Donkey welfare assessment in north-east Portugal

Z Cruz[†], M Nóvoa[†], B Leiva[†], D Andrade[†] and M Quaresma*[†‡§]

[†] Association for the Study and Protection of Donkeys (AEPGA), Largo da Igreja, 5225-011 Atenor, Portugal
[‡] Center of Animal and Veterinary Science (CECAV), University of Trás-os-Montes e Alto Douro (UTAD), Quinta de Prados, 5000-801 Vila Real, Portugal
[§] Veterinary Teaching Hospital of UTAD, Quinta de Prados, 5000-801 Vila Real, Portugal
* Contact for correspondence: miguelq@utad.pt

Abstract

The well-documented versatility of donkeys (Equus africanus asinus) means that issues concerning their welfare can vary depending on how they are mainly used and their geographic location. The present study is the first assessment of donkey welfare to be systematically conducted in the Iberian Peninsula. This area is characterised by the coexistence of high levels of mechanisation and industrialisation, and human populations with low levels of formal education, still making use of donkeys in their daily work. This study aims to evaluate the main welfare problems affecting donkeys within this context. The welfare assessment was carried out in accordance with the first level of the AWIN protocol for donkeys. Only 37.6% of the animals evaluated showed all positive indicators, with no physical problem detected while the remaining 62.4% revealed at least one negative health indicator. Body Condition Score (BCS) was one of the main concerns, with around half of the donkeys exhibiting an inadequate body condition. Dental evaluation revealed similarly concerning results, with 62.8% of the animals assessed requiring treatment. Indications of hoof neglect were noted in 39.5% of the animals evaluated with a 9.84% incidence of lameness. Skin problems affected 26.7% of individuals. Only 41% of the animals displayed positive results for all behavioural indicators. Aside from BCS, the most prevalent problems were sub-optimal behaviour, pain reaction to cheek palpation, hoof disease and integument alterations. These issues should be prioritised, both as regards this specific donkey population and the education of their caretakers.

Keywords: animal welfare, AWIN, behaviour, donkey, health, Iberian Peninsula

Introduction

Although not a new concept, awareness and concern for animal welfare has been growing globally (Violin 1990; Blosh 2012; Broom 2014). In the past, worry about animal welfare tended to focus on public health concerns, such as zoonoses, and animals' capacity to be more productive and live longer. However, this started to change, especially within the last decade, as increasingly large numbers of people have begun to regard animals as sentient beings (Le Neindre 2009). Welfare is not a simple concept to define; rather it is a consensus drawn from scientific, ethical, religious, legal and economic opinions, which may differ depending on the part of the world, and is best summarised in the Five Freedoms (Farm Animal Welfare Council [FAWC] 1993). Over the years, four different basic approaches have outlined the foundation of animal welfare: an animal's ability to cope with its environment; an animal's emotions; its experiences; and its expression of natural behaviour (Fraser 2003; Phillips

2009). Some of these ideas are intertwined, such as the fact that an animal's ability to cope with its environment will depend on its nature (Broom 2011).

Donkeys (*Equus africanus asinus*) are powerful, resilient animals and their naturally docile nature enables them to be used in agriculture and transport throughout most of the world (Palo *et al* 2016). Inherently versatile, donkeys' welfare problems vary depending on how they are mainly used and where they live. This leads to wide variation in the prevalence of welfare issues, which is mainly a reflection of the differences between developing countries and the industrialised world. In developing countries the most common problems tend to be low Body Condition Score (BCS), overwork, wounds, and dental and hoof problems, while in industrialised countries obesity and social isolation are more common, although none of these issues are exclusive to any one country or cultural background (Toit *et al* 2008; Burn *et al* 2010; Passantino 2011; Kumar *et al* 2014; Dai *et al* 2016). In Europe, as a contrast to the trend in devel-

oping countries, animal power has been replaced by machinery and, consequently, animals are used less in farming and transportation (Quaresma *et al* 2014; Camillo *et al* 2017). Most of the donkeys in Europe either function as companion animals or are used for other purposes, such as milk production or assisted therapy (Cox *et al* 2010; Borioni *et al* 2012; Mandrá *et al* 2019). The region where this study was conducted has a declining and ageing human population (INE 2019), factors impacting significantly on donkey use. Given the heterogenicity of contexts, establishing a universal protocol for the assessment of welfare is somewhat challenging (Dalla Costa *et al* 2016).

