Using physical and emotional parameters to assess donkey welfare in Botswana

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ABSTRACT

Introduction: Working donkeys in Maun, Botswana contribute to people's livelihoods substantially through the provision of transport, ploughing and income generating activities. However, working donkeys suffer from various welfare issues that were investigated in this study to provide preliminary insights on their health and well-being.

Materials and methods: An assessment protocol involving direct observations of the donkeys was developed and operationalised to assess physical and emotional welfare. Physical welfare parameters such as body condition score, abnormal limbs, impeded gait, eye abnormalities, sore and scar locations, hoof and coat condition were recorded. Emotional welfare parameters such as eyes, tail movement, ear position, neck position, posture and vocalisation were recorded. In addition, donkey-owner interactions were recorded and scored, as well as the donkey's response to environmental factors. A total cross-section of 100 donkeys sub-stratified by roles of riding, cart pulling and resting were randomly selected in eight villages and three urban wards and assessed during the period of May to August 2012.

Results: The findings reveals that the 100 adult working donkeys assessed were physically afflicted by poor BCSs of two (66 per cent), long and cracked hooves (50 per cent), sores on at least two locations on their body (53 per cent), scars on at least two locations on their body (86 per cent), and poor coat conditions (58 per cent). Emotionally, donkeys displayed unresponsiveness (35 per cent), avoidance (31 per cent), disinterest in hand sniffing (59 per cent), dull facial expression (33 per cent), tail stillness (89 per cent), neck stiffness and/or raised head (13 per cent) or head hanging low (32 per cent visibly withdrawn), and tense ears pointing back or to the side (69 per cent). By contrast, the remaining donkeys (31 per cent) exhibited a happy demeanour of curiosity, interest, alert facial expression, tail swishing, relaxed ears pointed to the side or forward and neck relaxed and/or level.

Conclusions: This study offers preliminary findings from an investigation into the welfare of working donkeys in Greater Maun, Botswana, and provides baseline research to inform future research and strategies to enhance donkey well-being.

INTRODUCTION

Approximately 341,000 donkeys reside in Botswana (Mbaiwa and others 2007, FAOSTAT 2012). Donkeys provide draught power (ploughing, hauling) and transport (riding, cart pulling) during their lifetime, contributing substantially to people's livelihoods in terms of food security, mobility and income generation. Various welfare issues have been reported in working donkeys elsewhere in Africa. Long working hours, harsh environmental conditions, over-use, improper equipment, limited veterinary attention and little or poor quality supplementary feed during dry periods can lead to welfare problems (De Aluja 1998, Pritchard and others 2005, Tesfaye and Curran 2005, Burn and others 2010). Consequently, donkeys suffer from poor body condition, lesions and wounds, lameness, systemic infections, ticks and gastrointestinal parasites, dehydration and aggressive or apathetic behaviour —often related to their relationship with and labour demands from human beings and the surrounding environment (Pearson and Ouassat 1996, Wells and Krecek 2001, Pritchard and others 2005, Ayele and others 2006, Ouassat and others 2007, Shaw and others 2007, Burn and others 2010, Degefa and others 2010, Getachew and others 2010, McLean and others 2012). Recent studies have shown that chronic pain in working donkeys is common, and lameness is associated with pain responses in the hoof and lower joints and can lead to suffering, reduced work productivity and increased energy output (Broster and others 2009, Burn and others 2010, Reix and others 2014).

The objective of this study was to explore the health of working donkeys by assessing their physical and emotional welfare state at the time of examination and to identify potential connections to broader contextual factors in Maun, Botswana. The results will

inform future research on the well-being of working donkeys in Botswana and provide further insight into human–donkey relations in Africa.

METHODS

Data collection took place between May and August 2012 in Maun and its surrounding environs. Maun is the fifth largest town in Botswana located in the northwest region. Sampling took place in eight villages and three urban wards (selected randomly from a total of 24 locales) with nine donkeys assessed in each, substratified by key activities (three donkeys each for riding, cart pulling and resting) to ensure a cross-section of donkey roles most commonly performed in Botswana. At each site, the sampling began at the chief's office in the centre of the village or ward and moved outward along the main roadway. The first donkey encountered along this transect was evaluated for inclusion into the sample based on the owners' permission to conduct a welfare assessment. Assessments took approximately one hour. The primary researcher (Geiger) conducted the assessments, and once one was completed, the researcher continued along the transect and recruited donkeys belonging to each of the three activity categories until a total of nine assessments were completed for a particular locale. Four days were spent, on average, in each locale. Local training and in-kind assistance were provided by veterinarians and personnel at the Maun Animal Welfare Society and the Botswana Ministry of Agriculture.

