lesions are complex and multi factorial. Environmental factors, the type of harness material used (natural or synthetic), the fit of the harness, the behavior of the owner, the frequency of work and the load all contribute to the onset of health problems. In general, bumpy roads and rugged landscapes, a loose fit and synthetic harness materials, frequent beating and overwork may induce lesions and lameness. This finding is in agreement with reports by Mekuria *et al.* (2013), Pritchard *et al.* (2005) and Swann (2006), where pack animals coping with long distances frequently develop lesions.

Fifty-five percent (55%) ($n = 172$) of studied animals had a poor body condition score and of these, 67% ($n = 257$) were engaged in draught type of work whereas only 25% ($n = 96$) were pack animals. Among the latter, wither/spine lesion were significantly associated with thin or poor body condition score ($P < 0.05$).

It has been assumed that the type of work promotes the occurrence of certain lesions at different body sites. In the present study, pack animals were found to be more likely to suffer from tail and tail base, ribs/flank, breast/shoulder and hindquarter

lesions. In contrast, draught animals significantly suffered from lip lesions and lameness ($P < 0.05$). Animals with thin or poor body condition score were found to be more often affected by wither and spine lesion than equids in good body condition. However, Mekuria *et al.* (2013) reported that the interaction with the body condition is difficult to explain but concluded that fatter donkeys wearing metal shafts were less likely to suffer from breast and shoulder lesions. Longer and smooth shafts were found to be less dangerous than shorter and protrusions surfaces.

5. Conclusion and Recommendations

Although animal owners are trying to improve their equines welfare, health and management, the working equids in and around Batu town are still in multiple welfare and health problems. The major factors and indicators of poor welfare were lack of good management practices, harnessing problem, over loading, wound on different body parts, over working, disease, lack of veterinary service at the area, and lack of sufficient feed. It is hence imperative to increase the awareness of owners and users with regard to the identified problems. Further investigations on the risk factors associated with equid welfare are warranted as to improve the situation of these working animals. Based on the above conclusion, the following recommendations are indicated: the adoption of good equine health, welfare and working practices is among the most important ways to improve these problems; initiating training programs aiming at accustoming owners and users to improve harness material, adequate bits and correct behavior; a comprehensive equine health and welfare promotion program were important to alleviate the problem at the study area.

Corresponding Author:

Girma Kebede
Department of Microbiology and Public Health,
School of Veterinary Medicine, Wollega University,
Nekemte, Ethiopia, Telephone: 0929038290, P.O.
Box: 395,
E-mail: girmakebede27@yahoo.com

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