Animal welfare is a multi-disciplinary subject that involves medical, ethological, biological and zootechnical parameters (Fraser & Broom 1997; European Food Safety Authority [EFSA] 2006; Blokhuis *et al* 2019). Several protocols for equid welfare assessment exist, such as the Australian Welfare Protocol, the Assessment Protocol for Horses and the Animal Welfare Indicators for Donkeys and Horses (Australian Horse Industry Council [AHIC] 2011; Minero *et al* 2015a,b), the welfare assessment scoring system for working equids developed by Ahmed *et al* (2016) and the protocol presented by Somerville *et al* (2018). These protocols measure indicators that may be animal-based (ie behaviour, BCS), resource- (ie housing type) or management- (ie exercise time, number of meals per day) based (Viksten *et al* 2016).

Although many welfare assessment protocols have been established for horses, only the AWIN project has focused on developing one specifically for donkeys (AHIC 2011; Minero *et al* 2015b). The AWIN project was undertaken between 2011 and 2015 (AWIN 2015). The aim of this protocol is to assess and improve animal welfare, taking into account the human-animal relationship, management and animal welfare indicators. AWIN protocols have two levels of assessment. The first being a quick and practicable questionnaire while the second is a more in-depth study of welfare, therefore more time-consuming and necessitating more animal handling situations. The AWIN protocol for donkeys is comprised of four welfare principles — good feeding, good housing, good health and appropriate behaviour — which are matched to 12 welfare criteria and over 20 welfare indicators that vary with the level of protocol used. A common problem in attributing a particular indicator to a criterion is that most indicators can belong to a variety of criteria (Minero *et al* 2015a,b).

To the authors' knowledge, this study is the first welfare assessment of donkeys to be systematically conducted in the Iberian Peninsula. This area has a distinctive character, exhibiting high levels of mechanisation and industrialisation in addition to populations with low levels of formal education, who still use donkeys in their daily work. The main aim of this study is to evaluate the predominant issues affecting donkey welfare and what may be done to improve them.

Materials and methods

Data collection

Data collection took place during 2018 and 2019 and was undertaken through a welfare campaign carried out by the Association for the Protection and Study of the Donkey (AEPGA). The campaign aimed to evaluate donkeys' welfare status, assess their main problems, and offer advice to owners where required. The welfare assessment was conducted by three veterinarians, after the researchers had formulated procedures in order to avoid inter-observer variation. Owners and their respective animals met with the technical team at a set location on a pre-arranged date, in each of the villages in question. Data were collected in 35 villages in the municipalities of Miranda do Douro and Vimioso, in north-east Portugal.

The total number of evaluations performed was 505; 261 in 2018 and 244 in 2019. A total of 405 different animals were assessed, with 101 monitored in both years. Regarding animal identification, the following information was collected: name, microchip number or NIN (National Identification Number), sex, age and the village where they lived. The mean ($\pm$ SD) age of the animals at the time of the assessment was 10.4 ($\pm$ 6.92) years, ranging from 1 to 30 years old (Figure 1), with 435 observations in females (26 pregnant), 44 in geldings and 26 in jacks.

Animal handling was performed in compliance with national regulations and European Council Guidelines (Directive 2010/63/EU; European Commission 2010) for protection of animals used for experimental purposes, and respecting Animal Care and Welfare protocols.

Welfare assessment protocol

The welfare assessment was conducted in accordance with the first level of the AWIN protocol for Donkeys (AWIN 2015). As all the animals had been brought by their owners to a specific village for assessment, indicators such as housing were not able to be evaluated. Additionally, various pieces of equipment required for the study, such as a mouth-opener, were not available in both years, meaning that a number of adaptations had to be made to the original AWIN protocol. Occasionally, one or more parameters were not registered due to a particular animal not being co-operative, a lack of time on the part of the owners or a failure to carry out proper recording. Each observation and test were carried out once for each animal.

BCS was used to evaluate general caloric intake, using both visual observation and manual palpation. It was scored from 1 to 5, as described by The Donkey Sanctuary (2018). The presence and distribution of integument alterations was noted and classified into four types: alopecia, skin lesion, deep wound and swelling. These were distributed across nine body areas: muzzle, head, neck, shoulder, back, girth/ribs, hindquarters, legs and hooves/coronets.