Assessments were based on equine welfare methodologies, particularly of those working in the global south (Carroll and Huntington 1988, Ashley and others 2005, Pritchard and others 2005, Whay and others 2006, Burn and others 2008, Heleski and others 2009, Burn and others 2010, Van Dijk and others 2011, McLean and others 2012, The Brooke 2013) and they included examination of physical and emotional welfare parameters. Body condition score (BCS) was assigned based on the Brooke system (2013) informed by Carroll and Huntington (1988) and Vall and others (2003) for equine field practitioners and community workers to ensure rapid, repeatable and adequate BCS information. Body condition was scored from 1 to 4 as emaciated (score of 1), thin (2), optimal (3) or obese (4) based on muscle and fat distribution and prominence of the spine, hips and ribs. Identification of limb abnormalities involved examining donkey gait where possible and documenting the presence of any swelling of joints, tendons or limbs. Donkey gait was assessed by watching the donkey walk forward for 12 steps with the researcher observing from behind and the side (Pritchard and others 2005). Impeded gaits were observed as a limp, favouring of a certain leg or shortened stride; a natural stride was an even, cadenced walk where all four legs took equal, comfortable steps following in the footsteps of one another (Hodges 1993). Given that the donkeys were not trained to trot on command, lameness assessments were completed at the walk (Pritchard and others 2005, Reix and others 2014). Donkey hooves were examined by picking up the left front hoof (given typical left-sided handling of equines and less likelihood of front-ward kicking) to observe the inner and outer hoof walls. Hoof abnormalities were examined at the superficial level; this included hoof cracks (eg quarter cracks), heel cracks and hoof overgrowth. Other physical assessments included: sore and scar locations documented through close and systematic examination of the body; eye abnormalities recorded for ocular discharge, infection and blindness; nasal abnormalities recorded for discharge, colour and consistency; and coat condition examined for cleanliness and presence of dirt, burrs and/or mange and identified by visual appearance and touch. Physical parameters not measured on account of cultural context, time constraints and local capacity, including flexion test, heart rate, age and dehydration. Health problems were identified and recorded in a field notebook and on a photograph of the donkey via equine body mapping (Van Dijk and others 2011, p.210).

Emotional parameters were observed and recorded via an equine feeling analysis chart (Van Dijk and others 2011, p.208; The Brooke, 2013), and included the eyes (bright or dull based on corneal appearance and degree of eyelid openness), ear position (pointing up, mid-way, down or back), tail (moving or still), neck position (head raised, level or lowered), posture (turned towards or away from owner or assessor) and vocalisation (audible or silent). Further, each donkey in the study was assigned an overall category of happy, neutral or sad as discerned through their interactions with and response to the primary researcher, the owner and the local environment. Specifically, a hand-chin test was administered by the researcher (a stranger) approaching the donkey's shoulder at a 45° angle with hand extended to the donkey's chin; donkey responses were recorded as curiosity (ears forward, interaction via smell, interest in, movement towards researcher), avoidance (ears back, body movement away from researcher), apathetic (relaxed lips, ears/head lowered, disinterest, no movement) or aggressiveness (ears flattened back, attempt to kick or bite, teeth shown and/or wrinkled nostrils). A hand-smell test was also administered by the researcher with a hand extended to the donkey's muzzle, palm out flat and relaxed with donkey responses, then recorded on a basis of 'sniff' or 'no sniff' (based on Pritchard and others 2005, Tadich and others 2008, Weaver 2008, Burn and others 2010, Popescu and Diugan 2013, Dalla Costa and others 2014). Donkey–owner interactions (eg handling, cart driving, riding and so on) were recorded and scored by observing donkey handling by the owner and donkeys' reaction to handling during the approach, assessment and departure once completed. Human handling was characterised as 'calm and gentle' (slow and considerate

