Socio-economic importance, health and welfare aspects of donkeys (*Equus asinus*) used for carting in a peri-urban area of South Africa

By

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Declaration

I, Madure Marufu, hereby declare that this dissertation has not previously been submitted at this or any other university, and it is my original work conducted under the supervision of Dr V. Maphosa and Prof V. Muchenje. All the references and sources of information contained herein have been duly acknowledged.

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Dr V. Maphosa……. Date…….

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Abstract

The broad objective of the study was to determine the socio-economic importance, health and welfare aspects of donkeys used for carting in a peri-urban area. A survey was conducted among 71 donkey owners in Joza, a peri-urban area near Grahamstown in the Eastern Cape Province (ECP) of South Africa to investigate their perceptions on socio-economic importance, health and welfare aspects of donkeys used for transport. Two hundred and seventy-one donkeys used for carting were assessed through direct observation of health and behaviour parameters to determine their welfare status. Results revealed that donkeys are indeed of immense value to people, being used daily (54.93%) for income generation activities and at least once per month (7.08%) for domestic chores. Most of the respondents (32%) earned R 600.00 per week while 11% earned at least R 200.00 per week from carting using donkeys. Donkeys were used for carting of goods (90.14%) more than for manure (16.9%). Gender and age of owners significantly ($P < 0.05$) influence perceptions on source of income while education level influenced their perceptions on carting firewood, goods and water. Results on management practices and health problems encountered by working donkeys showed that most of the owners managed their animals poorly. Most donkeys were being beaten (74.65%) during work, made to travel long distances (43.66%), worked long hours (52.11%) without adequate water (59.10%) and feed supplements (83.10%). Wounds (95.97%), coughing (75.65%) and lameness (64.79%) were some of the health problems encountered by donkeys. Significant relationships ($P < 0.05$) were observed between owners' perceptions on management practices and health problems encountered by donkeys. Among the observed animals, 61% were thin and mostly apathetic (26.2%) than medium and fat animals. Responses to observer approaches were significantly associated with sex and body condition score (BCS), with stallions in good body condition being

more aggressive. Donkeys having a BCS of 3-5 avoided chin contact either by kicking out or moving away. Results further showed that most of the donkeys were suffering from external injuries, with the hindquarters (39.85%), shoulder (32.10%) and spine (21.77%) being the mostly affected areas. The prevalence of wounds on tail-base, belly, flank and neck were seen in less than 13% of the animals. The prevalence of wounds was influenced by age and BCS of the animals. Young donkeys with good BCS were less affected than old donkeys. Lameness, poor coat condition, external parasites, abnormal mucous membrane and dental problems were observed in less than 30% of the animals. It was concluded that donkeys play a pivotal role economically and socially to the livelihoods of people in a peri-urban area (Joza) in terms of income generation and transportation. However, these animals are experiencing multiple health and welfare problems. Therefore, more access to veterinary services, training on donkey use and management, health and welfare promotion programs are of paramount importance in solving the problem of poor health and welfare in donkeys.

Keywords: Body condition score, donkey owners, health problems, income generation, management practices, training, welfare assessment.

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Dedication

- The success of this research is genuinely dedicated to God and my parents, who understood the importance of education and paid my fees.
- To all the donkeys that symbolise humility or humbleness and that have to work faithfully for a living of their master.

"*And Jesus, when he had found a young **ass**, sat thereon; as it is written, Fear not, daughter of Sion: behold, thy King cometh, sitting on an **ass's colt**.*" (John 12:14-15)

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List of Abbreviations

ATNESA	Animal Traction Network for Eastern and Southern Africa
BCS	Body Condition Score
CHPA	Cart Horse Protection Association
DEFRA	Department for Environment, Food and Rural Affairs
DWAF	Department of Water Affairs and Forestry
ECHCU	Eastern Cape Horse Care Unit
ECP	Eastern Cape Province
FAO	Food and Agriculture Organisation
FAWC	Farm Animal Welfare Council
GMRDC	Govan Mbeki Research and Development Centre
NRF	National Research Foundation
QBA	Qualitative Behavioural Assessment
QHA	Qualitative Health Assessment
SanWatPUA	Sanitation and Water Supply in Peri-Urban Areas
SARPN	Southern Africa Regional Poverty Network
SAS	Statistical Analyses Systems
SPCA	Society for the Prevention of Cruelty to Animals
UREC	University of Fort Hare Research Ethics Committee

CHAPTER 1: Introduction

1.1 Background

Donkeys in South Africa originated from north-east Africa (Starkey, 1995). At present, the population of donkeys in South Africa is estimated to be one million (FAO, 2011). Of these, 190 000 donkeys are believed to be used for work in South Africa (FAO, 2011). In some parts of the Eastern Cape Province, donkeys contribute considerably to the livelihoods of resource-limited farmers or donkey owners. They play an important role as working animals in rural, peri-urban and urban areas, employed for carting, packing, riding, tillage and weeding (Pritchard *et al*., 2005; Bogale *et al*., 2012; Solomon *et al*., 2012) at a low cost. Also, donkey milk is believed to treat whooping cough and its meat is a delicacy in some areas of North West Kenya, Southern Ethiopia (Ibrahim *et al*., 2011) and Northern Cape Province of South Africa (Starkey, 1995). Donkeys have greater advantages as compared to any other draft animals. This is because they are affordable, docile, easy to train and handle (Nengomasha *et al*., 2000; Mengistu *et al*., 2005; Swai and Bwanga, 2008), although they are seen as stubborn and stupid when they are not willing to work. Nengomasha *et al*. (2000) also described the donkey as an animal that survives droughts better, that have ability to consume poor quality foods and have lower feed and water requirements probably due to its small body size.

Despite all these advantages and their contribution to human society, especially in peri-urban areas, very little is known about donkeys (Burden *et al*., 2010). In addition to this, these animals are given less consideration than any other species of livestock, and their welfare and quality of life is often neglected (Blakeway, 1994; Biffa and Woldemeskel, 2006; Sisay, 2013). One of the problems in promoting donkey use is that there is lack of knowledge about their socio-economic

status, health and husbandry needs (Swai and Bangwa, 2008). Swai and Bangwa (2008) reported that there is also lack of knowledge on improving saddling and harnessing techniques to reduce back and hind leg sores in donkeys. In general a lot of donkeys in South Africa suffer from overworking, overload, use of poorly designed implements, lameness, poor husbandry, cruel training methods, being underfeed, denied social and behavioural needs, lack of shade, water, health and veterinary care (CHPA, undated).

Smith and Pearson (2005) defined donkey welfare as the mental and physical health of the animal in relation to its environment. It's the state in which an animal is coping with the conditions in which it lives (Ndou *et al*., 2011). The definition is based on the five freedoms by Passantino (2011), which state that an animal should be free from hunger, thirst and malnutrition, physical and thermal discomfort, pain, injury and disease, fear and distress and should also be able to express most patterns of behaviour. All in all good donkey welfare involves disease prevention and veterinary treatment, proper shelter, management, nutrition and friendly handling. The welfare of working animals in developing countries has been little studied (Burn *et al*., 2009). For this reason, there is need for researchers to work on donkey welfare. This is because care for the donkeys include their maintenance in good physical and psychological health (Passantino, 2011), and requires everyday consideration of all the essential aspects of animal husbandry (Ndou *et al*., 2011).

1.2 Problem statement

Donkeys have not been given the care they deserve in terms of research and development (Wold *et al*., 2004; Fernando and Starkey, 2004), regardless of the vital role they play in the socio-economic life of the people in the developing countries. In addition to the negligence by researchers, donkeys suffer a considerable number of negative impacts such as low social status

(Fernando and Starkey, 2004). Very little is known about working donkeys, they are given less consideration than other species of livestock (Blakeway, 1994) and are poorly managed. Of major concern is that their health and welfare is often neglected. Welfare of working equines is a visible problem in many parts of the developing countries, as animals are often seen working with harness sores and in poor condition (Pearson *et al*., 2001), neglected in allocation of resources such as feed, shelter and equipment because they belong to the poorest members of the society (Whay and Pritchard, 2004). Ill-treatment, lack of veterinary care, lack of knowledge and poverty contribute to the early death of working donkeys. All these problems mean that health and welfare of working donkeys in developing countries is being compromised. Studies to elucidate the magnitude of these problems are lacking. Few studies that have been conducted in developing countries concerning the role, health and welfare aspects of working donkeys were much focused on animals in rural and urban areas than those in peri-urban areas (Pearson *et al*., 2001). Although few studies have been carried out in South Africa on the role, health and management of working animals (Starkey, 1995; James and Krecek, 2000; Wells and Krecek, 2001), information is largely restricted on donkeys in rural communities. Studies on working animals in peri-urban areas are lacking. As a result nothing is known about the socio-economic importance, health and welfare aspects of working donkeys in peri-urban areas of South Africa.

1.3 Justification

South Africa has donkey owners who really depend on them for their everyday activities such as carting, packing, riding, tillage and weeding. However, the socio-economic importance, health and welfare aspects of donkeys used for carting in a peri-urban area of South Africa have not been determined. There is therefore, a need to assess socio-economic importance, health and welfare problems faced by these animals. It is important to know the age, gender and social

position of present users of donkeys. By knowing the socio-economic importance of these animals, their image might be changed for better and the attitude of people can be changed from negative to positive. Information on health and welfare status of carting donkeys can be used to identify ways which use and management of working donkeys might be improved. More-so this information can be used as a benchmark from which future welfare improvements could be measured. A well managed, healthy donkey not only lives longer, but is also able to work more easily and more regularly than one that is in pain, ill or underfed. Therefore, improvement in health and welfare of working animals is of paramount importance, not only for the health and survival of these animals, but also for the livelihoods of people who depend on them.

1.4 Objectives

The broad objective of the study was to determine the socio-economic importance, health and welfare aspects of donkeys used for carting in a peri-urban area in the Eastern Cape Province of South Africa.

The specific objectives of the study were to:

i) Determine the socio-economic importance of donkeys used for carting.

ii) Determine owners' perceptions on health and welfare aspects in working donkeys.

iii) Assess the welfare of carting donkeys using behaviour and health parameters.

1.5 Null hypothesis

The hypotheses tested were that:

i) Donkeys used for carting are not of socio-economic importance.

ii) Owners have the same perceptions on health and welfare aspects of carting donkeys.

iii) Behaviour and health parameters cannot reveal the welfare status of carting donkeys.

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CHAPTER 2: Literature review

2.1 Introduction

According to FAO (2011b), working animals, especially donkeys, play a pivotal role in the livelihoods of people, through crop production and transportation, contributing to income generation, poverty reduction and food security. Despite their positive contribution, animal welfare practices are not properly followed worldwide (FAO, 2011b). There is very little information in literature regarding welfare assessment methods in working donkeys as well as husbandry practices affecting their welfare. The current chapter discusses the role of working donkeys and husbandry practices affecting their welfare. It also reviews methods that can be used to assess the welfare of working donkeys.

2.2 Role of working donkeys in peri-urban areas

It is quite important to give a brief background regarding the term peri-urban area and its characteristics before discussing the importance of working donkeys in peri-urban areas. Peri-urban area refers to an interaction zone where there is a mixture of urban and rural area activities (Douglas, 2006). In general, it encompasses both characteristics of urban and rural activities. Peri-urban areas are usually characterised by fast population growth, a mixture of formal and informal settlements, lack of adequate service such as water, sewage disposal, electricity and poor infrastructures (SanWatPUA, 2012). In many cases these areas tend to be overpopulated due to informal settlements thus resulting in social tension, insecure land tenure, health and environmental problems. According to DWAF (undated), peri-urban residents include recently arrived resource-limited migrants, well established urban dwellers, single or couple workers, families, people with different educational level and economic status.

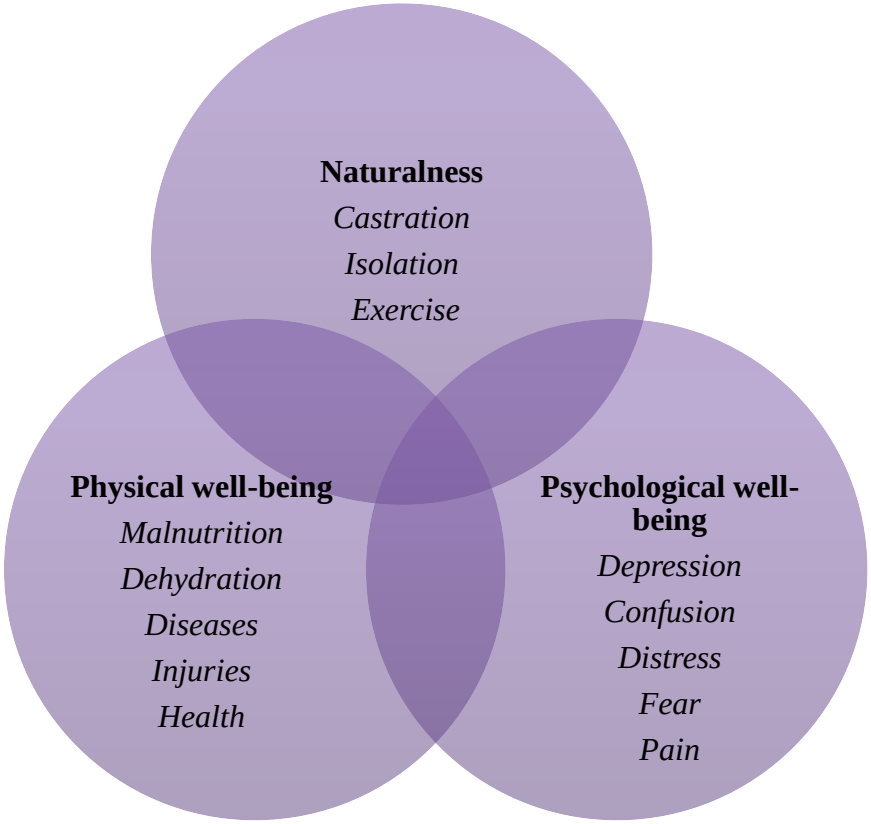
Many of the people living in peri-urban areas in South Africa are economic refugees who migrated from rural areas looking for better opportunities (Barry, 2003). However, when they are no opportunities at all, they look for alternatives which result in illegal settlements on the outskirts of urban areas. As time passes by, some of them may secure land tenure and eventually receive some public services (Barry, 2003; DWAF, undated). Nevertheless, this has not solved the problem, these people still need food on the table, as a result they look for alternative job opportunities such as vending, as well as being mine and farm workers. Some will go for employment creation opportunities such as subsistence crop farming and animal production. Others will venture into transport system using animals to transport farm products to markets in urban areas and also goods and building materials from one place to another. Since donkeys are one of the cheapest draft animals that survive droughts better, are easier to train and handle and with few gender restrictions on their use (Nengomasha *et al*., 2000), most people living in peri-urban areas tend to go for them. As a result most draft animals found in prei-urban and urban areas in South Africa are donkeys.