Figure 1
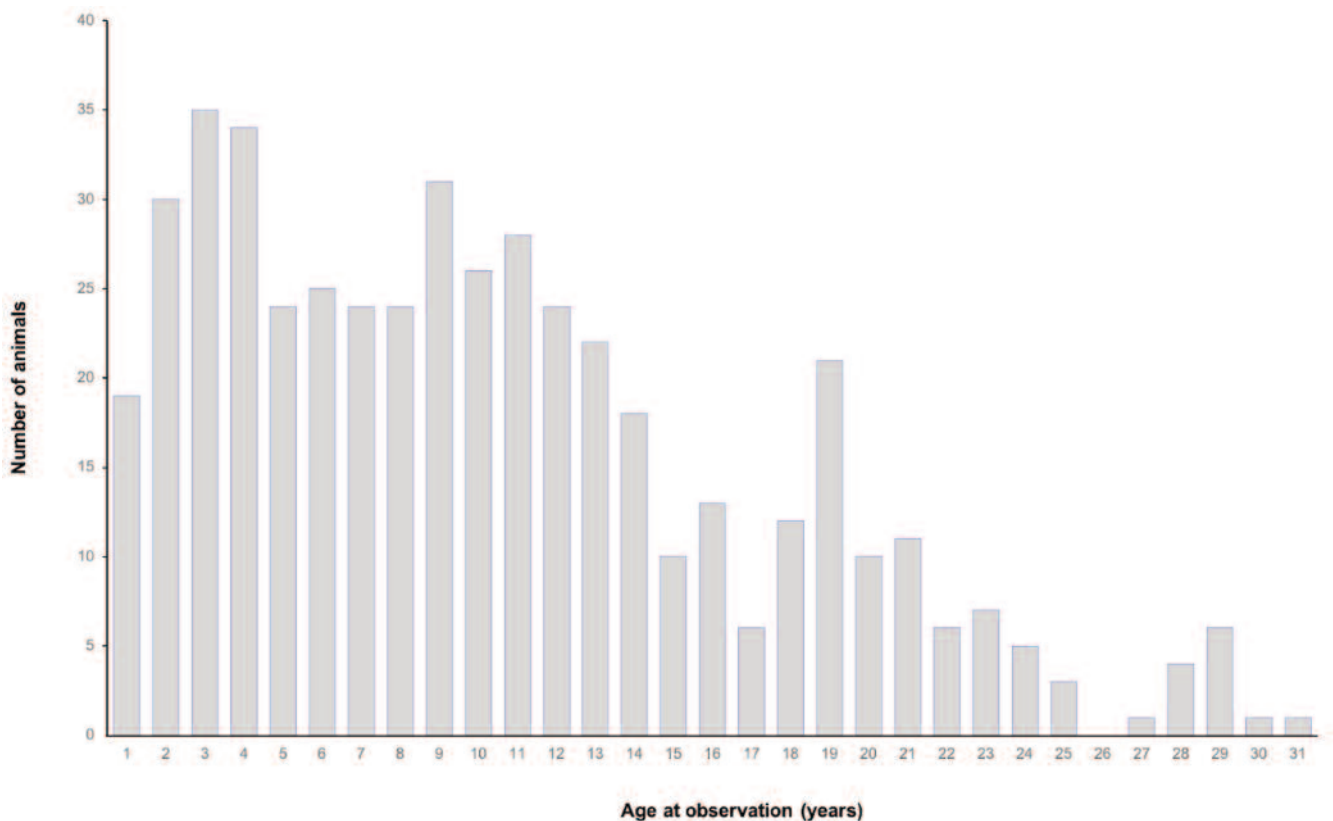
Age distribution of the donkey population evaluated in a welfare assessment study carried out in north-east Portugal during 2018 and 2019, (n = 481).

Swollen joints were visually inspected and further explored via palpation. Lameness was also addressed, firstly through observation of the animal's posture while resting and thereafter by watching the animal walking in a straight line. The owners were also questioned as to whether their animals showed signs of lameness during or after working. Hoof neglect, including presence of defects, such as overgrown hooves or cracks was also noted. Examination of neck and hindquarters was conducted to identify signs of hot branding.