handling and interaction paired with leading or whistling commands), 'rough and jerky' (harsh and fractious handling and interaction with pulling, pushing, waving or hitting commands) or 'angry and scolding' (aggressive handling and interaction with intensive yelling, hitting or kicking commands). Donkeys' response to owner handling was observed and recorded as interested and/or curious, responsive and/or indifferent, apathetic, avoidance and fright. Donkeys' response to environmental factors (eg traffic, pedestrians, ground surfaces, other animals, debris and others) was observed throughout the assessment period given fluidity of factors. Environmental response factors, where present, was recorded as 'alert and inquisitive', 'startled and/or fearful' or 'indifferent' and location was identified as rural or urban for contextual purposes.

Relationships among donkey welfare parameters were analysed using the Spearman Rank Order Correlation (r_s), a non-parametric statistical test measuring the strength of association between two ranked (ordinal) variables (Ha and Ha 2012). Correlations found to be significant (P<0.05) may be 'very weak' (r_s=0.00–0.19), 'moderate' (r_s=0.40–0.59), 'strong' (r_s=0.60–0.79) or 'very strong' (r_s=0.80–1.00), thus signifying varying strengths of correlation yet confirming that the correlation does not occur at random. Correlations between physical, emotional, environmental and human interaction variables were examined based on trends emerging from welfare assessments, such as lameness, sore prevalence, body posture, emotional state and owner–donkey interactions. Physical and emotional variables were examined in relation to one another to establish potential connections (eg donkeys expressing fear also exhibit high presence of scars/sores).

RESULTS

The study reveals that the 100 adult working donkeys assessed in and around Maun, Botswana, were afflicted by poor BCSs of two thin (66 per cent), long and cracked hooves (50 per cent), sores on at least two locations on their body (most often on the sides of a donkey's mouth or on their legs) (53 per cent), scars on at least two locations on their body (most often on the legs) (86 per cent), and poor coat conditions (most often dull, matted or dirty) (58 per cent) (Table 1). Results show a significant correlation between hoof condition and limb abnormalities (r_s=0.350, P<0.05, Table 2) and a significant correlation was also found between hoof condition and eye condition (r_s=0.238, P<0.05, Table 2).

The majority of donkeys exhibited an overall sad demeanour (69 per cent, Table 1). Specifically, donkeys displayed unresponsiveness (35 per cent), avoidance (31 per cent), disinterest in hand sniffing (59 per cent), dull

TABLE 1: Prevalence of poor physical and emotional welfare parameters based on 100 donkeys observed in Maun, Botswana, between May and August 2012

| | Gender | | | | |
| | Male | | Female | | |
	Per cent	Raw	Per cent	Raw	Mean
Physical welfare parameter					
Scar prevalence (>2 scar locations per donkey)	86	63	85	23	2.39
Sore prevalence (>2 sore locations per donkey)	15	11	11	3	1.26
Body condition score (recorded as optimal or obese)	63	46	74	20	2.35
Limb abnormalities	12	9	11	3	6
Hoof abnormalities	52	38	44	12	25
Poor coat condition	59	43	37	10	26.5
Nasal discharge	12	9	7	19	14
Ocular discharge	22	16	22	6	11
Emotional welfare parameter					
Reaction to researcher					
Avoidance	39	29	41	11	20
Aggressive	8	6	0	0	3
Apathetic	34	25	37	10	17.5
Curious	18	13	22	6	9.5
Hand-smell test					
Sniffing hand	18	13	19	5	9
Ear position					
Forward facing	33	24	26	7	15.5
Side facing	37	27	26	7	17
Back facing	30	22	48	13	17.5
Tail movement					
Swishing	29	21	22	6	13.5
Vocalisation (sigh, snort, bray)					
Yes	5	4	4	1	2.5

TABLE 2: Summary of statistically significant correlations (physical, emotional, and both) of donkeys observed in Maun, Botswana, between May and August 2012

