

Selected intervention strategies to improve health and welfare of working donkeys in Kenya. A narrative Review

ABSTRACT

Aim: To comprehensively review the interventions made, to address health and welfare challenges faced by working donkeys; to systematically analyze the reasons for failure; and triangulate them with donkey health and welfare.

Study Design: A comprehensive desktop narrative review

Methodology: a systematic review of some intervention strategies which included: (i) Knowledge change; through training donkey owners on donkey welfare, handling, feeding, working conditions, routine health checks and basic first aid skills for their donkeys. (ii) Refresher trainings to animal health providers to enhance their capacity in handling equine cases; (iii) Donkey health services provision (iv) Improvement of husbandry practices (v) advocacy and (vi) legislation.

Results and discussion: Some positive changes were recorded in health and welfare of donkeys. However, low adoption of knowledge and skills to change practice, unsustainable approaches which led to delayed treatment due late disease reporting and unwillingness to pay for health services, emerging challenges which complicate ongoing intervention efforts; were identified as the reasons for the persistent health and welfare challenges.

Study Significance: The findings would provide policy makers and implementers at county and national level with information they can use to ensure interventions are done in a manner that promotes sustainability of donkey welfare projects; ultimately improving the livelihoods of the donkey owners and users. Lessons of this study will also help project implementers to prioritize areas of intervention in light of the ever changing challenges affecting working donkeys.

Keywords: *Health and Welfare Interventions, Stakeholders, Sustainability, Working donkeys.*

1. INTRODUCTION

Domestication of the donkey from the African wild ass, which is estimated at about 6,000 years ago, transformed ancient transport systems in Africa and Asia and the organization of early cities and pastoral societies¹. Since ancient times, donkeys have been essential for transport in arid, rugged, and poorer regions of the globe². Animal welfare remains an area of consistent public concern³. Donkey welfare is a complex, multifaceted, international and domestic public policy issue with scientific, ethical, economic, legal, religious and cultural dimension as well as important trade policy implications⁴. Donkey welfare is intrinsically related to other government concerns such as public health, food safety, and long-term socioeconomic environment. It is a responsibility that must be shared among governments, communities and the animal owning communities⁴. In recent years animal welfare, has become an issue of increasing concern in several countries worldwide, including countries in Africa. It is defined as the state of how an animal is coping with the conditions in which it lives. It refers to the state of the animal; the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment⁵.

Over 7 million people are estimated to benefit directly⁶ from an estimated 1.1 million working donkeys in Kenya⁷. Working donkeys are kept under different production areas in the pastoral, rural and peri-urban areas of Kenya. They are used for income generation for many households. Donkeys are more popular choice of work animals for small-holder farmers⁸. Their versatility and dependability as a source of animal traction exposes them to different health and welfare challenges most of which are related to their

working environment. As such, specific management practices need to be devised in order to fully maximize their work output. Some challenges affecting their health include diseases such as African Horse Sickness⁹, Toxoplasmosis¹⁰, Parasitic infections¹¹, Wounds¹², Trypanosomiasis¹³, dental problems¹⁴. inadequate or inappropriate nutrition³ also shown in Figure 1, feed shortages^{15,16}, inability of donkey owners and users to recognize, and manage basic welfare issues (such as pain or behavioral problems), lameness, chronic or endemic health issues³, overloading, overworking^{14,16}, inhumane handling¹⁷, inappropriate harnessing^{14,16} and working in poor roads¹⁵ among others.



Figure 1: Donkeys feeding on vegetable trimmings after delivering farm produce to the market

There has been considerable social scientific interest in the health and welfare of farmed animals¹⁸. This has led to numerous intervention approaches to address the health and welfare challenges of working donkeys in Kenya. This has been enabled through joint efforts by the Kenyan government in partnership with the private sector including Non-governmental Organizations (NGOs) to implement donkey welfare initiatives for more than twenty years. Some NGOs such as Kenya Network for Dissemination of Agricultural technologies (KENDAT) (kendat.org) Brooke East Africa, International Fund for Animal Welfare (IFAW), (Africa Network for Animal Welfare (ANAW), Donkey Sanctuary (DS), Caritas, Kenya Society for the Protection and Care of Animals (KSPCA), Kenya Veterinary Association (KVA), World Animal Protection (WAP), Practical Action and World Society for the Protection of Animals (WSPA).

Figure 2, shows different counties of interventions by different NGOs. KENDAT (in Nairobi, Kirinyaga, Meru, Kiambu, Nyandarua, Kericho, Tharaka Nithi); Practical Action (in Wajir); Caritas in (Kitui); ANAW (in Narok and Kajiado); FSK (in Nakuru, Narok, Bomet and Baringo); AWAPH (in Kisumu); SPANA in (Narok) and KSPCA (in Nairobi, Naivasha, Nanyuki and Mombasa).