Prolapses were evaluated through visual assessment of the anus and vulva. Discharges of nose, eyes and vulva or penis were scored as absent or present. Hair coat condition was evaluated throughout the entire body, with special care taken not to confuse a changing coat due to a switch in season with a bad coat. Faecal soiling was assessed by observation of the hindlimbs. Oral pain was evaluated via application of pressure to the cheeks against the upper teeth and pressuring the temporomandibular joint. In the second year of research it was possible to check inside the donkeys' mouths and, with regard to the need for intervention, they were classified as D1, when they showed no alterations of immediate concern, D2, when a few small deviations were present and needed correction but were not causing eating disorders or discomfort, and D3, in relation to animals with abnormalities that

had an immediate negative impact on the animal's welfare and needed urgent correction (Easley & Tremaine 2011; The Donkey Sanctuary 2019). Breathing was evaluated prior to handling, in order to prevent stress-induced alterations.

Regarding appropriate behaviour, social interaction was scored based on questioning the owner and performing behavioural tests on-site. The owners were asked about the animal's environment and whether the donkey was in contact with other animals. Human-animal relationships were assessed during the evaluation using three behavioural tests carried out by the veterinarians: (i) avoidance distance; (ii) walking down side; and (iii) tail tuck, as described by Minero *et al* (2015b, 2016).

Data analysis

Collected data were processed in Excel® 2016 (Microsoft Corporation, USA) and statistical analyses performed using the statistics programme IBM SPSS Statistics 26 (IBM, Armonk, NY, USA), whereby the frequency, percentage distribution and variation were calculated, for all gathered welfare parameters. Using univariate analysis of variance, followed by a Bonferroni test, data were tested for associations, such as differences in incidence of any problem between villages and from one year to the other. Differences were considered significant at $P < 0.05$.

Figure 2
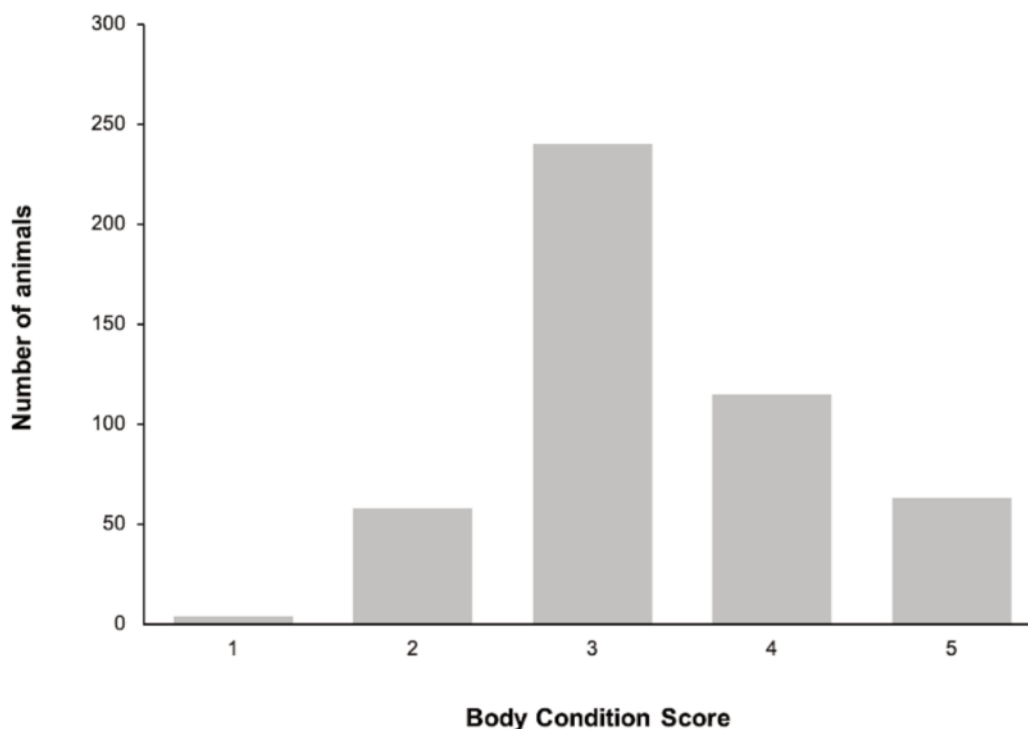
Body Condition Score (BCS) of the population evaluated in a welfare assessment study carried out in north-east Portugal, during 2018 and 2019 in a scale from 1 to 5 (1 = emaciated; 5 = obese). Mean (± SD) BCS was 3.38 (± 0.886), (n = 480).