In developing countries throughout the world, donkeys are the most important and reliable source of transport and agricultural energy for resource-limited people in rural, peri-urban and urban areas (Starkey, 1995; Biffa and Woldemeskel, 2006; Swann, 2006; Webber and Rogers**,** 2009). These animals are also reliable means of transport in rugged and mountainous areas, where the road networks are poor and in the cities where narrow streets prevent easy delivery of goods (Solomon *et al*., 2012). According to FAO (2011a), working animals like donkeys are usually used to support income generation through crop tillage and weeding for other people, mining, brick making, construction work and transportation of goods. In Kenya donkeys provide employment opportunities for young men, through starting a small transport enterprise and

driving donkey carts for others (FAO, 2011a). Working donkeys are also used to reduce drudgery and support women's and children's labour through reducing the burden of women in daily chores such as transporting farm produce, firewood and water (Fernando and Starkey, 2004).Women can also earn extra income through access to markets for surplus farm produce (FAO, 2011a). A study in Maasai, comparing two women fetching water, one carrying herself and other using a donkey, showed that using donkeys can save at least a day (25 hours) a week for other activities (Fernando and Starkey, 2004). With the increasing human population in least developed countries, the rise of oil and food prices, the use of donkeys for work is expected to continue and increase for the coming centuries (Webber and Rogers**,** 2009).

2.3 Welfare of working donkeys

Animal welfare in general refers to the 'well-being' of an animal (James and Krecek, 2000). It should include their psychological and physical well-being (Ndou *et al*., 2011). According to Whay and Pritchard (2004), animal welfare is best defined based on three broad concepts of animal welfare, which are physical well-being, emotional well-being and naturalness. Figure 2.1 illustrates the interrelationship between these concepts and anything concerning assessment and improvement of animal welfare must take into consideration the three concepts. Physical well-being includes issues such as health, diseases, injury, malnutrition and dehydration (Whay and Pritchard, 2004). The previous concept is followed by emotional well-being, the second concept which is known as psychological well-being and it includes pain, fear, distress, frustration, depression and confusion.



Source (Whay and Pritchard, 2004)

Figure 2. 1 Interrelationships between the three animal welfare concepts

Of major concern is that emotional well-being is not only influenced by physical condition but also by environment. The same authors also expressed that the animal should be able to express its normal behaviour and this concept is known as naturalness which is the third concept.

For working animals such as donkeys, a more specific and brief definition should be considered. The co-existence of donkeys as draught animals and man is regarded as symbiotic since both benefit from the association (James and Krecek, 2000). The donkey should work for the owner and fulfil his/her needs such as transportation and farming. And for the equation to balance, the owner should care for his/her donkey, feed it well, and protect it from injuries, diseases, pain, parasites and extreme weather. Furthermore, the animal should be treated humanely, that is according to animal welfare standards and worked within its physical capabilities.

Animal welfare is one of the subjects that have time and again ranked as top of the items brought to the attention of governmental organizations, non-governmental organizations and politicians across developed countries than in developing countries (Blakeway, 1994). The health and welfare of working donkeys in the developing world have not been extensively studied (Burn *et al*., 2009). Few studies have been carried out in developing countries such as Tanzania (McPeake, 2004), Mali (Mclean *et al*., 2012) and Egypt (Pritchard *et al*., 2005), to assess the welfare of working donkeys. Unfortunately no study has been carried out to assess welfare of working donkeys in South Africa. There is therefore, a need to design a study so as to address the gaps in the information regarding the welfare of working donkeys in communities in South Africa.

2.4 Husbandry aspects affecting welfare in working donkeys

2.4.1 Prevention and control of diseases and injuries

Regardless of type of work that donkeys do, they basically need to be protected from injuries, parasites and diseases (James and Krecek, 2000). This can be achieved through treating sick and injured animals. In addition remedies should be used for vaccination and control of parasites. Skilled people should perform tasks such as vaccination and dosing to ensure effectiveness and safety (Biff and Woldemeskel, 2006). Unfortunately this is not done, donkeys are not treated or vaccinated to prevent any disease and this might be because these animals belong to the poorest members of the society (Whay and Pritchard, 2004).

Previous studies on physical health and diseases problems of donkeys used for work in various developing countries recommend that donkey welfare can be enhanced by improvements in husbandry (Blakeway, 1994). Most of the commonest health and disease problems are generally simple to cure, if the owner can afford the remedies of which that is not the case with most if not all of the donkey owners (Webster, 2004). Studies in different countries, based on physical examinations at working places, clinics (Dennison *et al*., 2005; Pritchard *et al*., 2005; Burn *et al*., 2009) all suggest that wounds, missing teeth, abnormal mucous membrane, parasites, lameness and poor hoof horn quality are the commonest problems. As indicated earlier, prevention is better than cure and it is the most effective way to deal with health and disease problems in donkeys. Blakeway (1994) suggested that physical ill-health might be enhanced by combining better husbandry, regular de-worming and foot care, use of proper harnesses and less stressful working practices. Table 2.1 show a brief summary on animal requirements, husbandry aspects and their implications on health and welfare of working donkeys.

Table 2. 1 Summary on animal requirements, husbandry aspects and their implications on health and welfare

Husbandry aspect	**Requirements**	**Implications on health and welfare**
Prevention and control of diseases and injuries	Donkeys should be treated for diseases and injuries. Preventive measures such as vaccination and dosing should be done where applicable.	Sick animals Poor animal health and welfare Premature death
Nutrition and water	Working donkeys requires a regular supply of water and feed in correct quantity and quality at the right time for body maintenance and work requirements.	Poor body condition Premature death Poor animal health and welfare
Harnessing/Implements	Suitable size and correctly fitting harnesses should be used. Implements/equipments specifically for donkeys should be used.	Ill-fitting and poorly designed harnesses and implements can cause wounds and inefficient transfer of power
Handling and care	Working animal needs to be protected from predators, bad weather and accidents. Should be trained humanely and should not be worked until they are physically mature around 3 years.	Poor animal health and welfare Using young animals can cause damage to bones, development and health

2.4.2 Animal nutrition

According to Nengomasha *et al*. (2000), donkeys are more adapted to life in semi-arid and arid areas than cattle. Donkeys can also utilise low-quality and high-fibre feed efficiently and are able to tolerate dehydration up to 30 % (Nengomasha *et al*., 2000; Ayo *et al*., 2013). This makes them suitable animals for poor resourced farmers. Most donkeys in South Africa are raised in communal land where they are left to graze on their own. Like any other animal, working donkeys require sufficient quality and quantity of feed and water on regular basis to maintain a good body health condition and to meet other energy requirements for work, reproduce and rear healthy young ones (James and Krecek, 2000). In any case regardless of type of work, work has an effect of animal nutrition. It increases nutritional requirements for energy and reduces grazing time of the animal (Blakeway, 1994). There is therefore, a need to supplement feed to working donkeys where there is feed shortage especially during dry seasons when the donkeys will be in their poorest body condition (Turton, 2000). If donkeys are not given supplementary feed, they will use body reserves and this will affect body weight as animals will lose weight more and more (Pearson, 1992).

Webster (2004), reported that most common welfare problems regarding nutrition are under-nutrition resulting from lack of feed, or malnutrition due to unbalanced diet, joined with high internal parasites burdens. The problems of malnutrition and under-nutrition are greatest when nutrition is insufficient even without the demands of work (Yoseph *et al*., 2005). In some cases there will be a problem when donkeys are worked while pregnant (Mengistu *et al*., 2005). The same authors also point out that the contradictory physiological demands on the dam affect reproductive success and the survival of the foal. Most work on nutrition of working animal that has been done so far was much more focused on ruminants and for equines nutrition focus has

been emphasised on sport horses than donkeys. However, donkeys differ from both of these groups and there is need for more research of donkey nutrition.

2.4.3 Animal harnessing

James and Krecek (2000) reported that donkeys should be harnessed with suitable size and correctly fitting harnesses. This is because a good and well fitted comfortable harness enables the donkey to pull the implement without injury risks (Pearson *et al*., 2003). On the other hand, the same authors noted that poorly designed and ill-fitted harnesses can cause injuries, fatigue or discomfort to the donkey. In addition, they can also cause inefficient transfer of power from the animal to the implement.

In the opinion of Pearson *et al*. (2003), the efficient use of donkeys for work is much depending on the connection between them and the implement being pulled, or the materials being carried and the training and management received by the animals. There are two major types of harnesses that are used to connect the implement to the donkey and these are collar and breast band harness. Breast band is the cheapest and simplest to design, it is possibly the best for the resource-limited donkey owners (Blakeway, 1994). Collar harnesses are usually used with horses and tend to be more expensive and not easy to design (Pearson *et al*., 2003). For packing, pack saddle harnesses are used to carry substantial loads on the back of the animal. They are attached to the back of the animal before putting load on top of the animal. According to Pearson *et al*. (2003), power of donkeys is generated from the chest due to its anatomy. As a result, donkeys should never be harnessed using a neck yoke so as to avoid welfare problems. The neck is said to be weak and its skin is highly vulnerable to injuries. Welfare problems arise when donkeys are harnessed with wrong and poorly designed harness.

2.4.4 Animal handling and care

In order to prolong the donkey's working life, it should be handled and cared for properly (Pearson and Krecek, 2006). And this is achieved through taking good care of the donkey from the day it is born throughout its life span. This means that donkeys should be worked when they are physically mature, around three years old (de Aluja, 1998). Unfortunately, due to poverty, many of the donkeys in developing countries are often put to work at an early age around two years resulting in chronic musculo-skeletal injury (Blakeway, 1994). For the animals to understand and learn the required necessary commands and skills, they should be trained humanely (James and Krecek, 2000). Animals of the same age and size should be trained and worked together within their physical capabilities and should be handled with care. However, for most of the donkey owners, the realities of life do not allow them to meet these considerations.

Generally, work is naturally stressful to animals, but stress can be reduced through normal and considerate use of animals when it is not too hot during the day (Blakeway, 1994). If possible, animals should be rested at least one or two days after work (Pearson, 1992). The best way to make the work easier for the animal is to use the correct implement and harnessing type for the right animal. Although it is rare for donkey owners in South Africa to kraal their animals (Wells *et al*., 2004), these animals need to be well cared for, protected from predators, bad weather, car accidents and any form of abuse like any other animal. Hoof trimming should be done when necessary by skilled people (James and Krecek, 2000). All these points of husbandry practices can really affect the welfare of working donkeys in South Africa.

2.5 Welfare assessment methods

Welfare of working donkeys can be assessed using two broad different methods and these are animal-based and resource-based methods. Resource-based method involve the use of farmers or owners' information (Serpell, 2008), whereas animal-based involve the use of indicators such as health, behaviour (Pritchard *et al*., 2005), physiological and biochemical parameters to determine the welfare status of an animal (Duncan, 2005). Figure 2.2 summaries the two methods and the parameters that can be used to assess welfare of working donkeys.

2.5.1 Resource-based method

The resource-based method is sometimes referred to as the input-based method, management-based method or design-based method (Johnson *et al*., 2012). This method is based on measuring the availability of resources/inputs and management provision (Johnsen *et al*., 2001; Duncan, 2005; Pritchard *et al*., 2005; Johnson *et al*., 2012). The adequacy of resources such as feed, water, shelter, veterinary care, harnessing materials and type of implements used for working donkeys may be assessed by means of a questionnaires (Pritchard *et al*., 2005; Serpell, 2008; Willgert, 2010). Input-based method has several advantages when compared to animal-based method. One being that the assessment is uncomplicated since the parameters are easy and quick to record (Johnsen *et al*., 2001). It is not usually subjective than direct animal-based method, but it is repeatable (Whay *et al*., 2003). Apart from this, the method identifies potential causes of poor welfare in animals before negative implications (Johnson *et al*., 2012). Results from input-based on management parameters, serve as an excellent basis for solving the problem of poor welfare in animals. This is because correction and prevention measures can be taken based on these results (Johnsen *et al*., 2001; Duncan, 2005: Johnson *et al*., 2012).

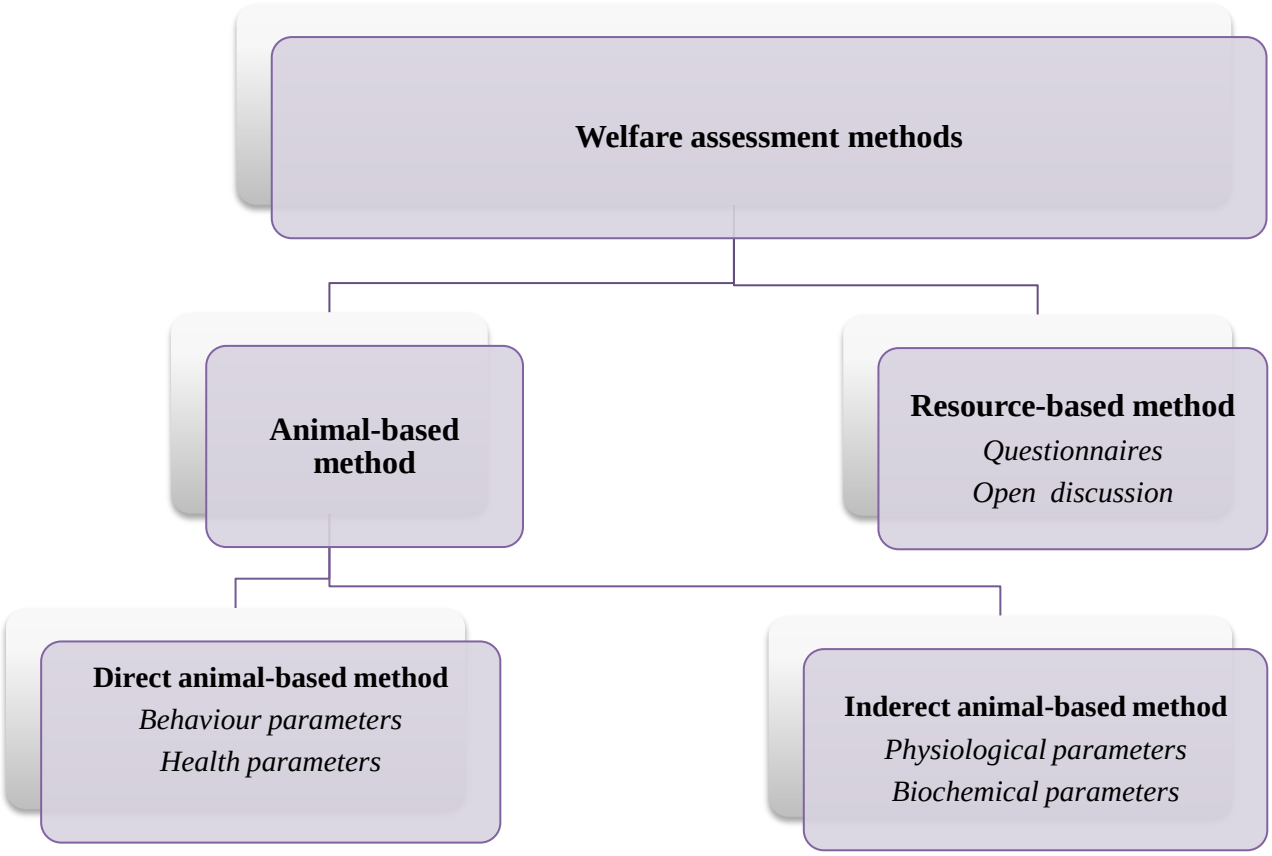


Figure 2. 2 Methods used to assess welfare of working animals

However, resource-based method indicates the risk of the welfare problems rather than an actual measure of welfare state (Pritchard *et al*., 2005; Johnson *et al*., 2012). As a result it does not provide the true picture of how the animals are coping with the environment they are living in.