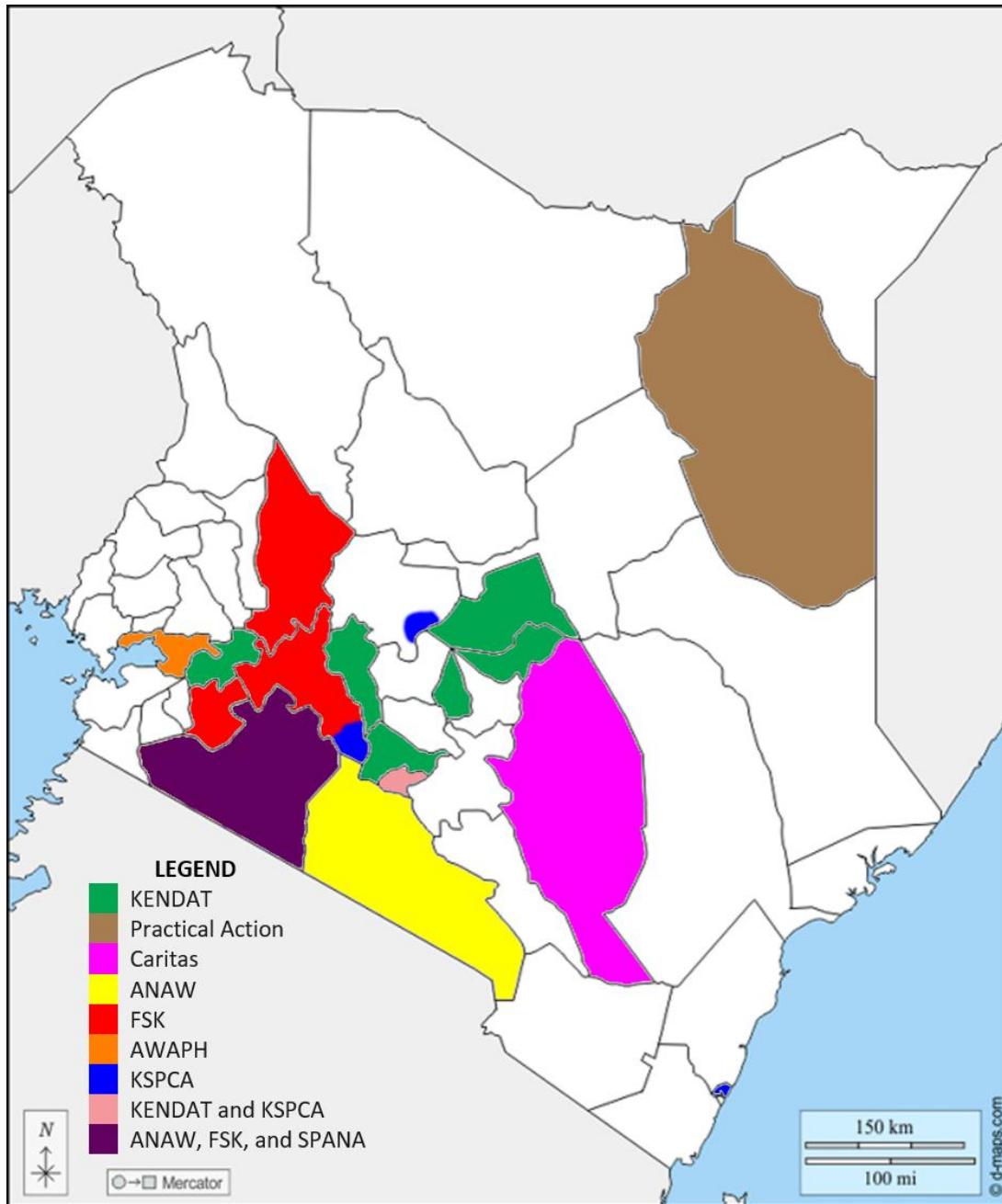


Figure 2 Map of Kenya showing counties of intervention by different NGOs

The approach by these NGOs ensure the safety of donkeys through ensuring good donkey health, good shelter though construction of lockable housing, availability of feed and water, appropriate load, carts and harnesses. Additionally the NGOs are involved in advocacy, research, training, creation of awareness and communication campaigns, refresher training on equine health and management to veterinary surgeons and veterinary paraprofessionals as well as through legislation and development of strategies at regional and national levels.

The intervention seemed to yield some results as depicted by knowledge change by donkey owners, local animal health practitioners, and the general community of highlighting welfare issues. However, some donkey owners had not utilized the gained knowledge and skills to care for their donkeys. As such, there were some donkeys that still suffered diseases, some were neglected due to these diseases, some

donkey owners continued to overload the donkeys, excessively whip them, failed to provide adequate feeds and water; all of which affected their welfare. For Instance, Kielland et al.,¹⁹ reported that farmer's perception and attitude directly relate to human – animal interactions and these attitudes and perceptions affect farmers' behaviours towards animals in terms of the type of feed they feed and the duration that animals spend working.

This calls for a comprehensive review and evaluation of the intervention strategies previously applied in order to determine if these strategies are useful, applicable and sustainable. It is also important to identify the gaps that could lead to persistence in health and welfare challenges among the working donkeys. This will advise future interventions on adoption of more sustainable measures. Adoption of less sustainable intervention measures creates dependency among the donkey owners hence fluctuations in health and welfare and consequently lowering their productivity. When working animals are in a state of good health and welfare, they live longer, are productive and are able to increase their work output hence increased household income earned by owners²⁰. Therefore, this study was conducted with the objectives of reviewing the intervention strategies previously applied to address health and welfare challenges among working donkeys; as well as to identify the gaps that could lead to persistence in health and welfare challenges among the working donkeys.

The findings would provide policy makers and implementers at county and national level with information that they can use to ensure development is done in a manner that promotes sustainability of donkey welfare projects; ultimately improving the livelihoods of the donkey owners and users. Lessons of this study will also help project implementers to prioritize areas of intervention in light of the ever-changing challenges affecting working donkeys.

2. METHODOLOGY

The study was conducted through a systematic review of the interventions made and triangulating them with the changes in health and welfare and therefore the productivity of the working donkeys through livelihood analysis. The results of other relevant published studies alongside future sustainability, economic and logistical considerations informed the selection of intervention strategies²¹. The following intervention approaches were reviewed.

2.1 Knowledge change

Training of donkey owners in Kenya occurs through the private extension system mainly delivered by non-governmental organizations or private companies^{22,23}. The government's role in extension services is often in monitoring and quality control²⁴. The NGOs use training as a sustainable intervention approach within their areas of operation²⁴, to quickly transfer knowledge, skills, new technologies to farmers²⁵. Training donkey owners builds their capacity in animal health and welfare^{26,27}.

The trainings offered are often short term, lasting approximately between 2 days to 2 weeks²⁸. The availability of the donkey owners for multiple days is a challenge²⁴, given that any day spent in training means a potential loss of daily income. As such, the attendance to the trainings is often inconsistent and low especially when the trainings are prolonged²⁸. The content of these trainings is often on routine health checks, early disease reporting, basic first aid¹⁶ as well as basic hoof care and trimming (kendat.org) among others. The content during these trainings should be guided by training needs analysis of the donkey owners²⁹ as well as the scope of what they can do in light of veterinary service regulation. The training delivery methods applied are often participatory²⁹. A combination of group-based and individual activities have been found to be effective in content delivery³⁰. As much as possible apply adult learning techniques³¹. Other modes of delivery such as e-learning for the literate category of donkey owners can also be utilized to transfer knowledge³². Literacy and education levels for the donkey owners is very varied^{16,28,33}. Stringer et al.,²⁷ compared knowledge change among participants at different literacy levels and found that knowledge change was greater among participants with higher levels of formal education, while participants with lower literacy levels had reduced ability for knowledge acquisition from

knowledge-transfer interventions requiring literacy. In light of this, it is important to design short term trainings to donkey owners and utilize delivery methods that provide the maximum transfer of knowledge³⁰. Grace et al.,³⁴ evaluated whether knowledge on a specific subject decrease over time and recommended that; in order to reduce this knowledge fade at longer time intervals, the information for owners should be made readily and continually available to farmers, as learning may decay unless reinforced.

Despite the fact that several initiatives have been put in place to train owners and users on the importance of taking good care of donkeys, the uptake of these initiatives remains low among donkey owners and users. An understanding of adoption of knowledge transferred to donkey owners as well as change in practice is crucial. It is important to integrate different perspectives and knowledges as a way of understanding and responding to animal health and welfare concerns³⁵. A previous study to investigate animal welfare knowledge, attitudes, and practices among livestock holders revealed a clear disparity between knowledge and practices of animal welfare³⁶. This discrepancy between knowledge of action that should be taken and the actual implementation of change is a well-recognized phenomenon^{35,37,38}. The process of introducing changes to routine behaviours is difficult³⁷, and presents many challenges when trying to work with farmers to knowledge gained to implement welfare improvement³⁷. The fact that donkey owners can recognize diseases affecting their donkeys and report the same is a step towards the right direction²¹.