Table 1   Incidence of health problems affecting donkey welfare in north-east Portugal during 2018 and 2019.

Health problems	N	Positive (%)	Negative (%)
No health problems detected	505	190 (37.6)	315 (62.4)
Lameness	469	427 (91.0)	42 (9.0)
Abnormal breathing	495	493 (99.6)	2 (0.4)
Hair coat condition	501	438 (87.4)	63 (12.6)
Signs of hot branding	493	492 (99.8)	1 (0.2)
Swollen joint	495	479 (96.8)	16 (3.2)
Signs of hoof neglect	491	352 (71.7)	139 (28.3)
Alopecia	505	406 (80.4)	99 (19.6)
Skin lesion	505	468 (92.7)	37 (7.3)
Swelling	505	489 (96.8)	16 (3.2)
Ocular discharge	497	483 (97.2)	14 (2.8)
Nasal discharge	500	492 (98.4)	8 (1.6)
Genital discharge	494	492 (99.6)	2 (0.4)
Faecal soiling	492	466 (94.7)	26 (5.3)
Cheek palpation	432	310 (71.8)	122 (28.2)
Lice	269	229 (85.1)	40 (14.9)
Teeth evaluation	129	48 (37.2)	81 (62.8)

Results

Regarding BCS, 50.2% of the donkeys attained a satisfactory score of 3 (n = 253). Overweight animals were more common than those underweight: 24% (n = 121) of the animals had a BCS of 4 and 13.5% (n = 68) were classified as a 5. Underweight animals represented an overall percentage of 13.1%: 58 animals showed a BCS of 2 and only 4 (0.8%) a BCS of 1 (Figure 2). The BCS of three of the animals was not recorded.

In terms of general health, only 190 evaluations (37.6%) had all-positive indicators, lacking any physical problem or detectable lesions. The remaining 315 (62.4%) had at least one negative indicator regarding health. There was no significant difference ($P > 0.05$) in the presence of any problem in the different villages. The general incidence of these problems can be seen in Table 1.

Dental evaluation produced the most negative results, with 62.8% of evaluated animals needing treatment. It was also the parameter for which fewer animals were checked (141 donkeys), as it was only evaluated in the second year of the study, due to the unavailability of an adequate mouth-opener in the first year. However, cheek palpation pain, also used to evaluate oral health, was checked in 432 donkeys and 39.4% presented negative evaluations, confirming the high incidence of probable mastication problems. However, of the 141 donkeys evaluated in 2019, 41.1% were classified as a D1 (n = 58) and 42.6% animals showed some

Percentages of individual variation in a group of donkeys of different welfare indicators from 2018 to 2019 in north-east Portugal (n = 101).

Welfare indicator	No variation (%)	Improved (%)	Worsened (%)	Not observed in both years (%)
Social contact	93.1	5.9	1.0	0.0
Lameness	68.3	4.0	8.9	18.8
Appropriate behaviour	30.7	5.9	63.4	0.0
Avoidance distance	58.4	5.9	34.7	1.0
Walking down side	27.7	5.9	58.4	7.9
Tail tuck	85.1	5.0	5.9	4.0
Swollen joint	91.1	4.0	1.0	4.0
Signs of hoof neglect	59.4	24.8	10.9	5.0
Integument lesions	66.3	15.8	17.8	0.0
Hair coat condition	80.2	8.9	8.9	2.0
Skin lesion	84.2	9.9	5.9	0.0
Alopecia	66.3	16.8	16.8	0.0
Check palpation pain	46.5	10.9	10.9	31.7

abnormalities and were classified as D2 (n = 60). The remaining 23 donkeys had a more pressing need for dental treatment and were, therefore, classified as D3 (16.3%). Furthermore, when comparing these results with those of cheek palpation, it was observed that, of the 58 donkeys which presented problems, 36 were classified as D2 and 16 as D3. The remaining six were either not evaluated by cheek palpation or had a classification of D1.

