

# Benefits and associated challenges of working donkey in small holder farming systems in Kenya

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**Abstract:** In Kenya donkeys are a source of income for farming households through subsistence and commercial transport. A study was conducted to determine the benefits of keeping donkeys and the associated production challenges in small holder farming system in Kirinyaga County, Kenya. Data were collected through thirteen focus group discussions (FGDs) using participatory epidemiological methods (PE). The FGDs comprised 8-12 participants who were donkey owners across thirteen donkey rearing locations in Kirinyaga County. Qualitative data was collected using listing, pairwise ranking and probing included reasons for keeping donkeys, challenges faced by working donkeys and the diseases encountered among these donkeys. Data analysis was performed using a non-parametric method, Kruskal-Wallis, to test whether median ranks were significantly different. Quantitative data was collected using the structured questions in the focus group discussion guide and the descriptive summaries were presented as tables and themes. Narrative summaries were provided for the responses. The benefits included the incomes obtained from the use of donkeys in transportation (Z= 5.80) and manure production (Z= 3.47). Identified challenges included; theft for slaughter (Z = 5.99), diseases (Z = 3.03), road accidents (Z =2.83) and malicious cutting (Z = 2.32). Some of the diseases identified were tetanus (Z = 5.35), hoof problems (Z = 4.55), worms (Z = 3.10) and mange (Z = 2.24). The results are important for policy makers and extension agents with regard to health and welfare of donkeys kept under similar settings.

**Keywords:** Working donkeys. Benefits and challenges. Livelihoods. Source of income.

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## 1. INTRODUCTION

The estimated World population of working donkeys is 44 million with 13.7 million found in Africa [1] and 1.8 million in Kenya [2]. A majority of working donkeys are owned by individuals as a source of income to sustain their livelihoods. The income from working donkeys makes significant contributions to individual household and national economies (Brooke 2015). They generate vital direct disposable income that enables millions of families to access the food they need and money to pay for a wide range of expenses. They also provide essential support to households' income generation activities particularly in livestock and dairy production [3]. Within these households, livestock contribute directly as a source of food and indirectly through income generated from the sale of animals and their products. For working animals, the draught power is an important output for the communities whose livelihoods depend on them. Draught power is however not included among primary output/ product of working equines [4].

Working donkeys are faced with such challenges poor husbandry and management, donkey size, improper and often injurious working implements including improper harnesses and cart designs [5]. Donkeys are also mistreated through whipping, over working, overloading, straying, poor feeding and poor handling practices in the form of use of tether ropes [6]. Donkeys suffer diseases like Trypanosomiasis [7], gastro-intestinal nematodes, gross skin conditions and ecto-parasites [8], internal parasites [9], worm infestations [10] and African Horse sickness [11]. All these challenges greatly affect their welfare. Another emerging challenge in Kenya is theft and inhumane slaughter of donkeys [6], [12] which threatens donkey population in the future.

As part of a broader study to investigate the contribution of working donkeys to livelihoods of small holder farming households in Kenya, this study specifically described the benefits of working donkeys and identified the challenges they faced in Kirinyaga County. Once the challenges have been resolved, donkey production will be optimized and improve the livelihoods which depend on them. The generated data will also inform policy makers to include donkeys among livestock that contribute to livelihoods and allocate resources to improve the wellbeing of donkeys. Further,

## 2. MATERIALS AND METHODS

### *Research design and study area*

This descriptive study was conducted during the months of June to September 2018 in Kirinyaga County. The County borders Mt Kenya and is divided into three ecological zones. The lowland areas that (1158 - 2000 metres above sea level (asl), characterized by gentle rolling plains, the midland area (2000-3400 metres asl) and the highland (3400 - 5380 metres asl) which includes the whole of the mountain area. Due to the topography, donkeys were found in the lowlands and a few parts of the midlands, where they were used as a means of transport for small holder farming households.

### *Selection of study units*

The county had a human population of 528,054 occupying an area of 1,205.4 km<sup>2</sup> with a donkey population 3990 [2]. Administratively, the county is divided into five sub- counties which are subdivided further into 12 wards, 30 locations and 81 sub-locations. Out of the thirty locations in Kirinyaga County, thirteen locations were purposively selected because of the presence of large number of donkeys raised.