2.5.2 Animal-based method

Animal-based method is divided into two categories namely direct animal-based and indirect animal-based method. Direct animal-based involve the physical examination of health and behaviour parameters (Dawkins, 2004; Dancan, 2005; Sejian *et al*., 2011). In any case, direct health and behaviour assessment determine the welfare status that is most significant to the animals (Pritchard *et al*., 2005). Behaviour and health status can be used to assess animal welfare directly. An indication of the health welfare of donkeys can be determined by visual assessment of body condition, wounds, lameness, coat condition, mucous membrane, ectoprasites and dental problems (Pritchard *et al*., 2005; Whay *et al*., 2006; Willgert, 2010; Geiger, 2013). In general, animals should be free from fear, depression and frustration as this affect their welfare (Dawkins, 2004). Behaviour parameters such as response to observer approach (Dodzi and Muchenje, 2011), general attitude and tail tucking can be used to assess the welfare of animals (Pritchard *et al*, 2005). A better understanding of the behaviour of working donkeys could be a helpful indicator of welfare status. According to Blakeway (1994), the behaviour of working donkeys is modified by work and management practices. Even though donkeys appear adaptable, the extent to which they are able to compensate by behavioural modification and how stressful the resulting changes are to the donkeys are not known (Blakeway, 1994). Direct animal-based measures are often subjective and provide more direct results than resource-based and indirect animal-based method (Duncan, 2005). In this method the precision of the observer or assessor is the most important consideration.

Indirect animal-based method involve the use of physiological and biochemical parameters to determine welfare status of animals (Duncan, 2005; Serpell, 2008). In this method equipments are used to measure some parameters that can be used to determine the welfare status of the animal. Physiological parameters such as heart rate, respiratory rate, skin and body temperature can be measured before and after work to see how work compromises animal welfare (Dube *et al*., 2000). In addition to this biochemical analysis, stress indicators such as hormone cortisol, enzyme creatine kinase and packed cell volume can be analysed to determine how work affect welfare of animals (Ndou *et al*., 2011). Unlike direct animal-based method that tends to be subjective, indirect animal-based method is usually objective. However, the recording of indirect animal-based measurements tends to be more difficult and require considerable number of equipment of which some of them are expensive (Duncan, 2005). Apart from being expensive, the outcomes tend to be a bit lag and this means that the result will benefit future generation (Johnson *et al*., 2012).

2.6 Summary

Working donkeys are the most important and reliable source of draft power to most of the resource-limited communities. However, husbandry factors such as prevention and control of diseases and injuries, harnessing, nutrition, handling and care of animals directly affect donkey welfare. Welfare of working donkeys can be assessed using animal-based and resource-based methods.

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CHAPTER 3: Socio-economic importance of donkeys used for carting in a peri-urban area of South Africa

Abstract

The study was conducted to gather information on the socio-economic importance of donkeys used for transport in a peri-urban area in the Eastern Cape Province of South Africa. Seventy-one donkey owners were interviewed on the role of donkeys in their livelihoods. The association between the owners' attributes and their perception on work type, income generation and major source of income were computed using chi-squared tests. Results revealed that donkeys were used daily (54.93%) for income generation activities and at least once per month (7.08%) for domestic chores. The majority of the donkey owners (32%) earned R 600.00 per week while 11% earned at least R 200.00 per week from donkey transport. Donkeys were used for transportation of goods (90.14%) more than for manure (16.9%). The study also revealed that donkeys were used in winter (84.51%) more than in spring (63.38%). The use of donkey carts was mainly dominated by men (95.77%), with (4.23%) being used by women. Blacks (87.32%) and coloureds (12.68%) were involved in the use of donkey carts. It was concluded that donkeys play an important role in the livelihoods of people in Joza a peri-urban area in terms of income generation and transportation.

Keywords: Donkeys, livelihood, income generation, survey, transport

3.1 Introduction

Donkeys are kept for various reasons, including poverty reduction through employment creation, food security and transportation of both goods and people (Nengomasha *et al*., 2000; Admassu and Shiferaw, 2011). These animals play a very crucial role in the economy of many countries (Admassu and Shiferaw, 2011), through carting, ploughing and packing activities (Starkey, 1995; Wells and Krecek, 2001). Donkeys are mainly used for transport instead of ploughing in most of the peri-urban and urban areas of South Africa (Starkey, 1995). They are mainly used to transport a wide range of loads that include goods, firewood, water (Testaye and Martin, 2005), food, people, farm products, manure and building materials such as poles, stones/sand/clay, bricks and iron sheets (ATNESA, 1998; Nengomasha *et al*., 2000; Admassu and Shiferaw, 2011; Hassan *et al*., 2013). In most rural and peri-urban areas, these animals have reduced the domestic transport burden and have created employment and income generation opportunities for their owners (Starkey, 1995). ATNESA (1998) revealed that little economic research undertaken in Ethiopia demonstrated that donkey transport makes major economic contribution to household incomes, national production and economic development and also reduces drudgery.

Despite the importance of donkeys in the livelihoods of people in rural, peri-urban and urban areas, donkeys have not received much attention (Starkey *et al*., 1995), and very little research related to donkeys has been carried out (Wold *et al*., 2004). There is little information in South Africa regarding the socio-economic importance of these animals (Wells and Krecek, 2001). Furthermore, the important roles of donkeys in South Africa are often underrated and sometimes are unrecognised by individuals, organisations and institutions (Fernando and Starkey, 2004). In many instances, donkeys have been totally ignored by extension workers, scientists, planners and policy makers (Starkey, 1995). These animals have a bad image and are mildly ridiculed in

conversation and through traditional words and phrases in most of South African societies, especially among agricultural staff (Starkey *et al*., 1995).

It is important to know the age, gender and social position of present users of donkeys. More so the society should have knowledge about the socio-economic roles of donkeys in different areas of the country. By knowing the socio-economic importance of these animals, their image might be changed for better and attitudes of people can be changed from negative to positive. More so, this could help in designing programs of better husbandry practices. Therefore, the objective of the current study was to determine the socio-economic importance of donkeys used for carting in Joza, a peri-urban area in the Eastern Cape Province of South Africa.

3.2 Materials and Methods

3.2.1 Description of study site

A survey was conducted in Joza, located near Grahamstown, in Cacadu District under Makana Municipality. The study area is situated in the Eastern Cape Province of South Africa and has a peri-urban environment (Chidzangwa *et al*., 2011). The area is located at 33.18^{o}S and 26.31^{o}E with an elevation of 257 m and it receives its lowest rainfall (16 mm) in July and highest (57 mm) in March, with an average annual rainfall of about 466mm (SA explorer, 2011). Furthermore, the area receives most of its rainfall during summer with the highest mean temperature being recorded in February (26.8^{o}C) and the lowest in July (5.6^{o}C) (SA explorer, 2011).

3.2.2 Data collection

Data was collected from personal interviews with donkey owners using a standard questionnaire. Questionnaires were pre-tested to verify the relevance of the questions. Two trained donkey owners were used as facilitators and translators to assist in information gathering. To maintain consistency, most of the questions were designed in a closed format. Seventy-one donkey owners were interviewed based on donkey ownership status (availability of donkeys). Owners were asked about use, source and number of donkeys owned, frequency of use, major source of income and income earned per week from donkey transport. Questions focusing on owners' demographic information such as gender, age group, race and level of education were also asked. Ethical clearance (Certificate number MUC02SIMAR01), to conduct this study was obtained from the University of Fort Hare Research Ethics Committee. Before interviews donkey owners were asked if they were willing to participate or not and signed consent was obtained from willing participants.

3.2.3 Statistical analysis

The data was analysed using PROC FREQ procedures of Statistical Analyses Systems (SAS) (2003) to give descriptive statistics. Chi-squared test of SAS (2003) was used to establish associations between the owners' attributes and their perception on work type, income generation and major source of income.

3.3 Results and discussion

3.3.1 Demographic profiles of donkey owners

Of the seventy-one interviewees, 95.77% were male while 4.23% were female (Table 3.1), and this clearly show that more men own donkey as compared to women. This might be attributed to the fact that the majority of the households were male-headed and it appears that men use donkeys for business activities which usually take precedence over domestic work for women. This concurs with Taylor (1999), Ndlovu *et al*. (2004) and Wells and Krecek (2001) who reported that men are usually in charge of equine species such as donkeys.

Two races were involved in donkey transport, blacks (87.32%) and coloureds (12. 68%). Based on these proportions, blacks were dominating donkey carting as compared to coloureds. The dominance of black people might be attributed to the population structure of the study area as there are more blacks than coloureds. In addition, more blacks are unemployed and poorer than coloureds in South Africa (Kingdon and Knight, 2005; SARPN, 2008). The higher rate of involvement in the donkey transport business by blacks indicates that this could be a means of creating employment and poverty reduction.

The dominant age group was 18-30 years, constituting 29.58% of the respondents, with the least being less than 18 years (8.45%) as shown in Table 3.1. The age group between eighteen and fifty years old revealed in the study implies that adult men are more involved in donkey transport than the young and old aged. Similar findings were reported by Braimah *et al*. (2013), where adult men were more involved in donkey carting than young and old men.

Table 3. 1 Demographic profile and donkey ownership

Parameter		Frequency	Percentage (%)
Sex of respondent	Male	68	95.77
	Female	3	4.23
Race	Blacks	62	87.32
	Coloureds	9	12.68
Age group	< 18 years	6	8.45
	18-30 years	21	29.58
	31-50 years	19	26.76
	51-60 years	14	19.72
	>60 years	11	15.49
Education level	Illiterate	13	18.31
	Primary	33	46.45
	Secondary	24	33.80
	Tertiary	1	1.41
Source of donkeys	Purchase	50	70.40
	Inherit	16	22.53
	Exchange	5	7.04
No. of donkeys	Mares	183	47.04
	Stallions	155	39.85
	Geldings	51	13.11
	Total	**389**	**100**

From this study, the adult men were resorting to employment creation through donkey carting; this could be due to higher rates of unemployment in South Africa (Kingdon and Knight, 2005; SARPN, 2008). Lower participants of young men could be that this category is in the school going age as a result they do not participate much in donkey carting.

The majority of the respondents were primary school leavers (46.48%) and 18.31% had no formal education (Table 3.1). Most of the donkey keepers were literate and these findings are similar with the findings by Swai and Bwanga (2008) and Angara *et al*. (2011) in Tanzania and Sudan, respectively. In contrast to the current study, Braimah *et al*. (2013) reported that most of the donkey keepers in Ghana were illiterate. The participation of more educated people in donkey transport might have been contributed by limited employment opportunities and higher rates of poverty in the country.

The study revealed that there were almost 400 working donkeys in Joza. According to the survey there were 189 mares, 155 stallions and 55 geldings (Table 3.1). Most of the donkey owners kept more males (stallions and geldings) than female donkeys. The same findings were reported by Pearson *et al*. (2001) and Swai and Bwanga (2008) where more transporters kept more male donkeys than female. The high proportion of male donkeys could be related to the belief that male donkeys are stronger and can work longer than females hence transporters who do not breed donkeys tend to buy more male donkeys. Reproductive roles place restrictions on mares, as they should not be worked for the last four months of gestation as this may cause abortion or premature birth and the foal may not be strong enough to survive (James, 1999).

Few transporters kept castrated donkeys and this was similar with findings by Tesfaye and Martin (2005), where only 4% of the respondents had castrated donkeys. However, most of the respondents expressed interest in castrating donkeys because of the perception that geldings are stronger, more docile and easier to handle and work with than stallions. However, this was in contrast with Taylor (1999), who reported that donkey owners expressed a preference for using entire stallions for working because they are considered to be stronger than mares or geldings. Owners' desire to have geldings was limited by lack of expertise to do castration. Respondents that owned castrated donkeys reportedly used the most painful and dangerous castration method, the scrotum beating method. The same method of castration was also observed in Kenya by Twerda *et al*. (1997).

Most of the respondents owned between 2-6 donkeys and the average number of donkeys per household were 5.4 donkeys. Almost the same trend was observed by Taylor (1999) and Swai and Bwanga (2008) where median number of donkeys per household was six. The reason for high numbers of donkeys could be that most of the owners were full-time transporters hence they need more donkeys to give the previously worked ones a resting period and also to give them chance to graze and drink, thereby regaining energy lost during work.

Most of the donkeys (70.04%) were acquired through purchase and a small number (7.04%) through trading (Table 3.1). Emerging donkey owners might have contributed a lot on higher numbers of donkeys acquired through purchase. In addition, most donkey owners did not breed their own donkeys and would consequently purchase. Same findings were also observed in previous studies (Dinka *et al*., 2007; Swai and Bwanga, 2008), where most of the donkeys were acquired through cash, inherited, born from their own equine stock or traded.

3.3.2 Sources of income for donkey owners and cash generated from donkey use

Figure 3.1 shows the major sources of incomes for donkey owners where carting was the main source of income (51%). The ranking of donkey carts as the major source of income shows that most of the owners in the study area were full-time transporters who mainly use carts for income generating activities. This means that most of the owners in the study area were living off the money generated through carting. These findings are in line with (Taylor, 1999; Wells and Krecek, 2001) where majority of owners ranked donkeys as their major source of income.

Fewer respondents reported that their main source of income were grants (25%), employment (14%) and pension (10%). This finding concurs with (Taylor, 1999; Wells and Krecek, 2001) who reported that employment, pension and grants were a major source of income to few donkey owners. Those who ranked employment, grants and pension as their main source of income were not full-time transporters who used donkey carts on daily basis for business, but mainly used them for domestic chores. Donkey carts play a paramount role when it comes to income generation (Zenebe and Fekade, 2004). Through transportation of goods from one place to another, owners in the study area earned a reasonable amount per week depending on the availability of contracts. Donkey owners also earned a steady income per week from carting of building materials, manure, water and firewood for their neighbours (Figure 3.2). Carting with donkeys is a good and profitable career and daily incomes are often higher than the average formal sector (Fernando and Starkey, 2004). Extra cash was also generated through selling of firewood transported by donkey carts.