After oral problems, the second highest incidence was hoof neglect with signs noted in 39.5% of the animals evaluated. Related to the previous issue, there was a 9.84% incidence of lameness. Lice detection, alopecia and hair coat in bad condition (all skin-related problems in donkeys) were found in more than 10% of donkeys evaluated. The 135 animals (26.7%) affected by some skin problem showed various types of lesions in different parts of the body. Alopecia was the most prevalent problem and was present in 19.6% of the animals. Skin wounds were present in only 7.3% of donkeys (n = 20), with the majority of wounds found in the limbs. Deep wounds were only found in one animal, also located in the limbs. Only one animal had been hot branded.

Although there was a relatively low incidence of swollen joints (n = 16; 3.2%), this still needs to be considered a significant finding due to the high potential for it to impinge greatly on animals' welfare. Faecal deposits on the hind legs, suggestive of diarrhoea, were found in 5.58% of the donkeys. Fourteen animals (2.82%) displayed ocular changes from a total of 497 checked, while nasal discharge was observed in eight animals (1.6%) out of 500 and genital discharge in only two females out of 494. Abnormal breathing was also a rarity, with only two animals affected out of 495, and both related to thermal stress.

In terms of appropriate behaviour, only 41% of the animals presented positive results for all behavioural indicators (n = 501). In the 'walking down side' test, 42.6% gave a negative result while 26.3 and 12.7% were also negative for 'avoidance distance' and 'tail tuck', respectively. The results of the 'walking down side' test were positively correlated with the results obtained in the 'avoidance distance' test ($P = 0.005$) but not with the 'tail tuck' test ($P = 0.704$). The results of the 'avoidance distance' test were highly correlated with both the 'walking down side' test and the 'tail tuck' test ($P < 0.001$). These results point to the observational outcome that multiple behaviour issues are commonly present in donkeys due to inadequate or inappropriate training and socialisation. Of the 501 donkeys monitored, only 18 had no contact with either donkeys or animals of another species.

In terms of individual variation within parameters tested, from 2018 to 2019 the majority showed no variation from one year to the other. The exception being behaviour tests, which worsened significantly in the second year of evaluation ($P < 0.05$), with 63.4% of the donkeys tested in both years obtaining poorer results in at least one of the tests in 2019. There was a clear improvement in signs of hoof neglect in 2019, with 24.8% donkeys improving, and only 10.9% deteriorating ($P < 0.05$). Variations for all parameters are displayed in Table 2.

Discussion

In Europe, animal power has mostly been replaced by mechanical power in agriculture (Quaresma *et al* 2014; Camillo *et al* 2017) unlike in developing countries, where it is more common to find overworked, underweight animals, even though the prevalence of ideal or underweight condition varies between countries or even

cities (Pearson & Ouassat 1996; Burn *et al* 2010; Kumar *et al* 2014; Fsahaye *et al* 2018). This contrast can also be attributed to the different quality and availability of forage in Europe compared to developing countries (Starkey 1998; Björkengren 2016). High parasite levels plus the lack of antihelminthic treatments might also be a factor contributing to low BCS as is observed in some regions of the world (Burden *et al* 2010), although in donkeys there might not be a direct link between parasite load and BCS. A study in Ethiopia showed most working donkeys to be highly infested with gastrointestinal parasites, especially nematodes (Getachew *et al* 2010). Although no precise data were available on deworming in the study animals, the practice is commonly under-taken in the area in question.

Despite the low prevalence of underweight animals in the present study, 62 individuals were classified as such. Prior to making nutritional changes, it is important to identify the primary cause of decreased bodyweight when evaluating an underweight animal, since weight loss can be secondary to other health problems and loss of appetite a common clinical sign (The Donkey Sanctuary 2018). It can occur as a result of many things, including inappropriate dietary management, primary diseases, parasitism, dental problems or even social issues. Even though, to the untrained eye, a thin animal might look less healthy than a fat one, a perception common to many of the owners surveyed, obesity can also lead to serious and life-threatening diseases. Hyperlipidaemia is one of the biggest concerns in the European donkey population, with a mortality rate that can reach 80% (Reid *et al* 1992; Burden *et al* 2011). