

THE USE OF PHYSICAL ANIMAL WELFARE INDICATORS: A CASE FOR WORKING DONKEYS IN RURAL AND URBAN/ PERI-URBAN AREAS OF MWINGI CENTRAL SUB COUNTY-KITUI COUNTY- KENYA.

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Abstract.

Donkeys have been serving mankind for several millions of years. The phrase the beast of burden describes their utility as pack animals in many parts of the world as they play a significant economic and social role in transport, whether riding, pack transport or pulling carts. They may also be used for farm tillage. Working donkeys suffer from various welfare constraints that need to be investigated and ameliorated. These welfare constraints significantly reduce work productivity and life of the donkey and hence the owners livelihoods.

A study to determine welfare differences between working donkeys in both rural and urban/peri-urban settings of mwingi central sub county of kitui county-Kenya was done. A total of 396 donkeys were sampled out of a donkey population of 35,361 in the sub county. A confidence level of 95% and a sampling error of 5% were used. The 396 donkeys were proportionately allocated into urban/peri-urban and rural settings as 215 and 181 respectively.

The study used donkey physical welfare parameters namely lameness, evenness of the hoof, eye conditions and body condition score to compare the two sets of animals. There was more lameness in animals working in the urban /peri-urban setting (14.4%) compared to the rural settings (11.6%). The physical welfare indicators namely hoof evenness, overgrown hooves, body wounds ,scars, eye discharges and corneal opacity were shown to have significant differences at $p < 0.05$ level between the two sets of animals.

Key words: animal welfare, donkey, physical welfare indicators, lameness, corneal opacity.

1.1Background information

Donkeys have been serving mankind for 5000 years (Rossel, *et al* 2008). The phrase beasts of burden describe their utility as pack animals in many parts of the world as they play a significant economic and social role in the transport of water, building materials, relief supplies, animal feeds and other critical supplies (Mrema 2004).

It is estimated that there are about 90 million donkeys worldwide and they are especially wide spread in Central and South America, Africa and parts of Europe. China has the largest population with 11 million donkeys (Starkey and Starkey 2004). Ethiopia has the largest population of donkeys in Africa and the second largest population in the world after China (FAO, 2007). There are over 1.8 million donkeys, two thirds of which play a major role in Kenya's economy especially in rural and urban poverty reduction by providing employment opportunities and income that supports people's livelihoods (The Brooke 2015). Kitui County has a donkey population of over 120,000

donkeys (KNBS, 2009). Majority of these are working animals used in transportation of farm produce, farm inputs, and transportation of water and in provision of drought power. These activities play a key role in Kitui's Agricultural economy and water availability to families across the County. According to the livestock census of 2009, the population of donkeys in Mwingi Central Sub county is 35,361(KNBS, 2009).

However, working donkeys suffer from various welfare issues that need to be investigated. These welfare issues significantly reduce the work productivity and life of the donkey. Constraints such as poverty and lack of knowledge mean that animal welfare is being compromised internationally (Niraj, 2014).

1.2 THE ROLE OF WORKING DONKEYS IN SOCIETY.

According to recent estimates there are over 100million equids working in developing countries (Anon, 2005). Even in the 21st century an estimated 50 percent of the world's population depends on animals as a source of energy (Wilson, 2003). In many rural areas, the use of power supplied by equines and other draught animals is not falling despite increase in mechanization and motorization, due to the cost of machinery (Sells, et al; 2010) A socio-economic study of donkeys working in Africa concluded that development professionals must recognize donkey use and management as an appropriate affordable technology for people with minimal resources (Fernando and Starkey, 2000). The use of equines in the context of provision of low cost transport, agricultural power and often as the sole means of generating income for their owners is expected to continue (Biffa and Woldemeskel, 2006).

2.0 LITERATURE REVIEW.

2.1 GENERAL VIEW ON ANIMAL WELFARE

Animal welfare lacks a good universal definition and a satisfactory distinction from the term Wellbeing 'However a consensual definition is essential for practical, legislative and scientific purposes .Without a clear definition , animal welfare cannot be effectively studied or conclusively assessed to provide remedial measures to its violation.(Broom 1993)

Animal welfare is therefore defined as the ability of an animal to interact or cope comfortably with its environment, resulting in satisfaction of both its physical and mental state (Duncan 2005). According to Nguhiu-Mwangi et al; 2013, the assessment of animal welfare is based on the provisions of five freedoms which include,

- a) Freedom from hunger, thirst, availed through provision of ready access to water and diet to maintain health and vigor.
- b) Freedom from pain, injury and disease availed through disease prevention and treatment.
- c) Freedom from fear and distress , availed through avoidance of conditions that cause mental suffering
- d) Freedom to have normal behavior patterns, availed through provision of sufficient space and appropriate physical structures.
- e) Freedom from thermal or physical discomfort availed through provision of a comfortable environment.

2.2 HISTORICAL PERSPECTIVE OF ANIMAL WELFARE

Systematic concern for the wellbeing of other animals probably arose in the Indus valley civilization as religious ancestors were believed to return in animal form; therefore animals had to be treated with respect (Cox, 2009).

Concern for animal suffering can also be found in Hindu thought, and the Buddhist idea of compassion is a universal one, extending to animals as well as humans, but western traditions are very different. Their intellectual roots lie in the Judeo-Christian tradition. Neither is kind to those not of our species (Cox, 2009)

2.3 ANIMAL WELFARE IN KENYA.

In Kenya KSPCA is the oldest charitable animal welfare organization which deals for the most part with domestic animals. It began sometime in 1910 in Nairobi and the surrounding areas when some ladies took pity on oxen bringing goods into Nairobi from surrounding districts (KSPCA, 2015). The organization exists to promote the protection of all types of animals, prevent cruelty to all animals and to rescue and relieve animals from all manner of suffering (KSPCA, 2012). The African Network for Animal Welfare (ANAW) is another organization in Kenya which focuses on humane treatment of all animals for human welfare. The organization promotes the understanding and appreciation that animals are sentient beings; they have feelings, emotions and respond to psychological and physiological changes in the environment (Gathanga, 2011)

Kenya Network for Dissemination of Agricultural Technologies (KENDAT) promotes sustained rural and peri-urban development through advancing capacity for small holder farmers across all components of the agricultural value chains. KENDAT with the support of the Brooke hospital for animals of UK advances the welfare of the donkey through the *Heshimu punda* (respect the donkey) programme (Gathanga, 2011).

The Brooke has been funding equine welfare programs in Kenya since 2001. These programs seek to improve provision of veterinary services through training of local health service providers and promote better and sustainable care by owners and users (The Brooke, 2012). Currently Brooke is working with seven partners in Kenya in the promotion of equine and especially donkey welfare. These partners are Kenya Network for Dissemination of Agricultural Technologies (KENDAT) , Kenya veterinary Association(KVA), Farming Systems Kenya (FSK), Vetworks Eastern Africa, Caritas-Kitui, Animal Welfare and Public Health (AWAPH), and VSF-Belgium(The Brooke, 2015). Among the legislation on animal welfare in eastern and southern Africa, the prevention of cruelty to animals Act, Cap 360 of the laws of Kenya, is one of the most comprehensive and inclusive pieces of legislation on animal welfare issues. The Act defines what constitutes an animal cruelty offence and what the penalties are for an offence. The Act also outlines regulations in relation to experimentation with animals, slaughter of animals, transportation of animals, welfare of dogs and cats used for breeding purposes, destruction of animals and the power to enforce the provisions of the Act (Masiga and Munyua, 2005)

2.4 Direct Animal – Based Measures of Welfare

Different experts tend to give priority to different aspects of an animals' state when assessing its welfare (Serpell, 2008). The best measures or indicators of an animal's welfare will also depend on the species of animals involved and the context in which it is being assessed. Animal Welfare scientists therefore tend to focus on a limited range of welfare 'indicators' when making their assessments (Serpell, 2008). The most widely used are the following.

2.4.1 Health: Although health and welfare are not synonymous, there is widespread agreement among experts that an animal's welfare is certainly compromised if it is injured, diseased, malnourished or in any sense unhealthy (Broom, 1991; Dawkins 1998, Fraser1995). Since poor health also limits an animal's usefulness to people (e.g by reducing its working ability, productivity

or the quality of its products), health based indicators of animal welfare may carry more weight with animal users or producers than other measures (Scott et al; 2001).

Overt signs of ill-health-wounds, lesions, abrasions, sores, coat or feather problems; parasite loads, lameness or abnormal gait, lethargy, difficulty standing up or labored breathing, physical deformities, overall body condition should therefore be in the forefront of any welfare assessment (Serpell, 2008).

Because they are overt and relatively simple to score or quantify, symptoms of poor health tend to be consistent both within and between rates and are therefore also likely to be useful as before and after measures of progress in animal welfare. Some good examples of use of health and body condition indices as both measures of welfare and of progress in Welfare have been provided by recent assessments of working enquires (horses, mules and donkeys) in developing countries (Pritchard et al; 2005).

Comparable, though less comprehensive, health assessments have also been employed to evaluate welfare in dairy cattle (Whay, 2002), pigs (Leeb et al; 2001), dogs (Patronek, 1998) and broiler chickens (Krestin et al; 92)

2.4.2 Productivity

As with health, the use of productivity e.g. growth rate, reproductive fertility and fecundity as a welfare indicator has the potential of appealing to animal users and producers. It is important to note that high productivity is not always indicative of acceptable levels of welfare among individuals. Animals may coexist with exceptionally high levels of farm productivity and poor welfare (MCInerney, 2004)

A further limitation of this method is the lack of detailed long term records. The best known examples of the use of animal productivity as welfare indicators come from a series of studies that demonstrate that rough handling during routine husbandry procedures significantly retarded growth rates, pregnancy rates and sexual development in young pigs(Hemsworth, 2003, Hemsworth et al; 1986, Wailblinger et al; 2006)

Productivity indicators are more likely to be valuable for measuring progress in animal welfare situations such as commercial farms, laboratories or zoos where systematic records of production traits are reliably maintained (Curran et al; 2005).

2.4.3 Physiology

A variety of physiological indicators have been used to assess the welfare of animals short term physiological responses include elevated or variable heart and respiratory rates, body temperature increases, adrenaline and corticosteroid secretion in blood and saliva, plasma level of glucose, lactate or acute phase proteins; all of which may indicate changes in welfare status(Serpell, 2008)

Long term measures of welfare also include indicators such as elevated urinary, fecal and or hair cortisol, adrenal gland enlargement or suppressed Ig a secretion and immune function (Accorsi et al 2007, Boissy et al; 2003; Broom and Fraser, 2007; Dawkins, 2003; Geers et al; 2003)

All such measures present difficulties in interpretation since none is exclusively a symptom of poor welfare. For this reason most welfare scientists argue that physiological indicators are only useful in combination with other evidence (Broom and Fraser, 2007; Barnett and Hemsworth, 1990; Dawkins, 2003 and Rushen, 1991)

Physiological indicators may have an increasingly important role to play as before and after assessment tools. Until recently, the collection, storage and analysis of psychological samples was too expensive and labor intensive (Serpell, 2008). However, the development of standardized, low cost assay kits for most physiological markers is now making the process easier and more accessible

(Serpell, 2008). Although still at an experimental stage of development, levels of hair/fur and feather glucocorticoids seem to provide a new and potentially valuable non-invasive measure of chronic stress in mammals and birds that may prove particularly useful for the assessment of progress in animal welfare (Accorsi et al., 2007)

2.4.4 Behavior

Behavioral indicators are widely used in the assessment of animal welfare on the assumption that an animal's behavior provides an immediate reflection of its internal emotional and/ or motivational state (Serpell, 2008).

The most basic types of behavioral evaluation generally focus on characteristics of posture, demeanor, or locomotion that are symptomatic of underlying pain or morbidity (Kestin et al; 1992). Most such studies attempt to score behavior using objective criteria and trained observers.

2.5 THE EFFECT OF PHYSICAL INJURIES.

Physical injuries are defined as any grossly visible skin/tissue damage located on any part of the body (Payne, 1990), (Biffa et al; 2006).

Injuries can be categorized as severe when the ulceration involves a pronounced contusion in wider areas, tissue hypertrophy and severe complication (Payne, 1990). Moderate injuries may involve a coalition of small wounds with tissue sloughing involving no complication and hypertrophy with chronic causes. Injuries are categorized as mild-severe when they involve only loss of epidermis and superficial layer with no further trauma (Houe, 2002). Physical welfare parameters consist of body condition score, abnormal limbs, impeded gait, eye abnormalities, sores, scars, hoof and coat conditions. (Geiger and Hovorka, 2014.)

3.0 METHODOLOGY.

To determine the welfare of working donkeys both in rural and urban/peri-urban settings, the researcher used a welfare assessment protocol based on direct animal observation and physical examination. Physical animal based welfare indicators such as lameness, evenness of the hoof, eye conditions and body condition score were observed and recorded. Body score was divided into three main categories; these were thin, moderate and fat.

Thin category

The animal is emaciated and individual spinous processes, ribs, hooks (tuber coxae), pins (tuber ischia), shoulder blades and all spine are prominent and sharply defined. The neck is thin with prominent withers and shoulders are sharply angular.

Moderate category.