Physical only	P value <0.05	Emotional only	P value <0.05	Physical and Emotional	P value <0.05
Hoof and eye condition	r_s=0.238	Owner handling and response to stranger	r_s=0.212	Sore location and neck position	r_s=0.197
Limb abnormalities and hoof condition	r_s=0.350	Overall emotional state and hand-sniff test	r_s=0.273	Overall emotional state and abnormal nasal discharge	r_s=0.297
Nose abnormalities and scar prevalence	r_s=0.252	Overall emotional state and ear position	r_s=0.272	Emotional response to owners and scar prevalence	r_s=0.270
		Overall emotional state and neck position	r_s=0.272	Hoof condition and urban and rural location	r_s=−0.211
		Ear position and neck position	r_s=0.222	Urban and rural location and hand-sniff test	r_s=−0.586

facial expression (33 per cent), tail stillness (89 per cent), neck stiffness and/or raised head (13 per cent had this outward indication of being upset) or head hanging low (32 per cent acting visibly withdrawn), and tense ears pointing back or to the side (69 per cent). By contrast, the remaining donkeys (31 per cent) exhibited a happy demeanour of curiosity, interest, alert facial expression, tail swishing, relaxed ears pointed to the side or forward and neck relaxed and/or level (Table 1). A significant correlation was found between owner handling of their donkey and donkey's response to the researcher (r_s=0.212, P<0.05, Table 2). Of the independent emotional parameters tested, those correlating most significantly with overall emotional state (and thus may be most important to observe in subsequent studies) were ear position (r_s=0.272, P<0.05), neck position (r_s=0.272, P<0.05) and level of interest (via hand-sniff test) (r_s=0.273, P<0.05, Table 2).

Physical and emotional welfare parameters examined together reveal that scar prevalence on different locations of the donkeys' bodies was significantly correlated with donkeys' emotional response to their owners (r_s=0.270, P<0.05, Table 2). Additionally, sore prevalence on the donkeys' bodies was found to be significantly correlated with the donkeys' neck position (r_s=0.197, P<0.05, Table 2) and nasal discharge was significantly correlated with the donkeys' overall emotional state (r_s=0.297, P<0.05, Table 2). Physical location of the study areas (urban or rural) was correlated with donkey emotional and physical parameters and displayed significant correlations between the donkeys' response to the hand sniff-test (r_s=−0.586, P<0.05) and donkey hoof condition (r_s=−0.211, P<0.05, Table 2).

DISCUSSION

Welfare assessments and analyses of donkeys in Greater Maun, Botswana, provide exploratory data as to the physical and emotional states experienced by 100 randomly selected donkeys during the time of examination. Results reveal that the majority of donkeys sampled exhibit signs of negative welfare states with key physical parameters, including body condition, hoof condition, scar/sore prevalence and coat condition, and key emotional parameters, including hand-sniff test responses, facial expression, tail and neck position and ear position. The results reveal significant correlations suggesting that care regimens and human handling can impact donkey welfare. For example, poor hoof condition given lack of trimming may cause limb irritation and, in turn, swelling and impeded stride; conversely, limb irritation given physical exertion and overuse may cause poor hoof condition, given impeded stride and unbalanced weight distribution. In another example, poor hoof condition and eye condition may occur simultaneously, given that both require regular trimming and cleaning, respectively, especially when working in harsh and dusty areas (Jones 2001, Weaver 2008, Reix and others 2014).

These results confirm and extend welfare trends experienced by working donkeys elsewhere in Africa and reflect the demanding roles and tasks performed by donkeys within harsh conditions and environs. In Botswana, donkeys play a vital role in human development and well-being, providing an affordable and accessible means of transport in terms of riding and cart pulling, as well as draught power in terms of ploughing and hauling (Fernando and Starkey 1998, Patrick and others 2000). This is especially the case for low-income smallholder farmers whose need for donkey labour is great but whose capacity for adequate care regimens are limited in terms of financial resources, willingness to pay for services and limited access. Donkeys whose bodies are thin and covered with scars and sores, whose coats, hooves and eyes are unattended and whose demeanour is sad and withdrawn thus signify people's desperate need for donkey assistance, yet lapse in care and attentiveness. To illustrate this connection, sore prevalence was significantly correlated with donkeys' neck position suggesting that donkeys with more sores are more likely to lower their neck as an expression of pain, weakness or exhaustion; additionally, scar prevalence was significantly correlated with donkeys' emotional response to

their owners suggesting that donkeys with more scars are more likely to express unresponsiveness, disinterest or avoidance towards their owners when handled. These findings complement welfare research elsewhere in the global south, which reveals that donkeys who suffer physically from lesions, lameness and poor body condition exhibit behaviours of unresponsiveness and apathy such that emotional health may be nurtured or inhibited by physical health, care regimens and interactions with human beings (French 1993, Pritchard and others 2005, Whay and others 2006, Tadich and others 2008, Burn and others 2010, Parker and Yeates 2012, Reix and others 2014). When people are unable to adequately meet their own household's basic needs, they rarely have the capacity or will to address their animal's health in a meaningful way (Pritchard and others 2005).