Preliminary visits to selected locations were conducted with local authorities (chiefs) and leaders of donkey owner community groups in order to introduce the project and its objectives. During the visits, the chiefs and donkey owners were asked to nominate one person per village who would participate in focus group discussions. This purposive selection of participants was done to identify people who could provide reliable information. These participants were selected to represent the entire location. The participants consisted of donkey owners who were also donkey users. Additionally, they had to be 18 years old and above and resident in the village. The researcher was not involved with selection of the participants.

### *Ethical approvals and participant consent*

Ethical approval to conduct the study was granted by the University of Nairobi biosafety committee. Additionally, before conducting the discussions, the study objectives were introduced to the participants and verbal consent to participate in the discussions was granted from all the participants. No participant declined to give their consent in the study period. Permission to conduct the discussions in the villages was also obtained from the village chiefs before commencement of the study.

### *Data collection*

Data was collected in thirteen focused group discussions in the 13 selected locations. One FGD was conducted per location comprising 8-12 participants from the different villages. The discussions were guided by a checklist of open-ended questions. The responses were also open ended and further probing was done to provide detailed information on the topics being discussed as well as to ensure clearer understanding of the information obtained. The responses were ranked using simple ranking method and pair-wise ranking based on the order of importance according to the participants. Key questions addressed included reasons for keeping donkeys, the names of diseases and the challenges facing the donkeys. Additional questions asked included the items transported, the reasons why the diseases were ranked in the order that they gave and the proposed solutions for the identified challenges. Manual notes based on their responses were also taken.

### *Data handling and analysis:*

Notes from the focus group discussion guide questionnaires were first transcribed into separate Ms word and excel documents. The ranks were then converted to reciprocals to give weights to the responses. The data was then exported to Genstat statistical package (VSN International 2015); where the median ranks of their weights was tested, by the Kruskal-Wallis test, to determine if they were significantly different. The responses were considered significant when the computed Z score was greater than the critical  $Z_{\alpha}$  1.96 value. Additional responses from the open-ended questions were presented in narrative summaries.

### 3. RESULTS

#### *Benefits of keeping donkeys*

Donkeys were kept in Kirinyaga County as a means of transport ( $Z = 5.80$ ) either as domestic transport or commercial transport which was a source of income. Donkeys were also kept for manure production ( $Z = 3.47$ ). This manure was used for farming crops such as rice. Other uses of donkeys in the County are indicated in table 1

**Table 1: Benefits of keeping donkeys**

Benefits of keeping donkeys	Median Rank	Z score
Transport	123.0	5.80*
As a source of manure	99.9	3.47*
For breeding	72.6	0.71
For ploughing	64.9	-0.07
For sale	51.2	-1.44
Trading	51.2	-1.44
As a source of income/ to hire it out	50.1	-1.56
As an asset	48.8	-1.68
As an identity	48.3	-1.73
As a pet	45.2	-2.05

\*Significant benefits

Rice was the most frequently transported item (10/13 groups). The rice was transported at different stages such as rice seedlings between different farms, paddy rice from the farms to the millers and white rice from the millers to the retailers. Water was also frequently transported followed by building materials, manure, farm produce such as maize, vegetables and potatoes, as well as moving people (especially household items, sick people and during occasions like political campaigns and weddings) and other animals.

Donkeys were also kept for production of manure (12/13 groups), for breeding (7/13) in order to obtain replacement stock; as assets (6/13) in order to sell it times of money needs; for ploughing (6/13) where they substituted and complemented bulls. One group also indicated they used donkey milk which as thought to have medicinal properties for people who had respiratory tract health problems.

Donkeys were therefore kept as a source of income either through charging of transport services they offer, or through their sale or sale of their products. Domestically, donkeys were used in order to avoid transport charges that would be incurred if labour was hired hence to saving the household income.

#### *Challenges experienced by working donkeys*

The challenges facing working donkeys in Kirinyaga County were theft and slaughter ( $Z = 5.99$ ), diseases ( $Z = 3.03$ ), road accidents ( $Z = 2.83$ ) and malicious cutting ( $Z = 2.32$ ) indicated in Table 2. They are sorted in descending order of significance.

**Table 2: Challenges experience by working donkeys in Kirinyaga County**

Challenge	Median rank	Z score
Theft and slaughter	214.0	5.99*
Diseases	163.2	3.03*
Road accidents	159.7	2.83*
Malicious cutting	150.9	2.32*
Competition by tuk-tuk	141.5	1.77
Lack of reliable vet services	110.7	-0.02

Poor image of donkeys	101.1	-0.57
Conflicts eg donkey detentions	93.6	-1.01
Lack of feeds	92.8	-1.06
Cost and availability of treatment	92.2	-1.09
Poor payment by customers ie debts	92.1	-1.10
Lack of housing	84.6	-1.54
Harassment by police	81.3	-1.73
Theft only	81.2	-1.73
Lack of unity among peers	76.5	-2.01
Poor roads	76.5	-2.01
Seasonality of work/ weather	75.4	-2.07

\*Significant challenges

Most of the respondents linked the challenge “donkey theft and slaughter” to the opening of the slaughter houses in Naivasha and Mogotio and the export of donkey skin. Due to the threat in numbers of donkeys and the upcoming industrialization, most donkey owners had diversified to *tuk-tuks* (*tuk-tuks* are motorized tricycles used to transport items) and motorbikes for transport due to the changing customer needs for increased speed and transport of fewer loads.

**Table 3: Narrative summaries for the identified challenges and proposed solutions**

Challenge	Proposed solution
Theft and slaughter	Closure of slaughterhouses, placing a ban on donkey slaughter and trade on its products; legalizing donkey meat and donkey slaughter so that donkeys are sold willingly from owners; monitoring of movement and marketing of donkeys by transport and movement permits; Improvement of donkey housing and security; Prosecution of all perpetrators of illegal theft and slaughter
Diseases	Practicing disease prevention such as vaccination of animals and improvement of hygiene, practicing home based care, routine health checkups for the donkeys, Improvement of donkey husbandry; Early disease identification and reporting for veterinary treatment immediately; Improve the competency of existing animal health service providers on donkey diseases and conditions
Road accidents	Donkey users to be trained on traffic rules and road safety, motorists to be sensitized on animal road use by use of road signs and bumps, donkey owners to prevent roaming of their donkeys and always wear reflective jackets and carry a torch at night to improve visibility by other road users.
Malicious cutting	Donkey owners to prevent straying of their donkeys, Sensitize the community on humane and amicable solutions to donkey related conflicts, prosecution of the perpetrators of malicious cutting
Competition by <i>tuk-tuk</i>	Maintaining a good relationship with customers ie be trustworthy in work, charge reasonably; offer reasonable competitive charges for donkey transport services; Improvement of donkeys to increase their efficiency to improve their preference among customers; reducing dependence on donkey transport income by sale of donkey manure
Cost and lack of reliable vet services	Improving the competency of existing LAHPs to offer services to donkeys; subsidizing drugs used for donkey treatment in order to lower the cost of treatment; paying promptly for services offered to encourage service providers to work with donkeys, Budget wisely to include treatment costs; maintaining a good relationship with animal health service providers who can extend services even on credit
Conflicts eg donkey detentions	Owners to prevent their donkeys from straying, County government to provide land or owners to unite and buy some land as holding ground within the town area
Lack of feeds	Owners to preserve/store hay (feeds) while in plenty for use in scarcity and prevent their donkeys from roaming
Poor payment by customers ie debts	donkey owners to unite and set equal charging for the services offered, refusing to offer services to customers who don't pay,

***Disease conditions experienced by donkeys***

Donkeys in Kirinyaga County faced diseases such as tetanus ( $Z= 5.35$ ), hoof problems ( $Z= 4.55$ ), worms ( $Z= 3.10$ ), and mange ( $Z= 2.24$ ) among other diseases indicated in table 4.

**Table 4: Identified disease conditions affecting donkeys in Kirinyaga County**

Disease/ Condition	Mean Rank	Z score
Tetanus	191.0	5.35*
Hoof problems	178.0	4.55*
Worms	154.6	3.10*
Mange	140.7	2.24*
Wounds	120.3	0.98
Rabies	113.4	0.55
Colic	100.1	-0.27
Respiratory problems	99.7	-0.30
Diarrhea	81.1	-1.45
Eye problems	79.1	-1.57
Tryps	75.2	-1.81
Sarcoids	71.7	-2.03
Staggering/ gaits	67.4	-2.30
Abscess, Blisters	66.7	-2.34
Hypersalivation	66.7	-2.34
Allergies	66.3	-2.36