The animal back is flat and well covered with muscle. One cannot easily feel the spinous processes. Some fat can be felt on the neck, base of the neck and shoulder area. The neck is well filled into the shoulders.

Fat category.

Animals appear well covered with fat and well rounded, bones are not discernible and flanks are well filled. The back is flat and broad.

3.1 STUDY AREA

The study area was mwingi central sub county of Kitui County in Kenya. It was chosen as it has the urban/peri-urban and rural component. The sub county is made of six wards namely Waita ward which has 7 sub locations, Nguni ward with 8 sub locations, Nuu ward with 7 sub locations, Mui ward with 6 sub locations, Kivou ward with 5 sub locations and central ward with 4 sub locations.(IEBC 2016). The total number of sub-locations in the sub-county was determined to be 37.those falling in the rural areas were 20 while 17 sub-locations were located in the urban/peri-urban area.

3.2 TARGET POPULATION

The population of donkeys in Mwingi Central Sub county is estimated to be 35,361(KNBS 2009). The human population in the area according to the last census is 141,207 persons and is projected to be 151,510 persons currently (KNBS, 2015). There are a total of 29752 households in the entire mwingi central sub county. Urban/peri-urban households are 16,188 while those in the rural areas are 13,564, this represents 54 percent and 46 percent respectively.

Table 1. A table showing the number of households in the various wards that of mwingi central sub-county.

Ward	Sub-location	Number of house holds	Totals
Waita	Mwambui	535	4197
	Ikusya	529	
	Thonoa	645	
	Waita	723	
	Nyanyaa	332	
	Katitika	628	
	Kathoka	805	
Nuu	Mwangeni	590	5170
	Ngieni	606	
	Malawa	1052	
	Ngaani	718	
	Nyaani	591	
	mwambiu	577	
	kyangati	1036	
Nguni	Kyavyuka	928	5514
	Mwasuma	1043	
	Mbuvu	892	
	Kalanga	304	
	Mathyakani	507	
	Kamutiu	432	
	Ukasi	770	
	Mwalali	638	
Mui	Yumbu	503	4041
	Itiko	529	
	Kitise	690	
	Ngoo	932	
	Ngungi	528	
	Ngiluni	859	

Kivou	Enziu	1311	
	kanzui	432	
	Kivou	785	
	Ithumbi	850	
	Kyanika	2165	5543
Central	Mwingi	3924	
	Kanzanzu	498	
	Mathyakani	428	
	Kalisasi	358	5208

3.3 SAMPLE SIZE

Sample size was calculated based on a formula by Israel (1992) as shown below.

$$n = \frac{N}{1 + N(e)^2} = \frac{35361}{1 + 35361(0.05)^2} = 396$$

Confidence level selected is 95%

Level of precision/or sampling error selected is 5%

The sample size was calculated to be 396 donkeys.

3.4 STUDY DESIGN

A cross-sectional study was conducted with the objective of assessing the, physical welfare challenges affecting donkeys in the rural and urban/peri-urban areas of the study area. A total of 396 questionnaires were administered to households owning a donkey. The first part of the questionnaire regarding household demographics was completed by the respondent and recorded by the researcher while part two was completed by the researcher through a detailed physical examination and direct observation of the donkey.

3.5 STUDY ANIMALS

The study animals were the indigenous breeds of donkeys including both sexes of the working age.

3.6 SAMPLING DESIGN

The study used multistage sampling design. All sub locations in each of the 6 wards in the study area were classified into either rural or urban/peri-urban. Then, one sub location in rural and another in urban/peri-urban were randomly selected from each ward. The third stage was to select randomly 2 villages from each sub-location. The final stage was simple random sampling from the list of all households in each village to proportionately select the respondents and donkeys

3.7 SAMPLING FRAME

Mwingi central sub-county has 37 sub-locations 20 of which are in urban/peri-urban while 17 are in rural set up. Out of a total 29,752 households 16,188 households are in the urban/peri-urban and 13,564 are in the rural set up. This represents 54.4 percent and 45.6 percent of the households respectively and based on this 215 questionnaires and 181 questionnaires were proportionately administered to urban/peri-urban and rural households respectively.

4.0 RESULTS

4.1 PHYSICAL AND PATHOLOGICAL WELFARE INDICATORS

4.1.1 Donkey lameness / Condition of hooves / Evenness

On physical examination of the animals the researcher was to indicate if the animal suffered any lameness on its limbs and the number of limbs affected by the lameness. Similarly the hooves were examined for evenness and any signs of overgrowth.

Lameness in donkeys was recorded at 13 percent of the sampled animals with a many of these being in the urban / peri urban areas at 14.4%. Majority of lameness affected one limb of the donkey. Majority had even hooves with only 19% reported to have uneven hooves. While 16.7% of the donkeys had cracked hooves with majority of these being at the rural areas at 20.4%. Overgrown hooves was recorded in 7.4% of the donkeys, again majority being at the rural setup.



Plate 1: a donkey with cracked hoof

Table 2: physical welfare indicators.

		study site		Total
		Rural n=181	Urban/Peri-urban n=215	N=396
lameness	Yes	21(11.6*)	31(14.4*)	52(13.1*)
	No	160(88.4)	184(85.6)	344(86.9)
Limbs affected	One	19(10.5)	26(12.1)	45(11.4)
	Two	2(1.1)	7(3.3)	9(2.3)
	Three	0	1(0.5)	1(0.3)
	Four	0	0	0
hoof evenness	Even	139(76.8)	183(85.1)	322(81.3)
	uneven	42(23.2)	32(14.2)	74(18.7)
Condition of hooves	cracked	37(20.4)	29(13.5)	66(16.7)
	Not cracked	144(79.6)	186(86.5)	330(83.3)
Overgrown hooves	Yes	16(8.8)	13(6)	29(7.3)

Number of hooves affected	One	8(4.4)	1(0.5)	9(2.2)
	Two	6(3.3)	10(4.7)	16(4)
	Three	0	1(0.5)	1(0.3)
	Four	1(0.6)	1(0.5)	2(0.5)

**figures in brackets are percentages*

Source: author 2016

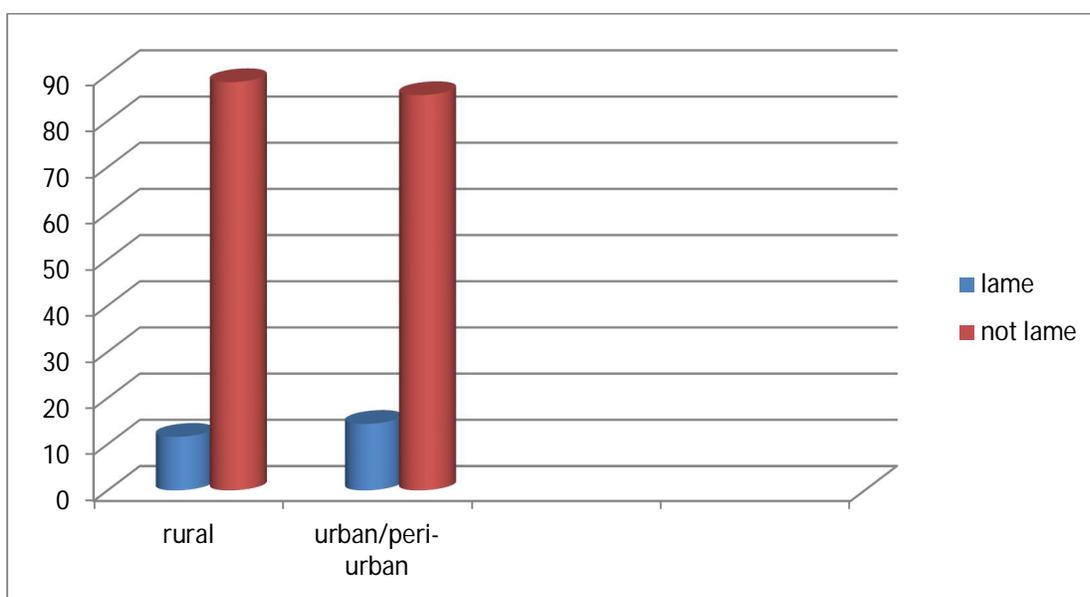


Figure 1: Lameness in rural and urban/peri-urban donkeys.

4.1.2. Body condition / Hair coat appearance

Body condition score was categorized as thin, medium, and fat. The researcher scored the appropriate body condition of the donkey as assessed. This also applied for hair coat appearance which was categorized as smooth and shiny, starring, matted and uneven.

The basic wellbeing of a donkey can be observed by its body condition. A donkey is too thin if its ribs or backbone are very obvious, the neck is thin on top, the rump is pointed or the hip bones are sticking up like those of a cow (Oudman, 2004).

A majority of donkeys at 64% had a medium body condition score with more than half of these being at the urban peri-urban settings. Those with a body condition score of fat were 28% while the thin ones were 8.8% at the urban / peri-urban animals while 7.7 percent of rural donkeys were thin. On hair coat appearance 42% of the donkeys had smooth and shiny hair coat, while 37% had a starring hair coat appearance. Those with matted hair coat were 11% while 9 percent had uneven hair coat appearance.



Plate 2: A donkey with a poor body condition (thin)
Source: author 2016

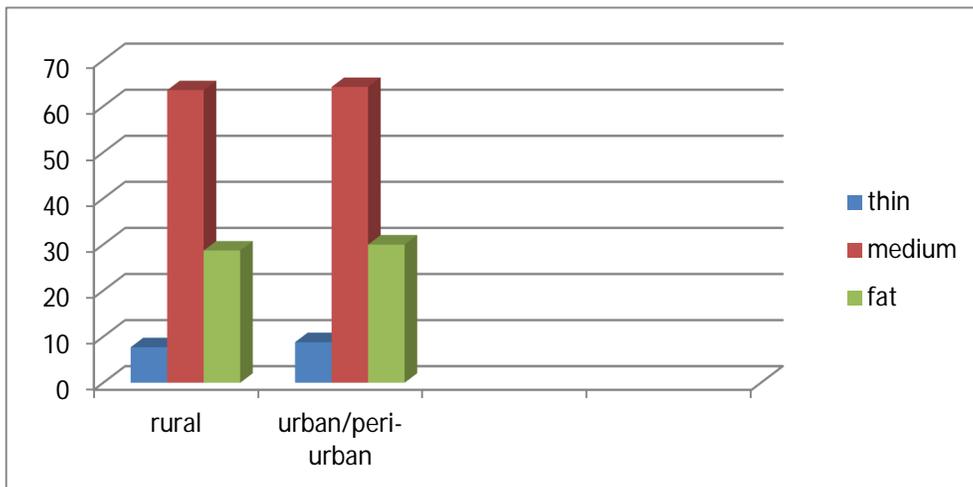


Figure 2: Body condition score. Rural versus urban/peri-urban donkeys.

Table 3: body condition score

		study site		Total
		Rural n=181	Urban/Peri-urban n=215	N=396
body condition score	Thin	14(7.7*)	19(8.8*)	33(8.3)
	medium	115(63.5)	138(64.2)	253(63.9)
	Fat	52(28.7)	58(30)	110(27.8)

**figures in brackets are percentages*
 Source: author 2016

Table 4: hair coat appearance

			study site		Total
			Rural n=181	Urban/Peri-urban n=215	N=396
hair coat appearance	smooth& shinny		73(40.3*)	95(44.2*)	168(42.4*)
	starring		72(39.8)	76(35.3)	148(37.4)
	matted		19(10.5)	26(12.1)	45(11.4)
	uneven		17(9.4)	18(8.4)	35(8.8)

**figures in brackets are percentages*
 Source: author 2016

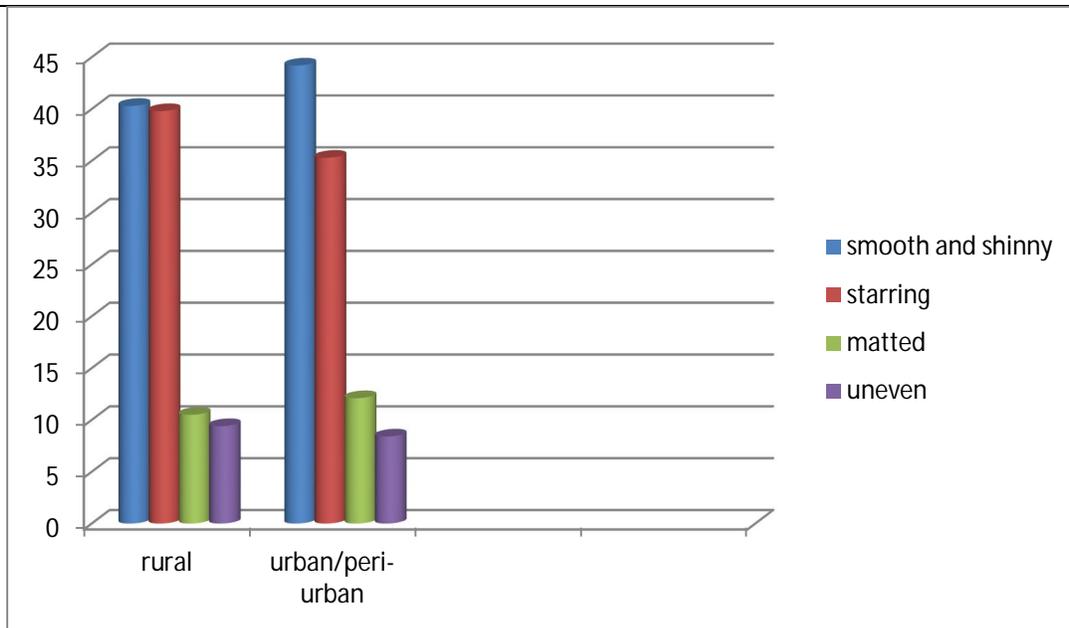


Figure 3: Hair coat appearance.

4.1.3. Body wounds and scars.

Upon physical examination the researcher was to indicate the presence of wounds and scars on the animals body, the number of wounds and scars on the animal was assessed according to the numbers categorized as 1-3,4-7, 8-11,12-15 and 16 and above. The body parts affected with wounds and scars were also evaluated.

The presence of wounds prevalence was at 18.2% with a majority being in the urban / peri urban setting. Many of the donkeys had between 1-3 wounds at 16.7 % with a large proportion at the urban peri-urban.

The part of the donkey's body most affected by wounds was the sides followed by limbs and then the back. Tether wounds caused by ropes on the limbs were found to be in 16.7% of the donkeys sampled. Out of these 65% of the donkeys had tether wounds on 2 limbs with a large proportion being in the urban / peri-urban centers.

The study established that 52% of the animals sampled had scars on their body. The rural ones had 59.7 Of their sampled ones with scars while the urban peri-urban ones were at 45.1 percent. Overall donkeys with 1-3 scars were at 44 percent with majority of these again being in the rural set-up. The body part with most scars was the sides of the animals, followed by the limbs and then the back. This pattern closely mirrored the location of the wounds as earlier shown in the study.



Plate4: A donkey with a septic wound on the back

Table 5: Scars on the animals.

		Study site		Total
		Rural n=181	Urban/Peri- urban n=215	N=396
scars on animal	yes	108(59.7*)	97(45.1*)	205(51.8*)
number of scars	1-3	93(51.4)	81(37.7)	174(44)
	4-7	12(6.6)	15(7)	27(6.8)
	8-11	3(1.7)	1(0.5)	4(1)
	16 and above	0	1(0.5)	1(0.3)

Figure:

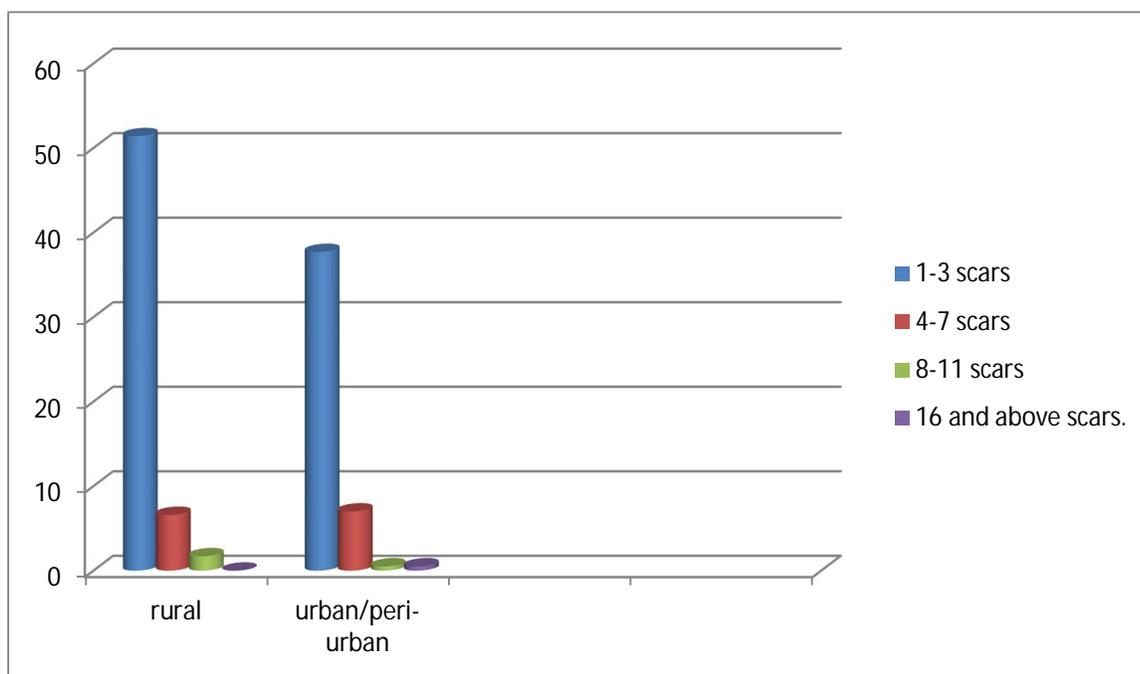


Figure 4: scars count on the donkeys.

Table 6: presence of wounds, number of wounds and part affected.

		study site		Total
		Rural n=181	Urban/Peri-urban n=215	N=396
presence of wounds	Yes	33(18.2*)	39(18.1*)	72(18.2*)
number of wounds	1-3	28(15.5)	38(17.7)	66(16.7)
	4-7	4(2.2)	0	4(1)
	8-11	1(0.6)	1(0.5)	2(0.5)
body part affected with wounds	Back	7(3.9)	8(3.7)	15(3.8)
	Sides	13(7.2)	10(4.7)	23(5.8)
	Limbs	9(5)	10(4.7)	19(4.8)
	Neck	2(1.1)	6(2.8)	8(2)
	Loins	0	3(1.4)	3(0.8)
	Withers	1(0.6)	2(0.9)	3(0.8)

Source: author 2016

*Figures in brackets are percentage



Figure 5: Body wounds.



Plate5: A tether wound on the foreleg of a donkey.

Table 7: Tether wounds

		study site		Total
		Rural n=181	Urban/Peri-urban n=215	N=396
tether wounds	Yes	32(17.7*)	34(15.8*)	66(16.7*)
limbs affected by tether wounds	One	13(17.2)	12(5.6)	25(6.3)
	Two	20(11)	26(12.1)	46(11.6)

*figures in brackets are percentages.

Source: *researcher 2016*

4.2.1. EYE CONDITIONS

The donkey eyes were examined for presence of discharges and corneal opacity and the results recorded. Among all the animals sampled 19 percent of them were found to have eye problems such as eye discharges, corneal opacity and blindness. Overall at 12.9 percent had one eye affected and 7.6 percent had two eyes affected. Overall 19.2 percent had eye discharges while only 2 percent of the animals had corneal opacity.



Source: researcher 2016

Plate6: A donkey with teary eye discharges.

Table 8: eye conditions

		study site		Total
		Rural n=181	Urban/Peri- urban n=215	N=396
does animal have eye problem	Yes	42(23.2*)	35(16.3*)	77(19.4*)
number of eyes affected	One	26(14.4)	25(11.6)	51(12.9)
	Two	17(9.4)	13(6)	30(7.6)
presence of eye discharge	Yes	37(20.4)	39(18.1)	76(19.2)
corneal opacity	Yes	4(2.2)	4(1.9)	8(2)

**figures in brackets are percentages*

Source: author 2016.

4.4.5 A summary of the results of statistics on physical animal welfare variables

All the physical welfare indicators used were subjected to a t-test to determine the ones that showed significant differences. The following variables in table * were found to have significant differences at levels where $p < 0.05$ level.

Table 9:

Variable	Location	F -value	significance
Hoof evenness	Rural and urban/peri-urban	18.084	0.039*
Overgrown hooves	„	17.692	0.042*
Wounds	„	0.304	-0.012*
Scars	„	24.822	0.000*
Eye discharges	„	3.241	-0.042
Corneal opacity	„	0.725	0.016*

There were significance differences between the evenness of donkey's hooves between the rural and urban peri-urban donkeys. The urban/peri-urban donkeys had 85.1% uneven hooves compared to 76.8% of their rural based counterparts. On the presence of body wounds an scars there was significance difference of the F statistic as well. The presence of eye discharges and corneal opacity parameters were also determined to be significantly different between the two groups of donkeys.

5.0 CONCLUSION

- Donkeys working in the rural areas had more hoof (uneven, cracked and overgrown hooves) conditions as compared to the urban/peri-urban counterparts.
- Urban/peri-urban working donkeys had more lameness cases as compared to the rural working donkeys.
- In terms of body condition score, the urban/peri-urban working donkeys registered a higher number of thin donkeys compared to the rural working donkeys.
- Presence of wounds was the same in both study sites, the most body part affected was the sides of the donkey, followed by limbs and then the back.
- Tether wound were most prevalent in rural working donkeys with a large proportion of these donkeys having tether wounds on two limbs.
- Rural based donkeys suffered more eye conditions compared to their urban/peri-urban working donkeys.
- Hoof evenness, overgrown hooves, body wounds and scars, eye discharges and corneal opacity physical parameters differences were statistically significant between the rural and urban/peri-urban working donkeys.

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