The results suggest further that the local context and environment can impact donkey welfare. Donkeys' emotional responses to the hand-sniff test was correlated with location, whereby those in urban locales were less responsive than their rural counterparts. Donkeys in urbanised areas may face particular challenges given the lack of grazing opportunities and risk of malnutrition (Pearson and Oussat 2000), increased stimulation from noise and congestion, hazards such as vehicles and refuse, lack of social contact, exhaustion or habituation to people thus stifling curiosity and alertness (Pritchard and others 2005), exposure to hard concrete roads that may cause cracking or uneven wear of donkey hooves, as well as joint damage caused by awkward stride (Bordalai and Nigam 1977, Morgan and others 2007, Reix and others 2014). Thus, welfare assessments of working equines must take into account differential conditions within which work is conducted, as well as the locales in which this effort is exerted.

Finally, the results reveal significant correlations between physical and emotional parameters, offering researchers insights into how both material and cognitive experiences of donkeys may be captured in welfare assessments. Emotional observations provide vital insight into an equine's quality of life, which encompasses physical health, and also cognitive health as experienced through enjoyment or comfort (Webster 2005, Yeates and Main 2008, Parker and Yeates 2012). These emotions experienced can be outwardly displayed through body language, such as signs of happiness with ears forward, bright eyes and licking of lips (Weaver 2008, Van Dijk and others 2011). Emotional well-being of working equines may be nurtured or inhibited as a result of husbandry practices, health issues, environmental conditions and interactions with other donkeys, other animals or human beings (Tadich and others 2008, Parker and Yeates 2012, Popescu and Diugan, 2013, Dalla Costa and others 2014). Animal welfare science features empirically measurable outcomes based on biological conditions. Some scientists have begun to extend research to include examinations of animal quality of life as impacted by animal subjective experiences and affective states (Fraser and others 1997, Desire and others 2002, Boissy and others 2007, Wemelsfelder 2007, Fraser and Weary 2008, Yeates and Main 2008, Mendl and others 2009, Parker and Yeates 2012, Popescu and Diugan 2013, Regan and others 2014).

Moving forward, working equine welfare assessments can be enhanced through specific attention to an animal's emotional and sentient experience (expressed through their body language) of the physical assessment itself, as well as broader handling, training regimens, husbandry practices, working conditions and environmental factors. This study contributes to a holistic welfare assessment so as to appreciate more fully the toll of compromised welfare on an animal's body and spirit (Wemelsfelder 2007).

Researchers wishing to replicate this study should be aware of the following limitations stemming from the local context. As observed by the primary researcher, donkey owners preferred males for work-related tasks based on their perceived strength and inability to foal relative to females, potentially explaining why more male donkeys were represented in the sample than females. Additionally, age was not assessed given the undo stress it caused donkeys with sores around their mouths, the inability of human owners to assist with age estimates and the confirmed inaccuracies of using donkey teeth as determinate of age particularly in adulthood (eg Muylle and others 1999, W/giorgis and others 2013). Finally, the sample is not generalisable to the larger Maun donkey population estimated at 24,000, yet these preliminary results remain insightful and a useful springboard for further research.

CONCLUSION

Physical and emotional welfare of donkeys assessed in and around Maun, Botswana, suggests that donkeys suffer from negative welfare states extending to varying degrees and reflects the difficult conditions within which working equines provide valuable time and energy to the daily lives of the owners, especially smallholder farmers. This exploratory study provides a springboard for future research on donkeys in Botswana and for a preliminary guideline development to improve donkey well-being, husbandry and enhanced labour capacity in relation to people's livelihoods in Botswana and beyond.

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