For efficiency of knowledge transfer to donkey owners as an animal health intervention; it is proposed that formal education and literacy levels, shorter durations or trainings which should be strengthened with refresher trainings on relevant topics, combined with participatory content delivery methods centered on adult learning techniques should be considered when structuring the trainings. Due to the limited government funding on extension, collaborations with the private sector such as NGOs may be a viable solution to keep the owners informed. The NGOs are also more efficient in extension service delivery²⁴.

2.2 Refresher training to existing animal Health Providers.

The impact of donkey health and welfare interventions cannot be overstated³⁹. Preserving donkey health and welfare is key to sustaining the livelihood of many populations across the world⁴⁰. Knowledge of animal health providers to handle equine cases was low²⁶. This could be due to limited training on equine management from the education institutions in Kenya as seen in curricula of training institutions teaching certificate, diploma and degree in animal health and veterinary sciences. This challenge in knowledge and skill levels leads to disparities in case-loads by local animal health professionals when treating donkeys compared to other livestock²⁶. Access to essential medicines was also a challenge affecting health and welfare due to their high cost⁴¹. NGOs have intervened through training of animal health providers and linking the donkey owners to trained animal health providers. These animal health providers are trained on equine behavior, handling and restraint, management of equine diseases, equine drugs, pain relief etc. The Donkey Sanctuary Kenya' approach, for example, was through provision of technical and practical based trainings and support to animal health service providers on donkey diseases and husbandry to enable them provide vet care to donkeys (www.thedonkeysanctuarykenya.org, www.spana.org). Curran et al.,²⁰ evaluated the impact of this approach and found that donkeys within the intervention areas were significantly healthier and more productive than those in non-intervention areas. These findings are similar to Onono and Kithuka,²⁶who highlighted significant differences on level of knowledge of animal health providers in donkeys in operation areas where donkey welfare projects were being implemented compared to non-operation areas.

A study by Onono and Kithuka²⁶ highlighted significant differences on level of knowledge, on types of medicines used for treating health conditions in donkeys. In regions where welfare campaigns were done, the animal health services providers had better knowledge on veterinary medicines used for treatment of donkeys in addition to presence of more veterinary practices which were regulated by the

KVB²⁶. This positive change due to training is therefore encouraged as a way to ensure service provision to donkeys. Strategies such as subsidizing retail prices for medicines have been tried⁴¹, but the sustainability of this approach is questionable.

2.3 Donkey health services provision

Many of the health problems in donkeys are traumatic, mechanical as well as infectious in origin, resulting from the environmental causes and ill-treatment by owners and from critically considered attaches of the working apparatuses⁴². Delivery of veterinary services in Kenya has evolved through different stages since the era of structural adjustment programmes (SAPs) in the late 1980s. The privatization and subsequent devolution of veterinary services from the national government, together with challenges in the human resource capacity of the DVS, are major constraints to provision of animal welfare services in Kenya⁴³. According to Okwiri et al.⁴⁴, privatization of veterinary services resulted in rapid expansion and growth of private veterinary delivery system. The challenges relating to donkey health service provision included unavailability and high cost of equine specific drugs in agro-vets (shops selling agricultural inputs including veterinary drugs) such as those used for pain relief, lack of proper regulations, including selling of veterinary medicines without proper advice on route of drug administration and correct dosages⁴⁵. Outlets selling veterinary medicines within the smallholder farming systems, which are properly regulated, are instrumental for supply of veterinary medicines to farmers⁴⁶.

Attempts to intervene in health provision by NGOs has been through direct free or subsidized treatment of donkeys in medical camps (www.thedonkeysanctuary.org) as well as mass treatment and vaccination of donkeys in a medical camps⁴⁷.

This has resulted in a perceived undue competition between NGOs and animal health providers working in the regions. This may cause ripple effects such as reducing the reliability of the animal health providers in project areas when called to treat donkey diseases. Onono and Kithuka,²⁶ recorded a lower reliability of 57% in operation areas compared to 71% in non-operation areas when there was no competition. Sustainability of direct treatment can also be evaluated by willingness and actual payment for treatment of donkey diseases. In a study by Onono and Kithuka,²⁶ approximately 80% of donkey owners in intervention areas recognize the need to pay for donkey treatment services compared to 94% in non-intervention areas. The actual willingness to pay according to animal health providers was 39% in intervention areas compared to 42 % in non-intervention areas. These results suggest that even though donkey owners have been sensitized on the need to pay for treatment of their donkeys, only a few were actually willing to pay; further emphasizing the sustainability of intervention gaps; unless donkey owners were assured of other benefits of paying for health services⁴⁸. Other challenges associated with direct free or subsidized treatment of donkeys were delayed reporting of sick cases, neglecting and abandoning sick donkeys keeping sick donkeys by the road until they are rescued, die or are presented for a mass treatment camp⁴⁹.

2.4 Improvement of husbandry practices

Animal husbandry is defined as the science of breeding, feeding, and tending domestic animals, especially farm animals (www.thesaurus.com). In this study, husbandry implies aspect of handling and restraint, feeding and watering, housing as well as breeding of donkeys. Donkeys have been always managed less than other livestock⁵⁰. Inadequate care remains an issue in donkey husbandry in the developing world⁵¹.

Improper handling is considered as a major stressor, adversely affecting farm animals^{52,53}. It exerts deleterious effects on health, well-being, behavior, performance and production quality⁵⁴. The NGOs have focused on humane handling and restraint of donkeys through training donkey owners on the use of halters made from sisal ropes, avoiding the use of nylon ropes, proper control of the donkeys when working by avoiding excessive whipping, proper loading and offering time for resting the donkeys. Although there has been some changes noted in the handling, some poor management continues to be

seen through the presence of wounds associated with the use of nylon ropes, skin lesions due to excessive whipping and abnormal aggressing in some donkeys due to harsh treatment. Working donkeys don't usually show aggressive behaviour towards people ⁵⁵. The reason attributed to persistence of the poor management practices is the slow adoption of acquired knowledge and skills ^{35,37}, hampered by the owner's 'perception' on welfare as greatly affects how they treat their donkeys ³³. There was also an observed high turnover of donkey owners and users; such that those who had been trained had ventured into other income generating activities, leaving people who were not previously untrained to work with donkeys. As such trainings were highly recommended to continue ³⁴. During the trainings the donkey owners should be persuaded that by taking care of their donkeys better, it will not only benefit the donkeys but also themselves; a healthy donkey is a more hardworking donkey ⁵⁶.

Improper harnessing, overloading and overworking are identified as common animal welfare problems affecting donkeys ¹⁴. Improper harness and saddles are associated with discomfort, external lesions and fatigue on donkeys ^{49,57}.

Feeding and watering is an important aspect in the husbandry of donkeys. It requires knowledge of the feeding behavior and nutrient requirements of animals for specific production functions, for instance work ⁵⁸. Donkeys are commonly fed with poor-quality feed. They suffer chronic under-nutrition conditions especially during the dry season which coincides with the time of agricultural and work operations that require most of the work production from the donkeys ⁴². Greater ability to tolerate thirst, lower water needs compared to other livestock, re-hydrate rapidly and maintain appetite may give donkeys a survival advantage during times of drought over less thirst-tolerant animals ^{8,58}. In nature, donkeys are able to adapt to grazing for long periods of time, and forages are the basis of their diet ⁵⁹. They maintain a low level intake of dry matter relative to their body size. This level of intake is relatively independent of diet quality ⁸. Proper feeding of donkeys enables them to resist better to disease, have a higher rate of reproduction to provide replacement animals and live longer. During feeds and feeding trainings by the NGOs, the practices which were emphasized to the donkey owners included appropriate nutrition, fodder preservation, as well as watering the donkeys (kendat.org).

The evaluation of the good feeding welfare principle remains multi-faceted and complex ⁶⁰. Various efforts have been directed towards proper loading. For example, it is recommended that a donkey should not carry more than one third of its body weight by pack, approximately between 40-80 kg, ⁵⁷, however most donkeys carry weights exceeding these limits. Additionally, it is recommended that donkeys be worked during the cooler parts of the day and also be provided shaded rest during the day when the temperature is high ⁶¹. However, it is common to find donkeys working throughout the day when their demand is high. It is therefore apparent that some recommendations aimed at improving welfare of donkeys do not actually reach to donkey owners or are not implemented ⁵⁶. There should be a system of unpacking research information to the consumers. This may be done through feedback workshops or through public awareness forums. Indeed, Blokhuis et al., ⁶² emphasized that feedback along with practical advice and alternative strategies can help the farmer to improve the animal welfare through informed decisions.

Donkeys are provided a form of enclosure at night which may be inside a fence or in some form of shed, sometimes together with cattle ⁵⁶. Some donkeys are also tethered within the homestead without being enclosed. The enclosures often lack shade leaving them to be exposed to hot sun or rain. Donkey housing continues to receive less attention, and they are kept in an open backyard ¹⁶. The limited rescue centers in Kenya do not allow for rehabilitating abandoned donkeys.

2.5 Legislation

There are over 25 laws governing the animal resource subsector in Kenya. All these many laws are old, outdated, fragmented and difficult to implement and enforce animal welfare standards. The Prevention from Cruelty to Animals Act CAP 360 (Amended, 2012) ⁶³ despite being one of the most comprehensive animal welfare legislations in Kenya, is equally outdated and not fully compliant with the WOAHA animal welfare standards, some of which were adopted as recent as 2016 (welfare of working equids) KNAWS,

⁴³. The prevention of cruelty to animal act- CAP 360 also failed to mention donkey specifically, but the horse was always mentioned ⁶³. Other legislation in Kenya animal which are concerned with welfare include the National Livestock Policy (2008), the Wildlife Management and Welfare Policy (2015) and the Draft Veterinary Policy (2015). Although working equids technically fall under the definition of livestock, they are often not considered as such by policy makers probably because they are not food producing animals. Further, there exists policy and legislation gaps that have been identified in animal welfare; which include weak institutional frameworks for implementation of animal welfare, particularly following devolution of veterinary services, animal husbandry and animal welfare services to the county governments, the lack of formally appointed government structure for providing animal welfare governance at national and county levels. There is inadequate coordination, collaboration and partnerships for animal welfare. Although two laws (Prevention of Cruelty to Animals Act CAP 360 and VSVP Act CAP 366 mandate the Ministers to develop animal welfare regulation, there is no explanation for the fact lack of animal welfare regulations in Kenya. Subsequently, there are no animal welfare standards, guidelines or codes of practice to guide programs and through priorities. This confirms a weak policy and legislative framework for animal welfare in the country that requires strategic intervention. Lack of animal welfare legislation was also a constraint in improving the welfare of working donkeys in Ethiopia ⁵⁶. It is expected that continued advocacy, animal welfare legislation will be changed and the working environment for donkeys will be better.

2.6 Advocacy

NGOs have significantly contributed to advancing animal welfare programmes through advocacy, awareness and communication campaigns ⁴³. Animal advocacy is the pursuit for the humane treatment of animals and the prevention of their suffering ⁶⁴.

Advocacy is a strong focus point for organizations to influence policy and governmental decision making ⁶⁵. In advocacy, collaborations are made among varied stakeholders with a common interest in donkey health and welfare such as regional and international NGOs including the KALRO, animal welfare organizations, AU-IBAR, World Organization for Animal Health (WOAH), the World Bank, the United Nation (UN), the Food and Agriculture Organization of the United Nations (FAO) and the European Union. For example, at an advocacy campaign held in the year 2022 themed "Donkeys in Africa: Now and in the Future", stakeholders who were drawn from the regional and international bodies involved in animal welfare agreed to safeguard the donkey which is threatened by overexploitation in the skin trade (panafricandonkeyconference.org).

The World Organization for Animal Health (WOAH, founded as OIE) develops communication programmes to provide governments, the agri-food sector, veterinarians and other professionals, including farmers, with accurate, accessible and up-to-date information on animal welfare. It also works with governments, international and regional organizations, and the private sector to promote its animal welfare standards and makes information available to the general public to raise awareness and promote progress on animal welfare issues (woah.org). Communication of animal welfare information in Kenya is currently not well coordinated in the country (fao.org). The collaborative pooling of experience across different NGOs could help make welfare communication more effective and provide a framework for NGOs in other fields to learn from each other's collective knowledge ⁶⁵. Communication of research finding is often unavailable or inaccessible to farmers such as donkey owners ⁶⁶. Communication methods for animal welfare content have largely been through the use of print and electronic media, including radio, television programmes and newsletters, magazines, newspapers and social media (email, face-book, twitter and whatsapp) depending on the age and social categories of society.

In Kenya, the donkey was gazetted as a food animal in the year 1999 ⁶⁷ with the aim of curbing backyard slaughter, improving food safety. Donkey slaughter was then legalized in Kenya in 2012. This led to the establishment of four export donkey slaughterhouses. Since the donkey population in Kenya and the abattoirs were slaughtering very many donkeys a day, much more than naturally the donkeys can replenish, unscrupulous businessmen turned to donkey theft, of slaughtering of underage donkeys, of

cross-border smuggling of donkeys. This threatened the communities whose livelihoods are dependent on donkeys. Indeed, the Kenya National Bureau of Statistics ⁷ indicated a decrease in donkey population over a 10 years period, from 1.8 million donkeys in 2009 to 1.17 million in 2019. There was then advocacy by donkey owners and animal welfare organizations petitioning the state to ban donkey slaughter ⁶⁸. The government then instituted a ban of donkey trade and slaughter in Kenya in April, 2020 through The Legal Notice 63 of 2020 published in the Kenya Gazette of 20th April, 2020. (<http://kenyalaw.org/caselaw/cases/view/213022>). However, the owners of the four donkey slaughterhouses in Kenya appealed this ban stating that it was a violation of the rights of the proprietors of the abattoirs. Kenya's High Court lifted a ban on the slaughter of donkeys for both meat and hide for medicine in the Asian market in March 2021.

3. DISCUSSION

The welfare of donkeys is crucially important not only for the health and survival of those animals, but also for the livelihoods of those people dependent on them ¹³. Prioritization of animal welfare issues can help identify which areas most require research funding and raise awareness of best practices ³. An understanding of the contribution of donkeys to households, local and national economy may help to mainstream donkeys with other livestock. Stakeholders responded differently with donkeys when compared to other animal species ³⁵. The generation of a farm action plan and subsequent implementation of identified action points can be seen as key process stages towards the target of reducing health and welfare challenges. The process requires the appreciation of the varied income benefits of owning donkeys and keeping them healthy and in a good state of welfare ⁴⁸. Donkey owners need support in starting and sustaining this process. It is important to note that the process of introducing changes to management practices, strategies and routine behaviours is not easy ³⁷. There needs to be a paradigm shift in addressing health and welfare challenges. Importantly, the recognition that management of donkey health welfare requires a multidisciplinary approach. For example, social sciences are increasingly being integrated to help resolve contemporary crises. A paradigm of 'behavioural change is providing apparent solutions to animal health policies ⁶⁹. This could prove beneficial for animal health and vets: it may lead to more effective design of knowledge transfer mechanisms, for example, to help improve animal health ⁷⁰.

There are limited studies documenting intervention strategies to address donkey health and welfare in Kenya; and the impacts thereof. Majority of the evaluation studies were drawn from other developing countries such as Ethiopia, Ghana, Botswana, Pakistan and Somalia, due to limited work on working donkeys in Kenya. These countries are largely comparable in terms of the context of working donkeys.

It would be more valuable to assess the specific issues affecting donkeys according to the different production areas as the issues and the methods of addressing them could be diverse Geiger et al., ⁷¹. A study conducted in Ethiopia ⁵⁴ revealed that; even though donkeys' requirements are similar everywhere, some differences in welfare are seen between those kept in the rural versus the peri-urban areas.

Both the health and welfare and hence the working ability of donkeys can be greatly improved with simple interventions, such as improvements in nutrition, water availability, proper harnessing, and/or balancing loads in carts or on packs ⁷². It is important to appreciate that most welfare problems and remedies were thought to be mediated by human. The way humans manage their animals in different parts of the world is a synthesis of cultural norms, experience, learning, received wisdom and trial and error. It is also dependent on income and access to resources ³³. In this regard, addressing donkey welfare problems was about changing human behaviour. The interventions on donkey health and welfare is largely been affected by donkey owners' perceptions and myths concerning their care. The notion that donkeys were regarded as 'the beast of burden' resulted in them being overloaded and overworked; notwithstanding the fact that donkeys needed to rest so that they could be more productive/ efficient ⁷³. Other myths that 'donkeys do not get sick, and if they do, they die' which was probably derived from the fact that donkeys

were regarded as sturdy animals, also prevented the owners from seeking early veterinary intervention for their sick donkeys.

4. CONCLUSION AND RECOMMENDATIONS

The success of donkey welfare interventions is hampered by constraints such as emerging theft of donkeys for slaughter due to the rising demand of donkeys to supply the slaughterhouses for their eventual export, low adoption and implementation of acquired knowledge and skills from sensitization trainings on animal welfare, as well as lack financial capability to provide donkeys with proper care. Therefore, long-term economic and financial gains from the use of donkeys should be established. Identification of suitable and relevant intervention strategies for working donkeys well-matched to the agro-ecologies and socio-economic needs of specific regions should also be developed. It is possible to improve the performance of donkey welfare by conducting continued sensitization and training their owners and users as a longer term activity. Effective knowledge-transfer methods and materials for adult learning for donkey owners should be designed and developed. There should be continued multi-disciplinary research conducted to improve donkeys' health and welfare. The findings of these research should be incorporated in extension material and disseminated in structured methods ensuring.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author MNG designed the study, and participated in the desktop review and wrote the first draft of the manuscript. Author OO participated in reading and improving the manuscript and also approved the final manuscript.

REFERENCES

- (1) Rossel, S.; Marshall, F.; Peters, J.; Pilgram, T.; Adams, M. D.; O'Connor, D. Domestication of the Donkey: Timing, Processes, and Indicators. *Proc Natl Acad Sci U S A* **2008**, *105* (10), 3715–3720. <https://doi.org/10.1073/pnas.0709692105>.
- (2) Blench, R.; MacDonald, K. *The Origins and Development of African Livestock: Archaeology, Genetics, Linguistics and Ethnography*, 1st ed.; Routledge: London, 1999.
- (3) Rioja-Lang, F.; Bacon, H.; Connor, M.; Dwyer, C. M. Prioritisation of Animal Welfare Issues in the UK Using Expert Consensus. *Vet Rec* **2020**, *187* (12), 490. <https://doi.org/10.1136/vr.105964>.
- (4) WOA. OIE Global Animal Welfare Strategy, 2017. https://www.woah.org/fileadmin/Home/eng/Animal_Welfare/docs/pdf/Others/EN_OIE_AW_Strategy.pdf. (accessed 2023-10-30).
- (5) WOA. Introduction to the Recommendations for Animal Welfare. Chapter 7.1 Chapter 7.1., 2016. https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2016/en_chapitre_aw_introduction.htm (accessed 2023-10-30).
- (6) Vallete, D. *Invisible Workers: The Economic Contributions of Working Donkeys, Horses and Mules to Livelihoods, 2015*; Brooke Hospital for animals: UK, 2015. http://www.thebrooke.org/__data/assets/pdf_file/0009/195984/Invisible-workers-report.pdf.
- (7) KNBS. *Kenya National Bureau of Statistics*; 2019. <https://www.knbs.or.ke/2019-kenya-population-and-housing-census-results/> (accessed 2023-10-19).
- (8) Smith, D. G.; Pearson, R. A. A Review of the Factors Affecting the Survival of Donkeys in Semi-Arid Regions of Sub-Saharan Africa. *Trop Anim Health Prod* **2005**, *37 Suppl 1*, 1–19. <https://doi.org/10.1007/s11250-005-9002-5>.
- (9) Gichure, M.; Philip, K.; Kihurani, D.; Mande, J.; Njenga, M. Sero-Prevalence and Risk Factors of African Horse Sickness among Donkeys in a Highland Area of Kenya. *Journal of Veterinary Medicine and Animal Health* **2020**, *12*, 125–131. <https://doi.org/10.5897/JVMAH2020.0862>.
- (10) Obonyo, F. O.; Maingi, N.; Githigia, S. M.; Kimeli, P.; Nyaboga, E. N. Occurrence of Serum Antibodies to *Toxoplasma Gondii* and Associated Risk Factors in Donkeys from Central Kenya. *Trop Anim Health Prod* **2022**, *54* (1), 77. <https://doi.org/10.1007/s11250-022-03079-w>.

- (11) Mulwa, N.; Githigia, S.; Karanja, D.; Mbae, C.; Zeyhle, E.; Mulinge, E.; Magambo, J.; Ogolla, K. Prevalence and Intensity of Gastrointestinal Parasites in Donkeys in Selected Abattoirs in Kenya. *Scientifica* **2020**, *2020*, 5672140. <https://doi.org/10.1155/2020/5672140>.
- (12) Rayner, E.; Airikkala-Otter, I.; Susheelan, A.; Gibson, A.; Itaba, R.; Mayani, T.; Mellanby, R. J.; Gamble, L. Prevalence of Skin Wounds in Working Donkeys in Bukombe, Tanzania. *Veterinary Record* **2020**, *186* (9), 284–284. <https://doi.org/10.1136/vr.105399>.
- (13) Mekuria, S.; Mulachew, M.; Abebe, R. Management Practices and Welfare Problems Encountered on Working Equids in Hawassa Town, Southern Ethiopia. *Journal of Veterinary Medicine and Animal Health* **2013**, *5*, 243–250. <https://doi.org/10.5897/JVMAH10.017>.
- (14) Kumar, N.; Fisseha, K. K.; Shishay, N.; Hagos, Y. Welfare Assessment of Working Donkeys in Mekelle City, Ethiopia. *Global Veterinaria* **2014**, *12*, 314–319. <https://doi.org/10.5829/idosi.gv.2014.12.03.82120>.
- (15) Feleke, A.; Kassa, G.; Golija, T. Assessment of the Production Status, Utilization and Management of Donkeys in Gena Bossa Woreda, Dawuro Zone, Southern Ethiopia. *Food Science and Quality Management* **2015**, *45*.
- (16) Iwal, A. Management Practices, Utilization and Challenges of Donkey in Godey Town, Somali Regional State, Ethiopia. *Open Journal of Animal Sciences* **2022**, 616–628. <https://doi.org/10.4236/ojas.2022.124044>.
- (17) Mesfin, F. Investigation into Health, Management and Welfare Problems of Working Donkeys in Wonchi District, South West Shoa Zone, Ethiopia., College of Veterinary Medicine and Agriculture Addis Ababa, Debre Zeit., Ethiopia, 2008.
- (18) Holloway, L.; Mahon, N.; Clark, B.; Proctor, A. Changing Interventions in Farm Animal Health and Welfare: A Governmentality Approach to the Case of Lameness. *Journal of Rural Studies* **2023**, *97*, 95–104. <https://doi.org/10.1016/j.jrurstud.2022.12.004>.
- (19) Kielland, C.; Skjerve, E.; Østerås, O.; Zanella, A. J. Dairy Farmer Attitudes and Empathy toward Animals Are Associated with Animal Welfare Indicators. *Journal of Dairy Science* **2010**, *93* (7), 2998–3006. <https://doi.org/10.3168/jds.2009-2899>.
- (20) Martin Curran, M.; Feseha, G.; Smith, D. G. The Impact of Access to Animal Health Services on Donkey Health and Livelihoods in Ethiopia. *Trop Anim Health Prod* **2005**, *37* Suppl 1, 47–65. <https://doi.org/10.1007/s11250-005-9008-z>.
- (21) Stringer, A. P.; Christley, R. M.; Bell, C. E.; Gebreab, F.; Tefera, G.; Reed, K.; Trawford, A.; Pinchbeck, G. L. Owner Reported Diseases of Working Equids in Central Ethiopia. *Equine Vet J* **2017**, *49* (4), 501–506. <https://doi.org/10.1111/evj.12633>.
- (22) Nambiro, E.; Omiti, J.; Godiah, M. Decentralization and Access to Agricultural Extension Services in Kenya. *International Association of Agricultural Economists, 2006 Annual Meeting, August 12-18, 2006, Queensland, Australia* **2006**.
- (23) Rees, D.; Momanyi, M.; Odondi, J.; Oyure, A.; Kamau, M.; Musembi, F.; Mwaura, L.; Joldersma, R. Agricultural Knowledge and Information Systems in Kenya: Implications for Technology Dissemination and Development. **2000**.
- (24) Muyanga, M.; Jayne, T. Private Agricultural Extension System in Kenya: Practice and Policy Lessons. *The Journal of Agricultural Education and Extension* **2008**, *14*, 111–124. <https://doi.org/10.1080/13892240802019063>.
- (25) Reddy, S. Y.; Kumar, T.; Author, C. Training: An Effective Approach for Farmer's Development; 2020; pp 300–312.
- (26) Onono, J. O.; Kithuka, J. M. Assessment of Provision of Extension Services and Advocacy on Donkey Health and Welfare in Kenya. *Asian Journal of Agricultural Extension, Economics & Sociology* **2020**.
- (27) Stringer, A. P.; Christley, R. M.; Bell, C. E.; Gebreab, F.; Tefera, G.; Reed, K.; Trawford, A.; Pinchbeck, G. L. Evaluating the Efficacy of Knowledge-Transfer Interventions on Animal Health Knowledge of Rural Working Equid Owners in Central Ethiopia: A Cluster-Randomized Controlled Trial. *Front Vet Sci* **2018**, *5*, 282. <https://doi.org/10.3389/fvets.2018.00282>.
- (28) Stringer, A. P.; Bell, C. E.; Christley, R. M.; Gebreab, F.; Tefera, G.; Reed, K.; Trawford, A.; Pinchbeck, G. L. A Cluster-Randomised Controlled Trial to Compare the Effectiveness of Different Knowledge-Transfer Interventions for Rural Working Equid Users in Ethiopia. *Prev Vet Med* **2011**, *100* (2), 90–99. <https://doi.org/10.1016/j.prevetmed.2011.02.001>.

- (29) Franz, N.; Piercy, F.; Donaldson, J.; RICHARD, R.; WESTBROOK, J. HOW FARMERS LEARN: IMPLICATIONS FOR AGRICULTURAL EDUCATORS. **2010**, 25, 37–59.
- (30) Cawley, A.; Heanue, K.; Hilliard, R.; O'Donoghue, C.; Sheehan, M. How Knowledge Transfer Impact Happens at the Farm Level: Insights from Advisers and Farmers in the Irish Agricultural Sector. *Sustainability* **2023**, 15 (4). <https://doi.org/10.3390/su15043226>.
- (31) Chaplowe, S.; Cousins, J. B. *Monitoring and Evaluation Training: A Systematic Approach*; 2016. <https://doi.org/10.4135/9781071878712>.
- (32) FAO. *E-Learning Methodologies and Good Practices: A Guide for Designing and Delivering e-Learning Solutions from the FAO Elearning Academy.*, Second edition.; FAO: Rome, 2021.
- (33) Yambu, S. Factors Influencing the Performance of Donkey Welfare Projects: The Case of Heshimu Punda Project in Mwea West Sub-County, Kirinyaga County Kenya., University of Nairobi, Nairobi, Kenya, 2019. http://erepository.uonbi.ac.ke/bitstream/handle/11295/152860/Yambu_%20Factors%20Influencing%20The%20Performance%20Of%20Donkey%20Welfare%20Projects%20The%20Case%20Of%20Heshimu%20Punda%20Project%20In%20Mwea%20West%20Sub-county,%20Kirinyaga%20County,%20Kenya.pdf?sequence=1 (accessed 2023-10-30).
- (34) Grace, D.; Randolph, T.; Diall, O.; Clausen, P.-H. Training Farmers in Rational Drug-Use Improves Their Management of Cattle Trypanosomosis: A Cluster-Randomised Trial in South Mali. *Prev Vet Med* **2008**, 83 (1), 83–97. <https://doi.org/10.1016/j.prevetmed.2007.06.005>.
- (35) Mahon, N.; Clark, B.; Proctor, A.; Holloway, L. Exploring Farmers' Understanding of and Responses to Endemic Animal Health and Welfare Issues in the UK. *Vet Rec* **2021**, 189 (10), e941. <https://doi.org/10.1002/vetr.941>.
- (36) Alemayehu, G.; Berhe, T.; Gelan, E.; Mokria, M.; Jaldessa, J.; Molu, J.; Wieland, B.; Knight-Jones, T.; Doyle, R. E. Animal Welfare Knowledge, Attitudes, and Practices among Livestock Holders in Ethiopia. *Front Vet Sci* **2022**, 9, 1006505. <https://doi.org/10.3389/fvets.2022.1006505>.
- (37) Whay, H. R.; Barker, Z. E.; Leach, K. A.; Main, D. C. J. Promoting Farmer Engagement and Activity in the Control of Dairy Cattle Lameness. *Vet J* **2012**, 193 (3), 617–621. <https://doi.org/10.1016/j.tvjl.2012.06.041>.
- (38) McKenzie-Mohr, D. Fostering Sustainable Behavior through Community-Based Social Marketing. *American Psychologist* **2000**, 55 (5), 531–537. <https://doi.org/10.1037/0003-066X.55.5.531>.
- (39) Heleski, C.; Mclean, A.; Swanson, J. Practical Methods for Improving the Welfare of Horses, Donkeys, Mules, and Other Working Draft Animals in Developing Areas. *Improving Animal Welfare: A Practical Approach: 2nd Edition* **2015**, 328–348.
- (40) WOA. Preserving Donkey Health and Welfare for a More Sustainable Future., 2022. <https://www.woah.org/en/preserving-donkey-health-and-welfare-for-a-more-sustainable-future>.
- (41) Stevens, H.; Huys, I. Innovative Approaches to Increase Access to Medicines in Developing Countries. *Front Med (Lausanne)* **2017**, 4, 218. <https://doi.org/10.3389/fmed.2017.00218>.
- (42) Khan, M.; Shah, G.; Gandahi, J.; Umer Chhargari, M.; A R, N.; Ali, T.; Tariq, M.; Kiani, F.; Qazi, I.; Arif, M. Donkey Conservation in Pakistan: Research and Welfare Needs in Rural and Semi-Urban Areas of Kyber Pakhtoon Khawa, Pakistan. *Advances in Applied Science Research* **2015**, 6, 118–124.
- (43) IGAD. Kenya National Animal Welfare Strategy and Action Plane (2017-2022) (KNAWS) (2017). <https://Faolex.Fao.Org/Docs/Pdf/Ken210708.Pdf> Accessed 30/10/2023. [https://www.anaw.org/wp-content/resources/Draft%20Kenya%20National%20Animal%20Welfare%20Strategy%20Action%20Plan%20\(2017-2022\).pdf](https://www.anaw.org/wp-content/resources/Draft%20Kenya%20National%20Animal%20Welfare%20Strategy%20Action%20Plan%20(2017-2022).pdf).
- (44) Okwiri, F.; Kajume, J.; Odondi, R. Okwiri FO, Kajume JK, Odondi RK (2002). An Assesment of the Economic Viability of Private Animal Health Service Delivery in Pastoral Areas in Kenya: Summary of Findings. Kenya Veterinarian. 25:24– 27. *Kenya Veterinarian* **2002**, 25 (24–27). <https://doi.org/10.4314/kenvet.v25i1.39530>.
- (45) Jacob, M.; Farah, K.; Ekaya, W. Indigenous Knowledge: The Basis of The Maasai Ethnoveterinary Diagnostic Skills. *J. Hum. Ecol* **2004**, 16, 43–48. <https://doi.org/10.1080/09709274.2004.11905714>.
- (46) Bett, B.; Machila, N.; Gathura, P. B.; McDermott, J. J.; Eisler, M. C. Characterisation of Shops Selling Veterinary Medicines in a Tsetse-Infested Area of Kenya. *Preventive Veterinary Medicine* **2004**, 63 (1), 29–38. <https://doi.org/10.1016/j.prevetmed.2004.02.004>.
- (47) Evans, M. J.; Burdon Bailey, J. L.; Lohr, F. E.; Opira, W.; Migadde, M.; Gibson, A. D.; Handel, I. G.; Bronsvort, B. M. deC; Mellanby, R. J.; Gamble, L.; Mazeri, S. Implementation of High Coverage

- Mass Rabies Vaccination in Rural Uganda Using Predominantly Static Point Methodology. *Vet J* **2019**, *249*, 60–66. <https://doi.org/10.1016/j.tvjl.2019.04.013>.
- (48) Maggs, H. C.; Ainslie, A.; Bennett, R. M. Donkey Ownership Provides a Range of Income Benefits to the Livelihoods of Rural Households in Northern Ghana. *Animals* **2021**, *11* (11). <https://doi.org/10.3390/ani11113154>.
- (49) Biffa, D.; Woldemeskel, M. W. Causes and Factors Associated With Occurrence of External Injuries in Working Equines in Ethiopia; 2006.
- (50) Marshall, F.; Weissbrod, L. Domestication Processes and Morphological Change. *Current Anthropology* **2011**, *52* (S4), S397–S413. <https://doi.org/10.1086/658389>.
- (51) Mutua, J. Mutua J (2004). Some Challenges to the Use of Donkeys in Kenya in Fielding & Starkey Eds Donkeys, People and Development: A Resource Book for the Animal Traction Network for Eastern and Southern Africa. ., 2004.
- (52) Knowles, T.; Warris, P. Stress Physiology during Transport. In: Grandin, T. (Ed.), *Livestock Handling and Transport*. *CABI* **2002**, 385–407. <https://doi.org/10.1079/9781780643212.0000>.
- (53) Minka, N. s; Ayo, J. Physiological Responses of Food Animals to Road Transportation Stress. *African Journal of Biotechnology* **2010**, *8*.
- (54) Geverink, N. A.; Kappers, A.; van de Burgwal, J. A.; Lambooi, E.; Blokhuis, H. J.; Wiegant, V. M. Effects of Regular Moving and Handling on the Behavioral and Physiological Responses of Pigs to Preslaughter Treatment and Consequences for Subsequent Meat Quality. *J Anim Sci* **1998**, *76* (8), 2080–2085. <https://doi.org/10.2527/1998.7682080x>.
- (55) Burn, C. C.; Dennison, T. L.; Whay, H. R. Relationships between Behaviour and Health in Working Horses, Donkeys and Mules in Developing Countries. *Applied Animal Behaviour Science* **2010**, *126*(3-4), 109–118. <https://doi.org/10.1016/j.applanim.2010.06.007>.
- (56) Björkengren, J. Assessment of Donkeys' Welfare in Addis Ababa and Ambo, Ethiopia; 2016.
- (57) Pearson, R.; Simalenga, T.; Krecek, R. *Harnessing and Hitching Donkeys, Mules and Horses for Work*; 2003; p 907146.
- (58) Aganga, A.; Letso, M.; Aganga, A. O. Feeding Donkeys. *Livestock Research for Rural Development* **2000**, *12*, 1–8.
- (59) Smith, D.; Burden, F. Practical Donkey and Mule Nutrition. *Equine Applied and Clinical Nutrition: Health, Welfare and Performance* **2013**, 304–316. <https://doi.org/10.1016/B978-0-7020-3422-0.00016-X>.
- (60) Raspa, F.; Cavallarin, L.; McLean, A. K.; Bergero, D.; Valle, E. A Review of the Appropriate Nutrition Welfare Criteria of Dairy Donkeys: Nutritional Requirements, Farm Management Requirements and Animal-Based Indicators. *Animals (Basel)* **2019**, *9* (6). <https://doi.org/10.3390/ani9060315>.
- (61) Trawford, A. *Veterinary Treatment for Working Equines* GR Duncanson (2010). Published by CABI, Wallingford, Oxon OX10 8DE, UK. 288 Pp Hardback (ISBN 978-1 - 84593-655-6). Price £70.00, US\$135.00, €100.00. *Animal Welfare* **2012**, *21* (1), 146–146. <https://doi.org/10.1017/S0962728600003584>.
- (62) Blokhuis, H.; Veissier, I.; Miele, M.; D, B. The Welfare Quality Project and Beyond: Safeguarding Farm Animal Well-Being. *Acta Agriculturae Scandinavica A* **2010**, *60*, 129–140. <https://doi.org/10.1080/09064702.2010.523480>.
- (63) GOK. Laws of Kenya. Prevention of Cruelty to Animals Act: Revised Edition 2012 [1983]; Chapter 360; 2012. <http://kenyalaw.org:8181/exist/kenyalex/actview.xql?actid=CAP.%20360> (accessed 2024-09-03).
- (64) Waters, J. Ethics and the Choice of Animal Advocacy Campaigns. *Ecological Economics* **2015**, *119*, 107–117. <https://doi.org/10.1016/j.ecolecon.2015.08.014>.
- (65) Haddy, E.; Brown, J.; Burden, F.; Raw, Z.; Kaminski, J.; Proops, L. “What Can We Do to Actually Reach All These Animals?” Evaluating Approaches to Improving Working Equid Welfare. *PLoS One* **2022**, *17* (9), e0273972. <https://doi.org/10.1371/journal.pone.0273972>.
- (66) Kimeu, S. Factors Influencing Utilization of Agricultural Research Findings among Rural Communities in Kenya: A Case Study of Yatta Division, Machakos County., University of Nairobi, Nairobi, Kenya, 2014. <http://erepository.uonbi.ac.ke/handle/11295/74866> (accessed 2024-09-03).
- (67) GOK. Meat Control Act Cap 356 Laws of Kenya., 2019. <http://kenyalaw.org:8181/exist/kenyalex/actview.xql?actid=CAP.%20356>.
- (68) Maichomo, M.; Karanja- Lumumba, T.; Olum, M.; Magero, J.; Oketch, T.; Nyoike, N. *The Status of Donkey Slaughter in Kenya and Its Implication on Community Livelihoods.*; Brooke and KALRO,

2019. <https://www.thebrooke.org/sites/default/files/Kalro%20Report-Final.pdf> (accessed 2024-09-03).
- (69) Enticott, G.; Donaldson, A.; Lowe, P.; Power, M.; Proctor, A.; Wilkinson, K. The Changing Role of Veterinary Expertise in the Food Chain. *Philosophical Transactions of the Royal Society B: Biological Sciences* **2011**, *366* (1573), 1955–1965. <https://doi.org/10.1098/rstb.2010.0408>.
- (70) Enticott, G. The Ecological Paradox: Social and Natural Consequences of the Geographies of Animal Health Promotion. *Transactions of the Institute of British Geographers* **2008**, *33* (4), 433–446. <https://doi.org/10.1111/j.1475-5661.2008.00321.x>.
- (71) Geiger, M.; Hockenhull, J.; Buller, H.; Tefera Engida, G.; Getachew, M.; Burden, F. A.; Whay, H. R. Understanding the Attitudes of Communities to the Social, Economic, and Cultural Importance of Working Donkeys in Rural, Peri-Urban, and Urban Areas of Ethiopia. *Front Vet Sci* **2020**, *7*, 60. <https://doi.org/10.3389/fvets.2020.00060>.
- (72) McLean, J. C., Amy K. and Heleski, Camie R. and Swanson. Practical Methods for Improving the Welfare of Equids: Horses, Donkeys, and Mules. *CABI* **2021**, 385–404. <https://doi.org/10.1079/9781789245219.0385>.
- (73) Pearson, R.; Nengomasha, E.; Krecek, R. The Challenge in Using Donkeys for Work in Africa. *Donkeys, People and Development* **1999**.