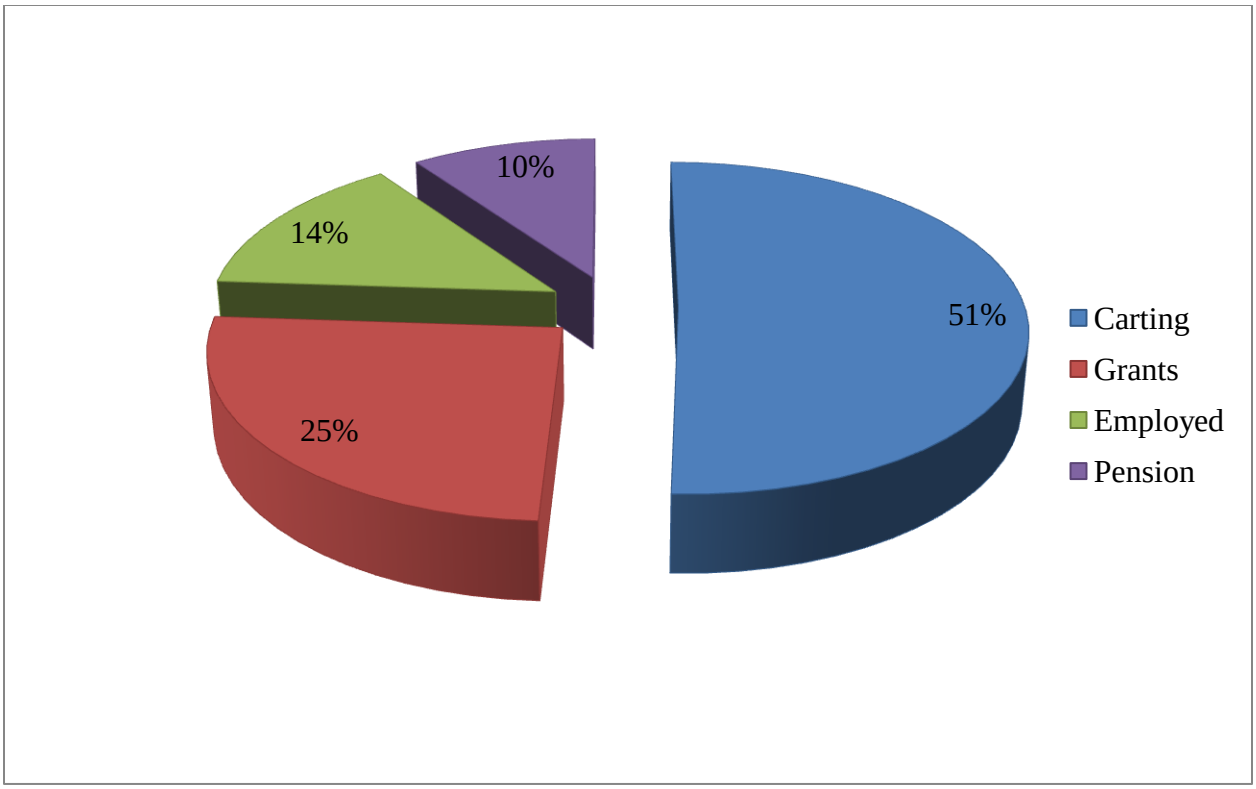
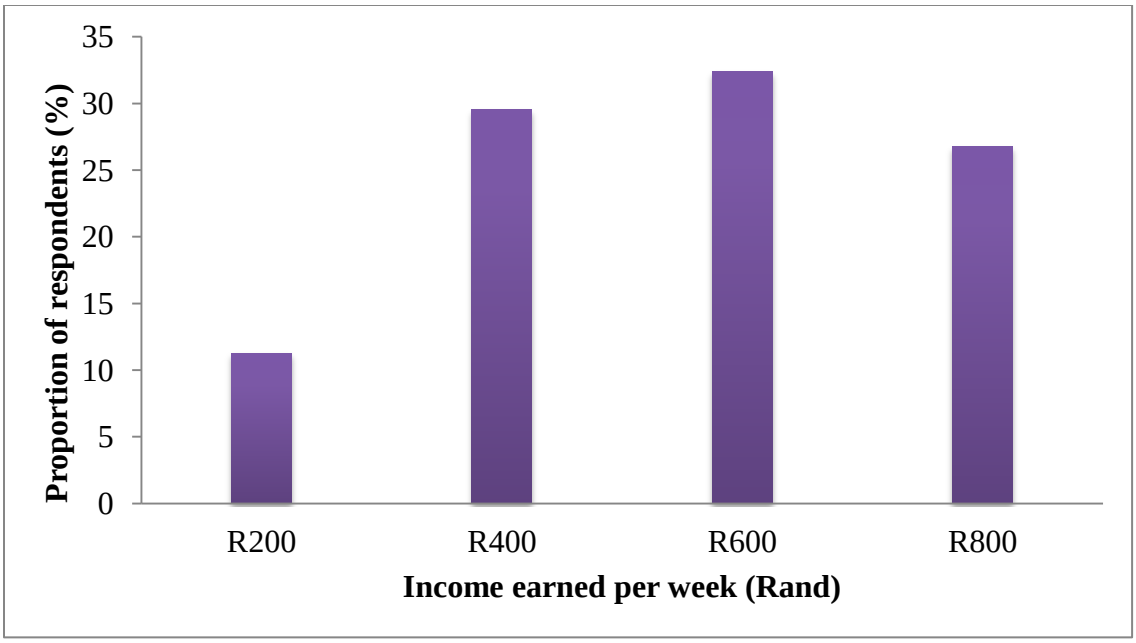


Figure 3. 1 Major source of income for donkey owners



NB: R Stands for South African Rand

Figure 3. 2 Income earned per week from donkey carting

In the study area the highest income earned per week was R 800.00 (26.76%), with 11.27% of the respondents earning at least R 200.00 (Figure 3.2). Average weekly income from donkey carts was R 500.00 and this accounted to about R 24 000.00 per annum that is an equivalent of $ 2 285.00 USD. The working days were 336 per annum and the exchange rate was R 10.5 for $1(2013). This means carting was more profitable than some earnings from grants, pension and even jobs in the private and public sectors. These findings are in line with Angara *et al*. (2011) in Sudan who reported that donkey owners earn about ($2880 USD) per annum from donkey carts, which was more profitable than some jobs in the public or private sectors in that country.

3.3.3 Role of donkeys in Joza

All respondents (100%) reported that they only kept donkeys for transport purposes. Donkey carts were used to transport goods, poles, water, firewood, bricks, manure, sand and clay as shown on Figure 3.3. Most of the donkey owners were engaged in goods transportation (90.14%). In most rural, peri-urban and urban areas carts pulled by donkeys are used to provide door-to-door services (Nengomasha *et al*., 2000), such as transporting beds, wardrobes, kitchen units (Figure 3.4), building materials and other goods when people are moving from one place to another. These results were similar to the ones observed by Angara *et al*. (2011) in Khartoum State, Sudan, whose findings showed that transportation of building and domestic materials was most dominant. The higher number of donkey owners who were involved in goods transportation could be attributed to the fact that this was the highest paying business compared to transportation of firewood (Figure 3.5), water, poles and manure.

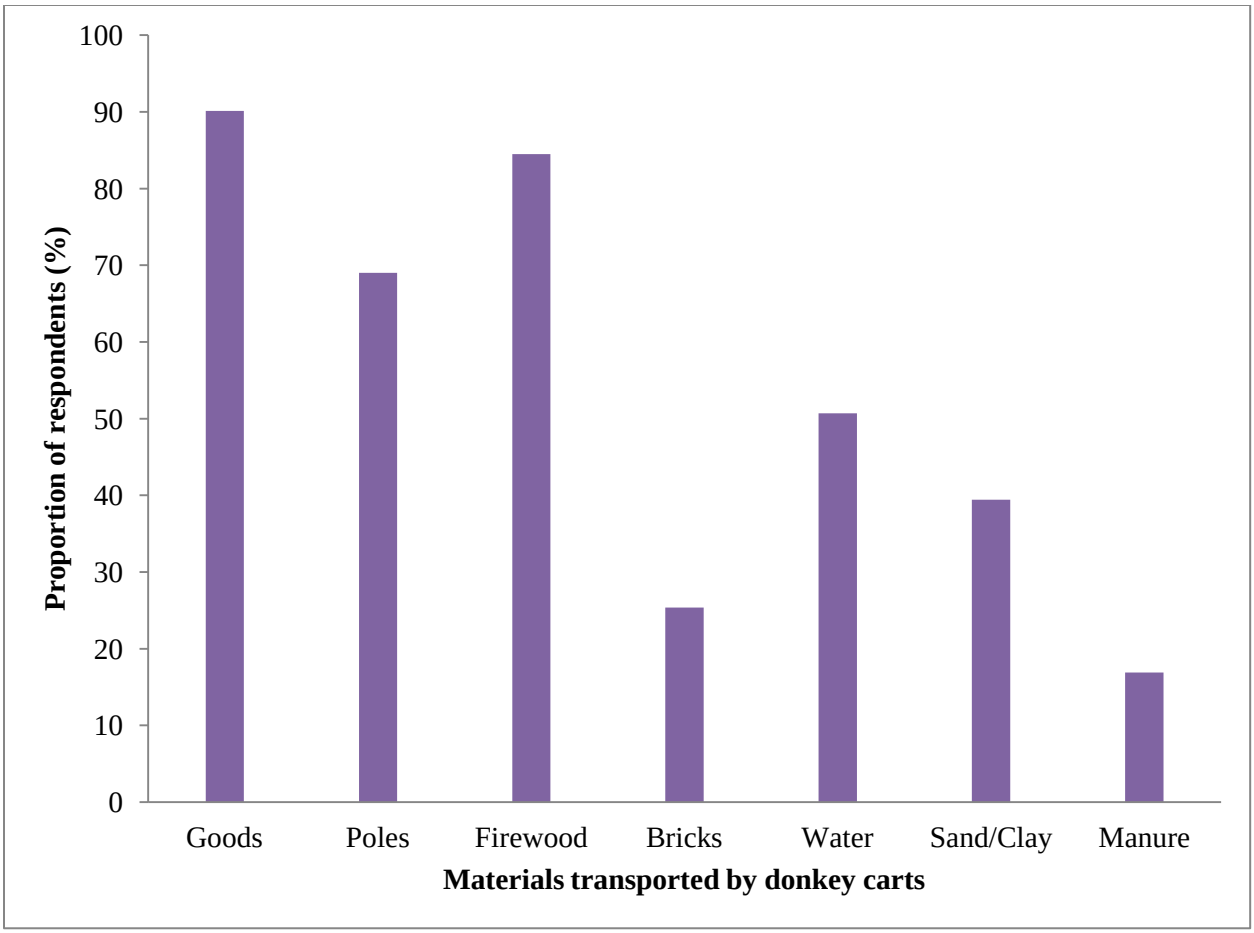


Figure 3. 3 Materials reported to be transported by donkey carts

Figure 3. 4 Transportation of goods from one place to another (*door-to-door delivery*)

Figure 3. 5 Transportation of fire wood for domestic use and sale

Transportation of firewood (Figure 3.5) was ranked second (84.51%). This could have been due to the fact that, there was a higher demand for firewood in this peri-urban area. Most donkey owners wanted firewood both for sale and for their own domestic use, since electricity was much more expensive and some areas did not have electricity at all. Transportation of firewood is ranked as one of the paramount roles of donkey carts in human life (Aganga and Seabo, 2004; Martin and Smith, 2005). Besides firewood carting, donkeys were also reported to be used for carting of poles (69.01%), while thirty nine percent of the respondents were engaged in carting of sand/clay. These poles, together with sand and clay were used in the building of mud houses. The carting of poles and sand for construction of houses was also reported by Leyland (2004), where donkeys were mainly used in the transportation of housing-building materials in Kajiado, Kenya. Poles were also transported to be used in the fencings of yards and construction of donkey kraals.

During water shortages, donkey carts were regarded as a reliable mode of transport that was being used to fetch water (50%) by the donkey owners for themselves and neighbours who did not have donkey carts. Not only in water crisis conditions were donkey carts important, but under conditions where owners did not have access to tap water at their homesteads. This was in contrast with Practical Action (2013), Samaritan's Purse (2013), Webber and Rogers (2009) in Kenya and SOS Children's Villages (2012) in Ethiopia who reported that donkey carts are mainly used for water transportation in rural areas than in peri-urban areas.

Few donkey owners were involved in transportation of bricks (25.35%). This could be linked to the fact that brick companies were offering free delivery services hence cart users could not get contracts to transport bricks. These findings were not in line with those of Khan (2004) in

Pakistan, The Brooke (2013) and Nepal (2013) in Egypt who reported that brick transportation is a viable business and donkeys are used for almost 12 hours a day and six days a week. Manure transported by donkey carts was the one ranked least by cart users with only 16.90% of the respondents being involved. The fact that most of the interviewees were not involved in crop production could have played a significant role in ranking carting of manure as the least. In Kenya, carting manure had helped women in increasing agricultural production and they earned income from hiring out the animals to help carry the manure (Samaritan's Purse, 2013).

3.3.4 Frequency of use and season donkeys mostly used for carting

Donkeys were used for carting daily (54.93%), at least three times per week (25.35%), fortnight (12.68%) and monthly (7.08%). Most of the respondents who reported using their donkey carts daily were full-time transporters who were living through income from carting. A study by Khan (2004) in Pakistan showed that donkey owners use their carts daily for brick transport business. Another study by Fahmy (2004), in Egypt also reported the same findings that donkeys were used daily in rubbish collection. Few owners who use their animals once in two weeks and a month were not in donkey cart business full-time. Their primary use of donkeys was domestic purpose and carting for business was regarded as part-time activity. These findings are similar to those of Ndlovu *et al*. (2004) in Zimbabwe who revealed that donkeys were mainly used for domestic chores.

Seasonal use of donkeys for carting is shown in Figure 3.6 with winter (84.51%) being ranked the season when donkeys were mostly used for carting. This could be linked to the fact that in winter the study area experienced cold weather hence the demand of more firewood to be used

for heating purposes. Ndlovu *et al*. (2004) also reported that winter was the peak working period of donkeys in Zimbabwe when they are used to transport farm products.

Donkeys were used less in spring (63.38%) than the other three seasons (Figure 3.6). Most of the donkey owners did not use their donkeys much in spring because of their poor body condition since spring (August-October) is the driest season in Joza and the grazing conditions are poor. In contrast to Wells and Krecek (2001), donkeys were used much more in spring than winter, summer and autumn when owners had to travel long distances to fetch water.

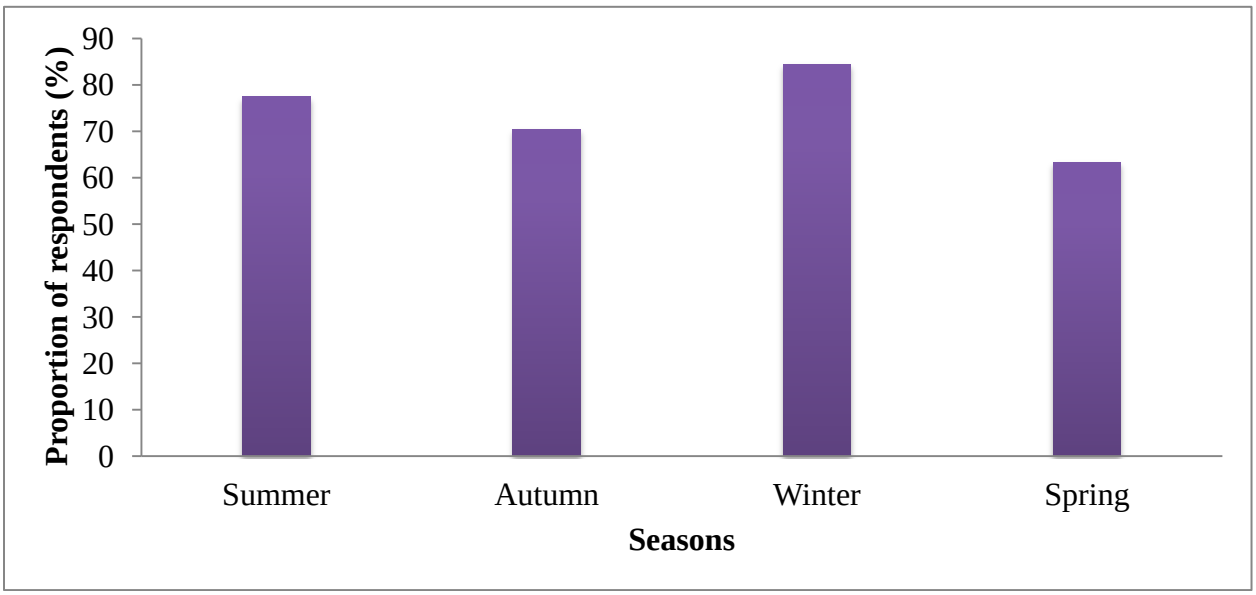


Figure 3. 6: Seasons when donkeys are mostly used for carting

3.3.5 Association of owners' demography with cash earned through donkey use, carting purpose, source of income and donkeys

The association between demographic information of donkey owners and carting purpose is shown in Table 3.2. Education level of owners influenced their perceptions on carting wood, goods and water. Literate donkey owners perceived that carting goods, firewood and water for neighbours was more profitable than carting bricks, manure, sand and clay. This was in line with Angara *et al*. (2011) who revealed that the higher the level of education, the better the performance of donkey owners in selection of activities for income generation through carting. Carting of poles was associated with race, only black people participating in carting of poles mainly for construction of mud house. These mud houses are associated with poverty and according to Kingdon and Knight (2005) and SARPN (2008), blacks are poorer than coloureds in South Africa.

The results highlighted in Table 3.3 show that gender and age of owners significantly ($P < 0.05$) influenced the perception on source of income. Elderly donkey owners reported that their main source of income was pension and grants. On the other hand women said their main source of income was grants hence they ranked donkey cart as their secondary source of income. Age and education also influenced owners' perception on source of donkeys, with young owners having inherited donkeys from their late family members. Most adult men and elderly people reported that they sourced donkeys through cash purchase. Most literate people said that they purchased their donkeys from other donkey owners.

Table 3. 2 Association between demographic information and carting purpose

Demographic factors	Carting purpose						
	Woods	**Poles**	**Goods**	**Water**	**Sand/Clay**	**Bricks**	**Manure**
Gender	0.447^{ns}	0.172^{ns}	0.163^{ns}	0.572^{ns}	0.324^{ns}	0.745^{ns}	0.425^{ns}
Race	0.169^{ns}	0.032*	0.288^{ns}	0.688^{ns}	0.689^{ns}	0.817^{ns}	0.619^{ns}
Age	0.105^{ns}	0.385^{ns}	0.912^{ns}	0.318^{ns}	0.308^{ns}	0.194^{ns}	0.396^{ns}
Education	0.021*	0.088^{ns}	0.009**	0.043*	0.504^{ns}	0.128^{ns}	0.091^{ns}

Significant at $P < 0.05$, ** Significant at $P < 0.01$, NS=Not Significant at $P > 0.05$

Table 3. 3 Relationship between demographic information, major source of income, source of donkeys and cash earned through donkey carts.

Parameter	**P-Value**	**Significance**
Gender *****source of income	0.0086	******
Race***** source of income	0.3937	ns
Age***** source of income	0.0207	*****
Education***** source of income	0.0825	ns
Gender*source of donkeys	0.1704	ns
Race*source of donkeys	0.6685	ns
Age*source of donkeys	0.0028	**
Education*source of donkeys	0.0116	*
Gender*cash generated per week	0.0882	ns
Race*cash generated per week	0.5696	ns
Age*cash generated per week	0.8796	ns
Education*cash generated per week	0.2569	ns

* Significant at $P < 0.05$, ** Significant at $P < 0.01$, NS=Not Significant at $P > 0.05$

3.4 Conclusion

Donkeys played a paramount role in the livelihoods of people who own them, mostly used for carting of goods, firewood, building materials and water. The study provided evidence that blacks are much more engaged in donkey carting than coloureds. More so, men were much more dominating in donkey transport than women. This research established that donkeys are mostly used in winter, but also used during other seasons on daily basis for income generation. Some of the owners' demography had influence on their perceptions regarding carting purposes, major source of income and source of donkeys. Generally, donkeys in Joza assisted resource-limited households with transport services, creation of employment and income generating opportunities. If donkeys are sick or die, the impact on resource-limited households can be devastating. It can result in less income generating opportunities, increased transport and unemployment problems. There is therefore, a need to evaluate the health and welfare status of working donkeys in peri-urban areas so as to determine its impact on human livelihoods.

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CHAPTER 4: Donkey owners' perceptions on health and welfare issues in carting donkeys

Abstract

The study was conducted to determine owners' perceptions on health and welfare aspects of donkeys used for transport. Data was collected by interviewing 71 donkey owners in Joza, a peri-urban area in the Eastern Cape Province of South Africa. Animal health, feeding, housing, work strategy and access to veterinary care were the major issues discussed with donkey owners. Chi-square test was used to determine association between owners' perceptions on management practices and major health problems encountered by donkeys. Results revealed that most of the owners managed their animals poorly. The majority of the donkeys were brutally treated with some of them being beaten (74.65%) during work, made to travel long distances (43.66%), worked long hours (52.11%) without housing (61%), adequate water (59.10%) and feed supplements (83.10%). Sixty one percent did not take their animals to the monthly mobile donkey clinic operated by the Eastern Cape Horse Care Unit (ECHCU) free of charge. Approximately 61% did not attend trainings on donkey use and management conducted by ECHCU and Society for the Prevention of Cruelty towards Animals (SPCA). The study also revealed that wounds (95.97%), coughing (75.65%) and lameness (64.79%) were some of the major health problems reported to be encountered by donkeys. In summary, most of the donkeys are being overworked without proper veterinary care, feed and water. As a result sores, coughing and lameness are the serious health problems encountered. Therefore, more access to veterinary services and training on donkey use and management is important to alleviate these problems.

Keywords: Brutal treatment, health, housing, management, training, welfare

4.1 Introduction

Donkeys are important animals to resource-limited communities (Biffa and Woldemeskel, 2006) providing power and transport at low cost (Pearson *et al.*, 2003). In peri-urban areas, donkeys are still used to transport people and all types of goods (Pritchard and Whay, 2006; Chapter 3). The use of donkey transport will continue for years to come because of the prevailing low economic status of communities and poor roads networks (Biffa and Woldemeskel, 2006; Sisay, 2013).

Despite their crucial contribution, the husbandry practices of working donkeys in most of the developing countries are poor (Mekuria *et al.*, 2013). It is well understood that husbandry practices affect the animal's ability to work and working practices affect the amount of work output and efficiency (Makki, 2013), this means that animal health and welfare are being compromised. According to Pearson *et al*. (2003), the efficient use of working donkeys depends on how they are connected to the implement they are pulling or the material they are carrying and how well they have been trained and managed.

Most donkeys are susceptible to painful, debilitating, fatal tropical illnesses and conditions such as toxic plant, colic and parasitic infection (Webber and Rogers, 2009). These animals work under difficult environmental conditions and are sometimes used with inappropriate equipment. Some harnessing methods cause discomfort and inflict wounds (Mekuria and Abebe, 2010). Inappropriate harnesses, walking long distances, overloading (Biswas *et al*., 2013), long working hours and insufficient feed have negative effects on the animal's health and welfare (Mekuria *et al*., 2013), resulting in exhaustion, malnutrition, lesions and hoof problems (Webber and Rogers, 2009). In addition lack of proper veterinary care, poor management and shelter that can protect animals from sun, rain, insects, and predators like hyenas and car accidents during night time is common in many parts of the world.

The misuse, ill-treatment and lack of veterinary and general care, contribute to the early death of working donkeys. The life expectancy of donkeys reaches up to 30 years where animal welfare is in practice especially in developed countries (Mekuria and Abebe, 2010). Constraints such as lack of veterinary care and knowledge as well as poverty, mean that the health and welfare of working animals in developing countries is being compromised. The health and welfare of working donkeys is therefore of paramount importance, not only for the health and survival of those animals, but also for the livelihoods of those people who depend on them (Webber and Rogers, 2009). The adoption of good health, welfare and working practices is among the most important ways that people in resource-limited countries can help secure and improve their income. A study concerning animal health and welfare cannot be reliable or useful without involving people who use or work with these animals every day. Therefore, this study was conducted to determine owner perceptions on health and welfare status of donkeys used for carting in a peri-urban area of South Africa.

4.2 Materials and methods

4.2.1 The study Area

The study was conducted in Joza, located in Cacadu District under Makana Municipality in the Eastern Cape Province of South Africa. The description of the site is detailed in Chapter 3, Section 3.2.1.

4.2.2 Survey description

Survey based on structured questionnaires was conducted from September to November 2013, among 71 donkey owners. The questionnaires were pre-tested in August 2013 to verify the relevance of the questions, at the same time the interviewers were also trained in order to minimise problems related to biasness of results. Questionnaires were administered to donkey owners through direct contacts in their homes, work points and at donkey clinics. Trained field-workers who could efficiently communicate to owners both in local and English languages were used to assist interviewing the donkey owners.

Ethical clearance (Certificate number MUC02SIMAR01) was obtained from the University of Fort Hare Research Ethics Committee (UREC). Owners were asked if they were willing to participate in the survey or not. Those who were willing were interviewed after signing consent forms obtained from UREC for confidential purposes. Owners were asked about demographic information such as gender, age group and education status. Perceptions on access to veterinary care, training on donkey use and management, major health problems encountered, fitness of a harness or saddle, husbandry and management practices were also asked.

4.2.3 Statistical analysis

Raw data collected was captured into Microsoft excel and later analysed using PROC FREQ procedures of Statistical Analyses Systems (SAS) (2003) to give descriptive statistics. Specifically the chi-square test was used to determine association between owners' perceptions on management practices and major health problems encountered by donkeys.

4.3 Results and discussion

4.3.1 Donkey owners' demography from a peri-urban area

Results from the current study showed that approximately 96% of the people engaged in donkey keeping were male with the remaining being female (Table 3.1, Chapter 3). This implies that the use, care and management of carting donkeys are the responsibilities of men. The results on gender inequality in the present study are consistent with previous reports (Mekonnen, 2007; Tekle, 2007). Dinka *et al*. (2007) also found similar results and reported that the use, care and management of working animals is the responsibly of men.

Almost 30% of the respondents involved in donkey keeping were aged between 18-30 years while 27% were aged between 31-50 years (Table 3.1, Chapter 3). This shows that more adult men were involved in donkey keeping than young and old men. The same findings were also reported (Wells *et al*., 2004; Dinka *et al*., 2007; Swai and Bwanga, 2008) where adult men were more involved in donkey carting. The fact that the young age group is school going might have contributed to their low participation in donkey carting. The involvement of adult men in donkey transport could be due to the fact that they were unemployed.

The majority of the respondents had completed formal education (81.69%) while 18.31% had not. The higher literacy rate among the respondents also concurred with Iga (2002), Dinka *et al*. (2007), Swai and Bwanga (2008) and Angara *et al*. (2011) in Gwanda, Ethiopia, Tanzania and Sudan, respectively. Limited employment opportunities and higher rates of poverty in the country (Kingdon and Knight, 2005; SARPN, 2008), might have contributed to the higher number of educated people being engaged in donkey transport.

4.3.2 Owners' perceptions on welfare, husbandry and management practices of donkeys

Few donkeys were being housed in a kraal (22.54%) while 16.9% were kept in yards at homesteads and the majority were left to roam around (60.56%) (Table 4.1). Similar findings were reported by Wells and Krecek (2001) who said the majority of the donkeys were allowed to roam free day and night whist only few owners kept their donkeys in kraal or yard at night. Most of the donkey owners said they could not house their animals because they wanted them to have enough time to graze since they could spend the whole day working. However this was in violation of animal welfare rights which require donkeys to be housed so as to protect them from rain, cold nights, strong winds, sun, flies, theft, wild animals and car accidents (Defra, 2009; McDowell, 2009).

According to FAWC (1992), as cited by Passantino (2011), animals should have freedom from hunger, thirst and malnutrition. This means that animals should have free access to supply of fresh and clean drinking water together with a balanced diet to meet their individual maintenance and everyday activity requirements. However, this was not the case in the current study, few owners provided their animals with water (41%) and feed supplements (17%) while the majority let their animals graze freely, of which the grazing condition was poor. Most of the owners could not supplement their animals because they could not afford the feed supplements. Water was not given to donkeys because owners assumed that their animals had access to the nearby dams. The findings of the current results are similar to those reported by Wells and Krecek (2001), Shelima *et al*. (2007) and Kumar *et al*. (2014) who indicated that the majority of the owners did not give feed supplements to their animals but allowed their donkeys to drink freely from the community dams. This was in contrast with Tadich *et al*. (2008) and Mekuria *et al*. (2013) who reported that most of the people provided feed supplements and water to their animals after work.

Table 4. 1 Perception of owners in respect to practices related to welfare aspects

Criteria	Practices	Frequency	Percentage (%)
Hours worked by donkeys	< 2 hours	11	15.49
	2-6 hours	23	32.39
	>6 hours	37	52.11
Distance travelled per day	< 3km	8	11.27
	3-6km	12	16.90
	7-10km	20	28.17
	>10km	31	43.66
Rest during work	Yes	24	33.80
	No	47	66.20
Concerned about donkey health	Yes	65	91.55
	No	6	8.45
Beating practice	Yes	53	74.65
	No	18	25.35
Fitness of harness	Good	16	22.54
	Fair	12	16.90
	Poor	43	60.56
Housing	Kraal	16	22.54
	Yard	12	16.90
	Bush	43	60.56
Water provision	Yes	29	40.84
	No	42	59.15
Supplementary feeding	Yes	12	16.90
	No	59	83.10

Ninety-two percent of the respondents said that they were concerned about the animals' health and welfare while 8% had the perception that donkeys should be worked hard because they are stronger. However when asked about some of the husbandry and management practices, their response seemed to be contradictory. For example most of the respondents reported using their animals for long hours (52.11%), travelling long distances (43.66%) without giving their animals a short break (66.2%) and when released, animals were left to browse and feed on garbage (Figure 4.1). In addition, a larger proportion (74.65%) said they beat their donkeys to encourage them to work hard. These findings were also reported in other countries (McPeake, 2004; Diarra *et al*., 2007; Biswas *et al*., 2013) where animals worked for long hours and travelled long distances without a short break. Unfortunately these practices are not in line with the Animal Cruelty to Draught Pack Rule (1965) cited in Biswas *et al*. (2013) which says animals should not be used for more than 5 hours without a break.

Fitness of harness was reported to be the major problem with almost 61% of the respondents saying their harnesses were in poor condition. Only a small proportion (23%) reported to use harnesses that were in good condition. The poor condition of harnesses might be associated with the fact that most of the owners could not afford to buy harnesses from the shops, hence they tend to make them themselves with inappropriate materials. Homemade harnesses were also reported to be used by most of the rural donkey owners (Wells and Krecek, 2001; McPeake, 2004; Swai and Bwanga, 2008; Khan *et al*., 2013), and they tend to cause sores.

Figure 4. 1 Donkeys feeding on garbage after work

4.3.3 Perceptions on age at which donkeys start working and their working life expectancy

Most donkey owners (52.11%) reported that donkeys started working when they were about two years old, while 33.8% of the owners had started working their animals at 3 years and 14.08% at four years. Several studies have shown similar results (de Aluja, 1998; Aganga and Tsopito, 2004; Blench *et al*., 2004; Tadich *et al*., 2008) where equines were used for work at an early age (< 3years). According to James (1999), donkeys should not be worked until they are at least 4 years old. If donkeys are used for work too early, long term damage to bones, development and health can occur (James, 1999). Appropriate age to start working depends on the number of animals owned and in the current study it appears as if donkeys in small herds were used for work earlier than those in large herds.

Almost 47% of the respondents reported that the life expectancy of a working donkey is between 11-16 years and 38% of the donkey owners were of the perception that these animals cannot be used for work for more than ten years. Only a small proportion (15%) said that donkeys had a life expectancy of more than 16years. The median age of work was 13.5 years and this low life expectancy is consistent with findings on surveys by Pearson and Ouassat (1996), Pearson *et al*. (2001), Wallace (2003), Powell (2004), Evans (2007) and W/giorgis *et al*. (2013). This shorter life expectancy could be due to greater work demands and less rest, exposure to tropical diseases and less veterinary care.

4.3.4 Access to veterinary services, health care and owners' response to sick donkeys

Few donkey owners practised preventive healthcare measures such as dipping (9.86%) and vaccination (5.63%). A large proportion did not practise these preventive health care measures because they could not afford the vaccines and acaricides. More so the majority of the donkey

owners lacked information on the presence of acaricides and vaccines such as tetanus anti-toxin. In agreement with this observation Shelima *et al*. (2007) and Khan *et al*. (2013) also reported that few owners vaccinated and dipped their animals because they could not afford and some were not aware of the presence of vaccines and acaricides used for donkeys.

The proportion of owners who could deworm (36.62%) and trim hooves (39.44%) of their animals was at least higher than those who vaccinated and dipped their donkeys. The higher numbers of respondents to these preventive healthcare measures could be that the ECHCU was deworming donkeys seasonally and trimming hooves monthly during donkey clinics free of charge. Although these practices were higher than vaccination and dipping, most of the owners did not bring their animals to the clinic for deworming and trimming of hooves. In concurrence with the current study, deworming and hoof trimming was reported to be practised by few donkey owners (McPeake, 2004; Shelima *at el*., 2007; Khan *et al*., 2013).

Figure 4.2 shows owners' responses on sick animals. A higher proportion (35.56%) of the owners did not provide any treatment to their donkeys. Few owners managed their sick animals differently by taking them monthly to the donkey clinic (26.76%), using medicinal plants (16.68%), commercial remedies (9.9%) and calling SPCA (11.48%) for help. Most of the donkey owners did not provide any treatment to their animals due to financial constraints. More so lack of care and ignorance contributed so much to most of the owners not providing any treatment to donkeys. Similar situations have been reported elsewhere in Africa (Biffa and Wodemeskel, 2006; Diarra *et al*., 2007; Sisay, 2013) where few owners provide treatment to their animals.

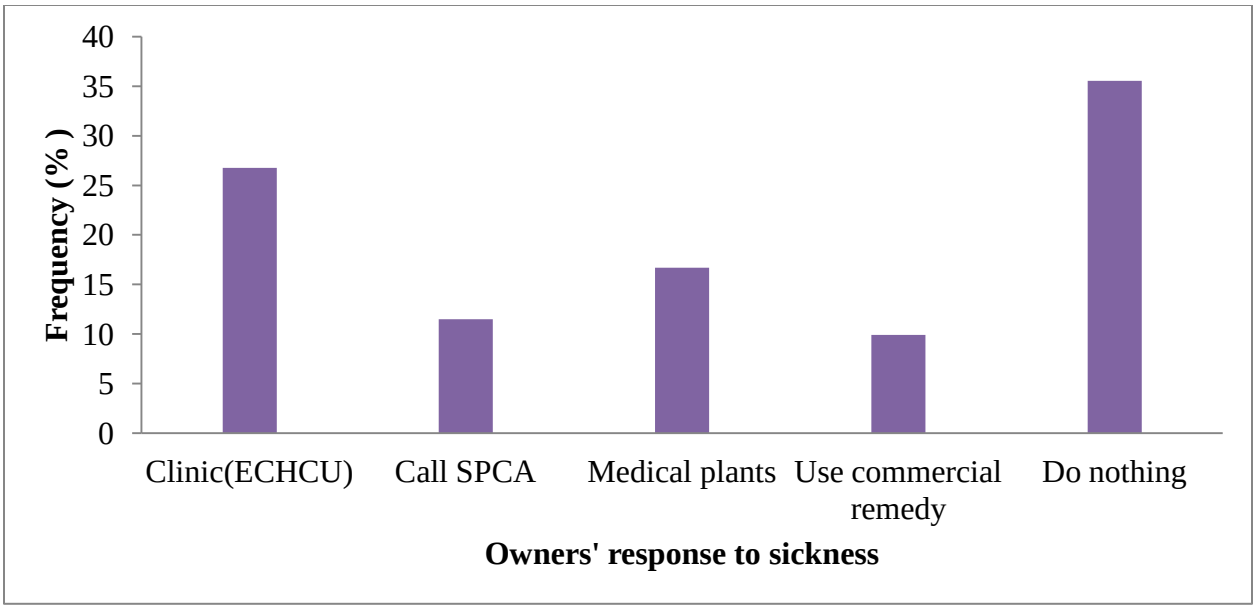

Figure 4. 2 Response by donkey owners in a peri-urban area of South Africa on the management of their sick animals

Few owners (38.03%) had access to the veterinary services or know of the existence of the ECHCU while the majority (61.07%) had no access (Table 4.2). This means that the service was underutilised. The underutilisation of the veterinary service could be that the donkey clinic is based in Port Elizabeth not the study area (Joza), as a result it conducts monthly mobile clinics where only few owners who had sick animals at that time would attend. In agreement with the present report (Martin *et al*., 2005; Tesfaye and Martin, 2005) also observed that few owners had access to veterinary services.

The majority of the respondents (60.56%) had no access to training on donkey use and management, with only a small proportion (39.44%) having access (Table 4.2). Knowledge on donkey use and management plays a pivotal role on the health and welfare of working animals. According to Pearson and Krecek (2006), several non-governmental organisations that provide static and mobile veterinary services also provide education, advisory services and training courses about working equine husbandry and management practices. However, in most of the rural and peri-urban areas access to veterinary services is poor (Pearson and Krecek, 2006). Similar findings were observed in the current study where the ECHCU and SPCA were the only organisations offering veterinary services and training on donkey husbandry and management practices. In addition to the limited access to veterinary services, most of the respondents were ignorant about utilizing the available services. As a result they perceived that they did not have access to veterinary services and trainings on donkey husbandry and management practices.

Table 4. 2 Perceptions of respondents on access to veterinary care, training on donkey use and management in a peri-urban area of South Africa

Parameter		Frequency	Percentage (%)
Access to veterinary care			
	Yes	27	38.03
	No	44	61.97
Access to training about donkey use and management			
	Yes	28	39.44
	No	43	60.56

4.3.5 Owner's perception on major health problems

The most frequently encountered health problems were wounds (95.97%), coughing (74.65%) and lameness (65.79) as shown in Table 4.3. Several studies also reported similar findings where wounds, coughing and lameness were the major health problems encountered (Wells and Krecek, 2001; Tesfaye and Martin, 2005). The problem of wounds might normally be associated with poor and ill-fitting harnesses which were used. Coughing can be caused by over-dosing of animals with traditional medicine and parasites infection. Lameness is often associated with pain on the feet and lower joints which could have been caused by poor hoof care that was reported in the current study.

Some of the health problems that were mentioned include colic (46.48%), poor body condition (36.62%), worms (25.35) and ticks (21.13%) (Table 4.4). Similar findings where colic, parasites and poor body condition were major problems cited by owners were also reported (Martin *et al*., 2005; Shelima *et al.*, 2007; Swai and Bwanga, 2008). The mentioning of colic as one of the major health problems could be due to high parasitic burdens and ingestion of toxic plants. Lack of dipping and deworming could have played a significant role in higher burdens of parasites. Poor body condition was mentioned as a major problem due to the fact that most of the donkeys were overworked without proper rest, adequate water and feed.

Table 4. 3 Major health problems encountered by working donkeys in a peri-urban area of South Africa

Health problem	Frequency	Percentage (%)
Coughing	53	74.65
Colic	33	46.48
Wounds	68	95.97
Lameness	46	64.79
Worms	18	25.35
Ticks	15	21.13
Poor body condition	26	36.62

4.3.6 Association between owners' perception on management practices and health problems encountered by donkeys

Perceptions of owners on deworming influenced their views on major health problems encountered such as coughing, colic and worms (Table 4.4). This could be due to the fact that lack of deworming could cause higher internal parasites infestation. According to Martin *et al*. (2005), higher parasitic burden can cause colic and coughing in donkeys. Hours worked by donkeys per day were also associated with colic, coughing and prevalence of worms. It was noted during data collection that owners who overworked their animals reported to encounter health problems like coughing, colic and worms. Perceptions on beating animals during work were associated with colic and wounds. The association could be attributed to the fact that beating animals at the same place can cause wounds (Sisay, 2013) and beating on the belly can cause colic. Fitness of harnesses was associated with prevalence of wounds. This could be due to the fact that poorly made and ill-fitting harnesses can cause sores (Swai and Bwanga, 2008). There was an association between perceptions on dipping and prevalence of ticks. Animals that are not dipped are more susceptible to high tick infestation.

Hoof care and distance travelled by donkeys per day had a significant effect on lameness. Lameness is usually caused by poor hoof condition such as untrimmed and unclean hooves that are commonly full of mud, manure, sand, gravel and nails (Khan *et al*., 2013). According to James (1999), walking for long distances on tarred roads can wear down and damage hooves of donkeys and can cause lameness. Body condition of donkeys used for carting was associated with supplementary feeding, hours worked and distance travelled per day. This might be related to the fact that animals were overworked without adequate rest, feed supplements and enough

grazing time and thus resulting in poor body condition. Pearson and Krecek (2006), revealed that overworking and poor nutrition affect the body condition of working equines.

Table 4. 4 Association between management practices and major health problems

	Major health problems						
Husbandry practice	Coughing	Colic	Wounds	Lameness	Worms	Ticks	Body condition
Supplementary feeding	0.975^{ns}	0.714^{ns}	0.425^{ns}	0.239^{ns}	0.116^{ns}	0.447^{ns}	0.003**
Water provision	0.304^{ns}	0.695^{ns}	0.100^{ns}	0.014*	0.425^{ns}	0.616^{ns}	0.656^{ns}
Deworming	0.042*	0.029*	0.270^{ns}	0.592^{ns}	0.008**	0.368^{ns}	0.947^{ns}
Dipping	0.838^{ns}	0.555^{ns}	0.163^{ns}	0.699^{ns}	0.837^{ns}	0.001**	0.543^{ns}
Vaccination	0.243^{ns}	0.239^{ns}	0.034*	0.129^{ns}	0.230^{ns}	0.040*	0.737^{ns}
Hoof care	0.289^{ns}	0.631^{ns}	0.324^{ns}	0.004**	0.956^{ns}	0.105^{ns}	0.125^{ns}
Fitness of harnesses	0.429^{ns}	0.891^{ns}	0.008**	0.379^{ns}	0.777^{ns}	0.473^{ns}	0.027*
Hours worked	0.047*	0.014*	0.399^{ns}	0.763^{ns}	0.232^{ns}	0.033*	0.043*
Distance travelled	0.870^{ns}	0.234^{ns}	0.456^{ns}	0.017*	0.124^{ns}	0.872^{ns}	0.013*
Breaks during work	0.229^{ns}	0.009**	0.206^{ns}	0.446^{ns}	0.092^{ns}	0.059^{ns}	0.358^{ns}
Beating	0.784^{ns}	0.046*	0.039*	0.342 ^{ns}	0.327^{ns}	0.792^{ns}	0.107^{ns}

* Significant at $P < 0.05$, ** Significant at $P < 0.01$, NS=Not Significant at $P > 0.05$

4.4 Conclusion

Results of this study revealed that many of the working donkeys in Joza were experiencing several health and welfare problems. Most of the donkeys were put to work at an early age and their working life expectancy was too short. Very little veterinary care was available to most of the donkeys in Joza. Owners' perceptions on health problems encountered by donkeys were influenced by husbandry and management practices. There were higher incidences of wounds, coughing and lameness. Access to veterinary services and training on donkey use and management had an impact on the health and welfare of donkeys. Therefore, the improvement in donkey health and welfare will not only improve their productivity, but will also increase their working life expectancy. Finally a more detailed study on the health and welfare aspects of carting donkeys in peri-urban areas using animal-based method is required. This will give a more direct and accurate picture on health and welfare status of working donkeys and how they are coping within the environment they live in.

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Chapter 5: Assessment of the welfare of carting donkeys using health and behaviour indicators

Abstract

A study was conducted to assess welfare problems encountered by donkeys used for carting in Joza, a peri-urban area in the Eastern Cape Province of South Africa. Two hundred and seventy-one donkeys used for carting were assessed between September 2013 and January 2014. Data was gathered using animal-based method, that is; direct observation of health and behaviour parameters. Results showed that approximately 61% of the donkeys were thin, having a body condition score (BCS) of 1-2 on a scale of 1-5 (1 Very thin and 5 Very fat). Thin donkeys were more apathetic (26.2%) than medium and fat animals. Responses to observer approach were significantly associated with sex and BCS, with stallions in good body condition being more aggressive. However, when the observer walked down the animal's side and back to its head again, most of the animals (75.54%) responded by tail clamping or tucking. Majority of the animals that had a BCS of 3-5 avoided chin contact either by kicking out or moving away. Results further showed that most of the donkeys were suffering from external injuries, with the hindquarters (39.85%), shoulder (32.10%) and spine (21.77%) being the mostly affected areas. The prevalence of wounds on tail-base, belly, flank and neck were seen in less than 13% of the animals. There was a significant difference in the prevalence of wounds among different age groups and BCS of the observed animals. Old animals in poor body condition were much more affected than younger ones. Thirty percent of the donkeys were lame ranging from mild to severe, with poor coat condition (28.78%) which was infested with external parasites (19.19%). Almost 20% of the animals assessed had abnormal mucous membrane and dental problems, with older donkeys mostly having missing teeth. In conclusion, the study showed that many of the

donkeys used for carting in the study area were experiencing multiple welfare problems. The study marks the first step in programs to prioritise the welfare issues faced by donkeys. Donkey management, health and welfare promotion programs are therefore, of paramount importance in solving the problem of poor health and welfare in donkeys.

Keywords: Animal-based method, body condition score, donkey welfare, donkey behaviour, health problems

5.1 Introduction

Animal welfare encompasses both physical and mental health well-being (Whay and Pritchard, 2004; Sejian *et al*., 2011; Fleming *et al*., 2013). Physical well-being includes health, injuries and diseases (Dennison *et al*., 2005) and this can be expressed through problems such as poor body condition, parasitic infection, lameness, sores (Willgert, 2010), abnormality of eyes, hooves and mucous membranes (Pritchard *et al*., 2005; Whay *et al*., 2006; Geiger, 2013). Qualitative Health Assessment (QHA) is a method that uses direct observations to assess and score the health of animals (Pritchard *et al*., 2005). On the other side, animal mental health can be expressed through their behaviour (Fleming *et al*., 2013). According to Fleming *et al*. (2013), behavioural expression of animals can be measured using Qualitative Behavioural Assessment (QBA) that uses human observations to assess and score. It is therefore, very important to consider both health and behaviour attributes of an animal when assessing its welfare.

To assess animal welfare different methods can be used, including direct animal-based and indirect resource-based (Pritchard *et al*., 2005; Dijk *et al*., 2008; Willgert, 2010; Sejian *et al*., 2011). Direct animal-based method involve direct observations of the health and behaviour of an

animal while resource-based method include measuring the adequacy of inputs, such as resources and management provision (Johnsen *et al*., 2001; Pritchard *et al*., 2005; Sejian *et al*., 2011). Indirect measures could be carried out by administering a questionnaire to the owner in order to gather information about feeding data, housing and management practices (Chapter 4). This method often relies on owner's information who does not usually keep animal health records and sometimes misunderstanding caused by cultural or social differences can occur (Pritchard *et al*., 2005).

Poor welfare of working equines is a visible problem in many parts of the developing countries, as animals are often seen working with harness sores and in poor condition (Pearson *et al*., 2001), neglected in allocation of resources such as food, shelter and equipment because they belong to the poorest members of the society (Whay and Pritchard, 2004). As a result, their welfare is a cause for concern in many areas of the world (Pearson *et al*., 2001; Pritchard *et al*., 2005). Until recently, the welfare of donkeys in developing countries, has received less research attention (Burn *et al*., 2009). There is little information available in literature regarding welfare problems faced by carting donkeys in the developing world. Information on the welfare of these animals can be used as a benchmark from which future welfare improvements could be measured. The objective of the study was therefore, to assess the welfare of carting donkeys in Joza, a peri-urban area in the Eastern Cape Province of South Africa using behaviour and health indicators.

5.2 Materials and methods

5.2.1 Study site

The study was conducted in Joza, located in Cacadu District under Makana Municipality in the Eastern Cape Province of South Africa. The description of the site is detailed in Chapter 3, Section 3.2.1.

5.2.2 Animals and data collection

Approval was granted for this study by the University of Fort Hare Research Ethics Committee (UREC), approval number (MUC02SIMAR01). Prior to the assessment, consent was requested from animal owners and if he/she was not willing the next person was asked. Over a five month period (September 2013-January 2014) behaviour and health data was collected from 271 donkeys. Welfare assessment protocols described by Pritchard *et al*. (2005) were used to collect the data. Before data collection three observers were trained in regard to animal examination procedures and collection of data. During observations guidance notes and photographs were also used. Examination of animals was carried out at homesteads (Figure 5.1), working sites and during monthly mobile donkey clinics and the assessment took between 10-15 minutes per animal.

As a starting point general descriptions were recorded for each animal including age, sex, disabilities and body condition. Donkey age was estimated by examining incisor appearance as described by Hadrill (2002). Donkeys were classified into three age groups (< 5years, 5-15years, >15years). Body condition scoring was based on visual appraisal and palpation of body parts such as neck, shoulder, back, ribs, pelvis and rump of the animal (Pearson and Ouassat, 2000). Scoring was also based on a system of 1 to 5, 1 being very thin and 5 very fat (Defra, 2009). The body condition scoring method used is shown in Table 5.1.

Figure 5. 1 Health and behaviour assessment at homestead

Table 5. 1 Body condition scoring guide for donkeys

Score	Pelvis	Back and Ribs	Neck
1. Very thin	Angular, skin tight. Very sunken rump. Deep cavity under tail	Skin tight over ribs. Very prominent and sharp backbone.	Marked ewe neck. Narrow and slack at base.
2. Thin	Promient pelvis and croup. Sunken rump but skin supple. Deep cavity under tail.	Ribs easily visible. Prominent back-bone with sunken skin on either side.	Ewe neck, narrow and slack base.
3. Medium	Covered by fat and rounded. No gutter. Pelvis easily felt.	Ribs just covered and easily felt. No gutter along the back. Back-borne well covered but spine can be felt.	No crest (except for stallions) firm neck.
4. Fat	Gutter to roof of tail. Pelvis covered by fat. Need firm pressure to feel.	Ribs well covered – need pressure to feel.	Slight crest. Wide and firm.
5.Very Fat	Deep gutter to root of tail. Skin distended. Pelvis buried, cannot be felt.	Ribs buried, cannot be felt. Deep gutter along back. Back broad and flat.	Marked crest very and firm. Fold of fat.

(Adapted from Defra, 2009)

Behavioural parameters were used to assess the animal's response to their environment and interaction with an assessor. A protocol described by Pritchard and Whay (2006) was used, where by the assessor approached the animal's head, walking down its side and back to its head again and then attempted to make contact with the animal's chin by hands. Indicators of general health such as coat conditions, wounds, lameness, ectoprasites, faecal soiling, abnormality of mucous membrane, eyes and hooves were also assessed. For the mucous membrane, pale or yellowish were considered as abnormal whereas pinkish was taken as normal. Animals that were found to harbour at least one external parasite (ticks, lice, fleas or mites) were considered positive for ectoparasites. Wounds or sores were characterised by hairless, broken, scabbed skin with or without breeding.

5.2.3 Statistical analysis

Data collected was analysed using PROC FREQ procedures of Statistical Analyses Systems (SAS) (2003) to give descriptive statistics. Chi-square test was used to determine association between age, sex, body condition with behaviour and health indicators.

5.3 Results and discussion

5.3.1 General observations of animals

Of the 271 animals assessed, there were more males (stallions and geldings) than females (mares). Similar findings were observed in different parts of the developing countries (Pritchard *et al*., 2005; Mekuria and Abebe, 2010; Chapter 3). There were 122 mares, 111 stallions and 38 geldings (Table 5.2). All animals assessed were used for carting only and this could be linked to the fact that packing donkeys carry smaller loads than carting animals.

Table 5. 2 Proportion of sex, age groups and body condition scores of observed animals

Factor	No. of animal observed	Frequency (%)
Sex		
Mares	122	45.02
Stallions	111	40.96
Geldings	38	14.02
Age group		
< 5 years	91	33.58
5-15 years	105	38.75
>15 years	75	27.68
Body condition score *(scale 1-5)*		
1-2	164	60.52
3	79	29.15
4-5	28	10.33

In addition, packing can cause spinal wounds if the load is not properly placed, and if no saddles or old saddles are used. Studies done elsewhere on welfare aspects, reported that donkeys were used for both carting and packing (Pritchard *et al*., 2005; Mekuria and Abebe, 2010; Mekuria *et al*., 2013; Chapter 3). Majority of the donkeys observed (approximately 39%) were aged between 5-15 years, whereas 33.58% were less than five years. Donkeys over 16 years of age were rarely seen, suggesting that the life expectancy of working donkeys in the study area is unlikely to be much over this age. Whay and Pritchard (2004) also observed the similar pattern where most of the animals assessed were middle-aged and the smaller proportion were young and old age groups.

Results showed that most of the donkeys assessed were thin (60.52%), while 29.15% were in medium body condition and only 10.33% were in good (fat) condition. These findings are supported by Burden *et al*. (2010), Burn *et al*. (2010), Geiger (2013) and Mekuria *et al*. (2013). Overworking, improper knowledge of health care, feeding and irregular or no medication for diseases, wounds and parasites, could have played a significant role in animals having poor body conditions. More so, lack of sufficient time to graze could have contributed to poor body condition in donkeys. Usually donkeys working in peri-urban and urban environment have less opportunity to graze, and are at greater risk of malnutrition compared to those in rural areas.

5.3.2 Assessment of welfare through behaviour

Most of the animals were alert (73.8%) than apathy (26, 2%) when examined by an observer (Figure 5.3). Foalks (2007) also reported similar results where most of the donkeys were alert to the observer. According to Swann (2006), apathy is associated with dehydration and chronic pain. This means that some of the observed donkeys were in poor welfare condition due to chronic fatigue and depression.

Table 5. 3 Behaviour parameters and their relationship with sex and body condition of donkeys

Observations of behaviour	No. of animals	Frequency (%)	Sex	Body condition
General attitude				
Alert	200	73.80	ns	< 0.05
Apathy/depressed	71	26.20		
Response to observer approach				
No response	107	39.48	< 0.01	< 0.001
Friendly response	50	18.45		
Avoidance/aggression	114	42.07		
Walk down side				
No response	40	14.76	ns	ns
Responds	231	85.24		
Chin contact				
Accepts	83	30.63	ns	< 0.05
Avoids	188	69.37		
Tail response				
Present	202	74.54	ns	< 0.01
Absent	69	25.46		

*Significant at P < 0.05, ** Significant at P < 0.01, NS = Not Significant at P > 0.05

Apathy can also lead to injuries such as broken knees as a result of falls and road accidents (Swann, 2006). Body condition of the animals was significantly ($P < 0.05$) associated with attitude. Donkeys in poor body condition (very thin and thin) were more likely to appear apathetic than those in good condition. These results were similar to Burn *et al*. (2010) who found apathy to be associated with poor body condition.

Almost 18 % of the donkeys assessed were friendly (turn head towards observer) while the majority were aggressive (42.07%) or non-responsive (39.38%) to observer approach (Table 5.3). These findings are similar to previous reports (Whay and Pritchard, 2004; Dennison *et al*., 2005), who observed that most of the animals demonstrated avoidance behaviour than friendly. Responses to observer approach were significantly associated with sex ($P < 0.01$) and body condition ($P < 0.001$) of the animals. Stallions were more likely to be aggressive to observer approach than mares and geldings. This could be that non-castrated males are more aggressive in nature than castrated males and females. Donkeys that were very thin and thin were more non-responsive to observer's approach than those that were fat and those in medium condition. Non-response to the observer could be due to tiredness, pain, diseases and dehydration and has been previously reported (Pritchard and Whay, 2006). Aggressive or avoidance may stress in animals reduces efficacy of the immune system and hence may have an effect on animal health (Dennison *et al*., 2005).

Most of the donkeys responded (85.24%) to the observer walking down their side and back again, with a small proportion (14.76%) showing no response at all. Animals responded by clamping the tail down or tucking it in their hindquarters (75.54%), with a few (25.46%) not responding at all. Similar observations were reported in previous studies (Dennison *et al*., 2005; Pritchard *et al*., 2005). The higher proportion in tail clamping or tucking when animals were

being approached by an observer may indicate fear or pain. Tail clamping or tucking was significantly ($P < 0.001$) associated with animal's body condition. Further studies are required to discover the relationship between body condition and tail tucking or clamping.

The proportion of donkeys avoiding chin contact was higher (69.37%) than those accepting (30.63%). Chin contact test had been previously reported (Pritchard *et al*., 2005; Tadich *et al*., 2008; Burn *et al*., 2010; Geiger, 2013) where most of the animals observed acted defensively either by kicking out or moving away from the observer. There was a significant ($P < 0.05$) association between chin contact and body condition. Donkeys that were very thin accepted chin contact and this could be attributed to the fact that most of these animals could be suffering from chronic fatigue and depression hence could not act defensively to the observer.

5.3.3 Welfare assessment using physical health parameters

Table 5.4 shows the general health problems observed from the total of 271 donkeys used for carting. The results showed that most of the animals were suffering from external injuries (wounds). Wounds occurred predominantly in the areas of hindquarters (39.85%), shoulder (32.1%) and wither/spine (21.77%). Areas such as neck, belly, flank and tail-base had fewer wounds (12.92%, 9.23%, 7.01% and 9.96% respectively). These observations are in agreement with Pritchard *et al*. (2005), Mekuria and Abebe (2010), Mekuria *et al*. (2013), Kumar *et al*. (2014), who reported that sores were mainly observed on shoulders, wither and hindquarters and were possibly caused by frequent beating, trauma and overworking. In contrast, Burn *et al*. (2008) observed that donkeys had more lesions on tail base than any other body areas.

Table 5. 4 Health parameters and their relationships with sex, age and body condition of donkeys

Observation of health	No. of animals	Frequency (%)	Sex	Age	Body condition
Coat condition*(Staring/matted)*	78	28.78	*	ns	***
Ectoparasites	52	19.19	*	ns	*
Lameness	90	33.21	*	ns	*
Wounds/sores on:					
Neck	35	12.92	ns	*	ns
Shoulders	87	32.10	ns	ns	***
Belly	25	9.23	*	***	ns
Flank	19	7.01	ns	*	ns
Hindquarters	108	39.85	ns	ns	***
Spine	59	21.77	ns	ns	ns
Tail-base	27	9.96	ns	ns	ns
Teeth missing	53	19.56	ns	**	*
Faecal soiling	15	5.54	*	ns	ns
Abnormal hooves	83	30.63	ns	ns	**
Eye(s) Abnormal	17	6.28	*	ns	ns
Ear(s) Abnormal*(cut or pierced)*	103	41.70	ns	ns	*
Abnormal mucous membranes	56	20.66	ns	ns	***

Significant at $P < 0.05$, ** Significant at $P < 0.01$, NS = Not Significant at $P > 0.05$

There was a significant difference ($P < 0.001$) in the prevalence of wounds on hindquarters and shoulders among different body condition scores, with animals in poor body condition being highly affected. This could be due to dehydration, decreased skin elasticity and prominence of bones that can lead to easy skin injury.

The current study also revealed that the occurrence of wounds on neck, belly and flank were significantly ($P < 0.05$) influenced by the age of the donkeys. Old donkeys were much more affected than young and middle-aged ones. These observations are in line with reports by Biffa and Woldemeskel (2006) and Sisay (2013) where old equines were at risk of external injuries five times greater than younger ones. The association could be linked to many factors of which some of them are reduced immune defence mechanism with age advancement, more prolonged and frequent exposure to work.

Thirty percent of the donkeys examined were lame, ranging from mild to severe, with poor coat condition (28.78%) which was infested with external parasites (19.19%). This concurs with Dennison *et al*. (2005) and Biswas *et al*. (2013) who reported lameness, unhealthy skin and ectoparasites to be the problems encountered by working equines. The prevalence of lameness, poor coat condition and ectoparasites were significantly ($P < 0.05$) influenced by both sex and BCS of the animals. Old mare donkeys which were very thin were more likely to have unhealthy skin and external parasites. This can be due to the reduced immune defence system as a result of poor body condition and also as the animal gets older. Further studies are required to discover the reason for the relationship between animal sex and the prevalence of poor coat condition and ectoparasites. Adult stallions were frequently seen laming and this could be attributed to the fact that these animals were continuously worked in tarred roads and on bumpy roads than mares and geldings, resulting in lesions in hooves and thus causing lameness. According to Dennison *et al*.

(2005), lameness is a complex problem that can be a result of both the environment in which animals work and the interaction with other health problems.

The observations indicated that almost 20% of the animals examined had dental problems and abnormal mucous membrane which was either pale or yellowish. These findings are in agreement with dental problem observations (Kumar *et al*., 2014) and mucous membrane (Whay *et al*., 2006; Mekuria *et al*., 2013). Donkeys with BCS ranging from 1-3 were more likely to have dental problems, pale mucous membrane and a swollen stomach (Figure 5.2) indicating the high prevalence of internal parasites. Different age groups of the animals examined had shown a significant difference, with the old animals more likely to have dental problems. This could be due to wear and tear and the consistency of teeth decrease with age resulting in dental problems.

Poor hoof horn quality was also observed as a major problem with 40% of the animals having hooves that were overgrown and had considerable cracks. Similar observations were reported by Dennison *et al*. (2005), Pritchard *et al*. (2005) and Geiger (2013) who reported that most of the animals examined had poor horn quality. Poor hoof horn quality was more prevalent in animals that were in good body condition. This could be attributed to the fact that fat and very fat donkeys were rarely used for work, as a result their hooves grew faster than the rate of wear. According to Natural Hoof (2005), overgrown and cracked hooves can develop if the donkeys do not get enough movement on hard surface to wear their hooves and if the hooves are not properly trimmed regularly to stimulate wear.

Figure 5. 2 Examination of teeth and mucous membrane

Six percent of the sampled animals had abnormities on the eyes ranging from ocular discharge, injuries and blindness. Abnormality of eyes in working donkeys has been previously reported (Dennison *et al*., 2005; Geiger, 2013). Donkeys' eyes are susceptible to infection that can result in ocular discharges or blindness, especially when they are working in dusty and sandy areas. Little research has been conducted on eye abnormality and risk factors in donkeys in relation to sex. Further studies are required to discover the relationship between sex and eye abnormality. Faecal soiling was observed in less than six percent of the animals sampled and was considered indicative of the presence of diarrhoea. This finding is in agreement with report by Popescu and Diugan (2013), where few animals had diarrhoea. Stallions were mostly seen with faecal soiling which could be that male donkeys contract pathogens from other equine species since they roam around chasing females.

5.4 Conclusion

The results of the current study revealed that BCS was a useful indicator of welfare problems. Mostly, thinner animals had unhealthy skin, wounds, external parasites, abnormal mucous membrane and eye abnormality and were also more likely to be apathetic and non-responsive to observer approach. In addition to these wide ranges of welfare problems, donkeys that were old had much more dental problems than younger ones. It is clear from the findings of the current study, that many of the donkeys used for carting in the study area were experiencing multiple welfare problems. This welfare assessment marks the first step in programs to prioritise the welfare issues faced by these animals. Donkey management, health and welfare promotion programs are of paramount importance to solving the problem of poor health and welfare in working donkeys.

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CHAPTER 6: General Discussion, Conclusion and Recommendations

6.1 General Discussion

The main objective of the current study was to determine the socio-economic importance, health and welfare aspects of donkeys used for carting in a peri-urban area of South Africa. The results showed that donkeys play a fundamental role in the livelihoods of people, mostly employed for carting of goods, firewood, building materials and water for income generation. However, the health and welfare of these animals is a cause for concern, as animals were seen working at an early age, with harness sores, in poor condition, without adequate veterinary care, feed, shelter and proper equipment and their working life expectancy is too short.

In Chapter 3, owners' perceptions on socio-economic importance of donkeys used for carting were determined. Results showed that more black men own donkeys than coloured and women of all races. More adult men were much more involved in donkey transport than the young and old age. This could probably due to the limited employment opportunities and higher rates of poverty in the country. Literate donkey owners reported that carting goods, firewood and water for neighbours was more profitable than carting bricks, manure, sand and clay. Most of the donkey owners reported carting with donkeys as their main source of income. Donkey owners in the study area earned a reasonable amount per week (R 500.00) from carting depending on the availability of contracts. This means carting was more profitable than some earnings from social welfare grants, pension and even jobs in the private and public sectors.

A study concerning animal health and welfare cannot be reliable or useful without involving people who work with these animals. In chapter 4, a survey was conducted to determine owner perceptions on the health and welfare of carting donkeys. Results revealed that the majority of

the owners did not provide housing, water and feed supplements to their donkeys. Most of the owners could not supplement their animals because they could not afford the feed supplements. Owners reported to put their animals at work at an early age (< 2years) as a result animals had a shorter working life expectancy due to exposure to tropical diseases, greater work demands and less rest. Few owners practised preventive healthcare measures such as dipping, deworming, vaccination and hoof trimming. This could be because the majority could not afford and lack information on the presence of acaricides, anthelmintics and vaccines. Most owners did not have access to the veterinary services and training on donkey use and management. As a result donkeys suffered from wounds, coughing, lameness, poor body condition and higher parasitic burden. Perceptions of owners on husbandry and management practices influenced their perceptions on major health problems encountered. Those that managed their animals poorly reported encountering a quite number of health problems.

Welfare of working animals can be determined using direct animal-based parameters such as behaviour and health. The objective of experimental Chapter 5 was to determine the welfare of donkeys used for carting using health and behaviour parameters. Results showed that most of the donkeys assessed were thin and mostly apathetic. This could be due to overworking, improper knowledge of health care, poor feeding and irregular or no medication for diseases. Stallions in good body condition were more aggressive than geldings and mares. This could be that non-castrated males are more aggressive in nature than castrated males and females. Donkeys in good body condition avoided chin contact either by kicking out or moving away and this could be due to fear of the observer. Thin animals accepted chin contact and this could be that most of these animals could be suffering from chronic fatigue and depression hence could not act defensive to the observer. Results on health parameters showed that most of the donkeys were suffering from

external injuries. Young donkeys with good BCS were less affected than old donkeys. Reduced immune defence mechanism with age advancement, more prolonged and frequent exposure to work could have contributed to high prevalence of wounds in old animals. Lameness, poor coat condition, external parasites, abnormal mucous membrane and dental problems were observed in less than 30% of the animals. The prevalence of the above health problems were significantly influenced by BCS of the animals. Thin old donkeys were mostly affected and this could be due to the reduced immune defence system as a result of poor body condition and also as the animal gets older.

6.2 Conclusion

The current study revealed that donkeys have a significant role in livelihoods improvement, mostly used for carting of goods, firewood, building materials and water for income generation. Black men were much more dominating in donkey transport than coloured men and women of all races. Although owners reported that they used their animals mostly in winter, donkeys were also used daily for income generation. Gender and age of owners significantly influence owners' perceptions on source of income while education level influenced their perceptions on carting firewood, goods and water. Most of the donkeys were put to work at an early age and their working life expectancy was too short. There were higher incidence of wounds, coughing and lameness. Very little veterinary care was available to most of the donkeys in the study area. Physical examination of health and behaviour of working animals revealed that BCS is a useful indicator of welfare problems. Thinner animals were more likely to have unhealthy skin, wounds, external parasites, abnormal mucous membrane and eye abnormality and also to be apathetic and non-responsive to observer approach. Donkeys that were old had much more dental

problems than younger ones. It is clear from the findings of the current study, that many of the donkeys used for carting in the study area were experiencing multiple welfare problems.

6.3 Recommendations

In the current study, access to veterinary services and training on donkey use and management had an impact on the health and welfare of donkeys. Therefore, improvement in animal health and welfare will improve animal productivity and working life expectancy, thus providing their owners with a better source of income which can improve their livelihoods.

Further research, is, however required on the following aspects:

- The role and impact of working donkeys on food security and poverty alleviation.
- Determine the prevalence, incidence and economic impact of donkey diseases.
- Ways to improve health and welfare of working donkey.
- Assessing donkey welfare using biochemical and physiochemical parameters.
- Animal-handler and animal behaviour aspects.
- Car accidents linked to donkeys and policies governing them.

Appendices

Appendix 1: Perceptions on socio-economic, health and welfare aspects of donkeys used for carting in a peri-urban area, South Africa

Date…… Questionnaire number……..

District……. Enumerator's name …….

Ward…… Respondent's name……..

SECTION A: DEMOGRAPHY AND SOCIAL CHARACTERISTICS										
1. Gender			Male				Female			
2. Age group(years)	< 18		18-30		31-50		51-60		> 60	
3. Level of education	Tertiary		Secondary		Primary		Can't read and write			
4. Who is the owner of the donkeys…….										
5. How many donkeys do you have?	Stallions		Geldings		Mares					
6. What is the source of your donkeys	Purchased		Inherited		Exchanged		Hired			
7. What is your main source of income	Employed		Carting		Grants		Pension			

SECTION B: DONKEY USE						
1. What do you use you carting donkeys for?.....						
2.At what age does your donkeys start working	2years		3 years		4years	

3. How long do they remain in use?(years)…….							
4. If you use your donkey(s) for transport, how long do you travel with your donkey per day?							
< 3 km		3 – 6 km		7 - 10 km		> 10 km	
5. When you are working with your donkeys, how long do you use them per day?							
< 2 hours		2 - 6 hours		7 - 11 hours		> 11 hours	
6. How often do you use your donkey?							
Daily		Weekly		Fortnight		Monthly		Seasonal	
7. When you are working with your donkeys do you give them breaks?				Yes		No	
8. When you are working with your donkeys do you beat them?				Yes		No	
9. Which season do you mostly use them?	Summer		Autumn		Winter		Spring	

SECTION D: HUSBANDRY, HEALTH AND MANAGEMENT									
1. What does your donkey feed on?	Grass		Tree leaves		Crop residues		Tree bakes		
2. How many times do you give water to your donkey (day)?	Nil		Once		Twice				
3. Where do you keep your donkeys at night?	Kraal		Yard		Bush				
4. Is any supplementary feeding given?	***YES***			***NO***					
5. Has your donkey ever gotten sick?	***YES***			***NO***					
6. What did you do if your donkey is sick or injured?									
Take the donkey to clinic		Call SPCA		Treat with plants		Use remedy		Nothing	
7. What kind of sicknesses are most common?.....									

……								
8. Are you concerned about your donkey's health?			***YES***			***NO***		
9. Do you dose your donkeys to control internal parasites?			***YES***			***NO***		
10. How frequent do you dose your donkeys?	Monthly		Seasonal		Yearly		None	
11. How frequent do you dip your donkeys?	Monthly		Fortnight		Week		None	
12. Do you dip donkeys to control ectoparasites?				***YES***		***NO***		
13. Are there any problems with parasites?				***YES***		***NO***		
14. Do you vaccinate you donkey to prevent diseases?				***YES***		***NO***		
15. Do you carry out any hoof-care or shoeing on you donkey(s)?				***YES***		***NO***		
16. Are there any problems with lameness?				***YES***		***NO***		
17. Are there any problems with harness sores or working injuries?				***YES***		***NO***		
18. What do you think causes injuries in working donkeys?.....								
19. Is there any veterinary help available?				***YES***		***NO***		
20. Is there any training done about donkey use and management?				***YES***		***NO***		
21. What body conditions are your donkeys in?		***Good***			***Fair***		***Poor***	
22. What can you say about fitness of Harness?		***Good***			***Fair***		***Poor***	

Appendix 2: Health and Behaviour assessment form for carting donkeys

Date…… Assessment form number……..……..

District……. Donkey owner's name ……

Ward…… Donkey number……

SECTION A: GENERAL INFORMATION (*Please tick in corresponding box* (√))						
1. What is the sex?	Stallion		Gelding		Mare	
2. How old is the donkey?	< 5years		5-15 years		>15years	
3. Is there any natural disabilities?			Yes		No	

SECTION B: GENERAL BEHAVIOUR (*Please tick in corresponding box* (√))						
1.Attitude	Alert		Depressed			
2.Response to observer approach	No response		Friendly		Avoidance	
3. Walking down side	No response		Respond			
4.Chin contact	Accept		Avoid			
5.Tail tuck	No response		Clamps tail down			

SECTION C: GENERAL HEALTH (*Please tick in corresponding box* (√))									
1.Body condition									
1= very thin		2= thin		3= medium		4= fat		5= very fat	
2. Coat condition		Staring/matted/dry/uneven				Flat/clean/shiny/nice			
3.Ectoparasites			***Present***			***Absent***			
4.Lameness			***Present***			***Absent***			
5a.Wounds/sores(Neck)			***Present***			***Absent***			
b. Shoulder			***Present***			***Absent***			
c. Belly			***Present***			***Absent***			
d. Flank			***Present***			***Absent***			
e. Hindquarter			***Present***			***Absent***			
f. Spine			***Present***			***Absent***			
g. Tail base			***Present***			***Absent***			
6.Diarrhoea(faecal soiling)			***Present***			***Absent***			
7. Missing teeth			***Present***			***Absent***			
8.Hooves	Good condition		Moderate condition			Poor condition			
9.Eyes	Normal		Blind			Injured			
10.Ear	Cut		Holes			Intact			
11.Mucous membranes		Normal colour				Abnormal colour			