\*Significant diseases

Most donkey owners in Kirinyaga County who were organized into self-help groups had been trained on early disease reporting and home based care by the Kenya Network for Dissemination of Agricultural Technologies, (KENDAT). (KENDAT is a local non-governmental organization (NGO) which partnered with an International based NGO called Brooke Hospital to promote donkey health and welfare through increasing the competencies of animal health service providers on donkey health management. The NGO also trained donkey owners and users on early disease identification and home based care of the sick donkeys. The NGO has been operating in Kirinyaga County for 20 years). Those who did not know the diseases were probably owners who had acquired the donkeys in the last two years. The disease which were identified as significant were those that were likely to cause death to the donkeys such as tetanus, rabies, colic, wounds; those that affected work output and therefore reduce income such as hoof problems, worms, respiratory problems; those which were expensive to treat and manage such as tetanus, worms, mange and wounds; those that were zoonotic and contagious such as rabies as well as those affecting appearance of the donkeys by affecting the coat hence reduces the price of a donkey during sale, also causes separation of donkeys by the owners and discourages potential clients from hiring the donkeys such as wounds and mange.

**4. DISCUSSION**

The importance of the working donkey cannot be overstated [12]. Their valuable contribution to rural livelihoods is increasingly recognized by international bodies such as the World Organization for Animal Health [13]. Donkeys were used in Kirinyaga County for transporting water, rice and building materials among other items. The water was transported to homes, schools, hotels, and construction sites. Transport of rice aided rice farmers to reach markets and therefore participate in its trade; a finding which concurred with Brooke [14] and Fernando and Starkey [15]. Wang'uru town which is located in Tebere Location within the Mwea Rice Irrigation scheme is the most populated town in Kirinyaga County [16]. The rice was transported as seedlings, paddy, white rice and husks from the farms to the millers and consumers. Donkey manure was also used in Kirinyaga for sale and use in the farms. The manure was reported to improve the soil quality by reducing the occurrence of crop parasites in the soils and reducing the acidity levels in rice fields. Further, donkey manure improves the composting process and the quality of resultant compost for use as manure in fields [17]. The money earned by a working donkey could support a family of between 5-20 members [18].

Donkeys are gazetted as food animals Meat control act CAP 356 [19] although their meat has not been accepted in Kenya hence they have not been previously explored for their role as production animals in Kenya. The consumption of donkey products re-emerged in the 21st century due to an interest in the use of donkeys as production animals for their skins, meat and milk [12]. Consumption of donkey meat is popular in China and the meat is highly prized [20]. The meat is low in fat and cholesterol and rich in iron [21].

Theft and illegal slaughter was identified as a significant challenge affecting donkeys in Kirinyaga. Reports from the police in Kirinyaga County reported approximately 300 donkeys stolen from Kirinyaga County, with 34 carcasses found. The carcasses were deboned and their skin was also collected. During the period of the study which was June to September 2018, 2 donkeys were reported to have been stolen (personal communication by the police officer commanding Mwea East station). This indicated that the thieves were after the skins [22] and the meat which was fraudulently sold as beef in local butcheries for public consumption. The carcasses posed a public health threat due to being improperly disposed hence contributed to environmental pollution as they decomposed.

The demand for donkey skin was high [22], due to donkey-skin gelatin which was highly sought after in China as an ingredient for production of a traditional medicine called *ejiao*, otherwise known as *Colla corii asini* or 'donkey hide glue'. Indeed, chinese traders opened three donkey export slaughterhouses in Kenya to facilitate the production of donkey skins for export to China. These slaughterhouses required a constant flow of donkeys which were obtained from Kenya and other neighboring countries. With the decreasing donkey population and unintentional breeding, unscrupulous businessmen turned to stealing donkeys from unaware owners. Infact, donkey theft and slaughter had been reported in other parts of the country such as Naivasha (in Nakuru County), Ol Kalou (in Nyandarua County) and Suswa in Mai Mahiu (Narok County). The unscrupulous traders also smuggle donkeys from neighboring countries such as Ethiopia, Somalia and Tanzania [23]. Some of the stolen donkeys were traced by the anti-stock theft unit to the donkey slaughterhouses [12].

Donkey theft and slaughter consequently affects the livelihoods of donkey owners who use them as their sole means of household income. Therefore, the respondents suggested placing a ban on trade of donkey products and closure of the slaughterhouses as a solution to end the illegal theft for slaughter. Other proposed solutions were having a system of tracing donkeys from their source, properly restraining donkeys to prevent roaming and providing security in homes and communal holding grounds.

Donkeys have been known as a dairy species since the Roman age. The milk is not only for its nutritional value but also for its beneficial properties in skin care. In the late nineteenth century, donkey's milk was successfully used for feeding orphan infants in Paris [24]. Respondents in Kirinyaga County also used donkey milk as a remedy for non-specific respiratory health problems. Additionally, donkey milk, due to its lysozyme, possessed effective properties in inactivation of certain viruses, anti-microbial activity, angiogenic inhibition and anti-tumour [25].

The significant diseases affecting donkeys in Kirinyaga County were tetanus, hoof problems, worms and mange. Tetanus is a bacterial disease caused by the anaerobic *Clostridium tetani*. Donkeys acquire the disease when tetanus spores enter the body through open wounds. The natural habit of donkeys rolling [26] increases the chances of donkeys acquiring the disease. Donkeys are however vaccinated against tetanus to reduce the chances of infection [27]. Occurrence of wounds was however not a significant challenge in Kirinyaga even though wounds are closely associated with tetanus. Wounds were the most important (82.3%) skin problem affecting working donkeys in Ethiopia. Wounds in donkeys were either work related such as those caused by whipping, friction injuries caused by carts or harnesses or loads which are not placed properly on the carts [28]. Donkey whipping was common in Kirinyaga County. It was done for the purposes of controlling donkeys to make them turn to the right or left. It was also done to inflict pain to the donkey so that they can increase their speed during work so that the owner can take up more work. Wounds were also inflicted maliciously by the community members when donkeys strayed and destroyed their property and the resulting conflict was not resolved amicably.

Hoof problems, mainly overgrown hoofs were identified as a challenge in Kirinyaga County affecting work output due to lameness. Since donkeys in the County either worked in wet areas such as the irrigation schemes or rivers or walked in tarmac, the integrity of the hoofs was compromised due to extended periods when the hoofs become wet combined with the period when the hooves were walking on hard surfaces like tarmac. This therefore put extensive pressure on the hooves and they developed hoof problems. Additionally, consumption of excessive amounts of concentrates such as rice

bran, which is readily available as a byproduct of rice processing increased the risk of the donkeys developing hoof conditions such as laminitis. “A working donkey is as good as its hoof” is a proverbial saying recorded from the mid 18<sup>th</sup> century that emphasized the need of taking care of donkeys’ hoofs. In Ethiopia, hoof problems contributed to 27% of lameness cases with overloading and overworking among the risk factors among working donkeys pulling carts [29]. Hoof problems was a common condition affecting working donkeys in Pakistan [30].

Working donkeys in Kirinyaga County were also affected by parasites, mainly internal parasites such as worms and external parasites such as mites which cause mange. Large Strongyle helminth species (87%) and small strongyles (11%) as the most important gastrointestinal parasites in donkeys [31], [10] and [8].

Diseases affecting donkeys elsewhere in Kenya but not significant in Kirinyaga county included African Horse Sickness [11] and Trypanosomiasis [7]. Although Mange, caused by mites, was identified among the important diseases affecting donkeys in Kirinyaga, other studies focusing on ecto-parasites in Mwingi, Kenya did not identify mites [8]. Future studies were proposed to establish the actual prevalence, risk factors and effects of tetanus, hoof problems and mange which were highlighted in Kirinyaga County.

## 5. CONCLUSION

In conclusion, income was an important benefit of keeping donkeys in Kirinyaga County for the purposes of sustaining livelihoods. The income was obtained directly through payment for transport services offered by the donkeys and sale of donkey manure. Indirect income was obtained through money saved for use of donkeys domestically instead of hired transport and labour. The significant challenges and diseases affecting donkeys were those that affected to income obtained from the donkeys directly and indirectly. The direct income losses were caused by challenges such as loss of donkeys from theft and slaughter as well as death and inability to work due to diseases, road accidents and malicious cutting. Indirect income losses from donkeys were due to the challenges reduced the amount of income obtained from donkeys due to competition by *tuk-tuks* and diseases which reduced the work output of donkeys hence lowering the income obtained. Donkey owners also used money for disease prevention, payment of vet services and purchasing feeds; all of which reduced the net income. The diseases which were identified as significant were those that were likely to cause death to the donkeys, those that affected work output and therefore reduce income, those which were expensive to treat and manage, those that were zoonotic and contagious as well as those that affected the appearance of the donkeys by affecting the coat hence reduced the price of a donkey during sale and also causes separation of donkeys by the owners and discourages potential clients from hiring the donkeys.

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## Conflict of interest

Authors declare that they have no conflict of interest

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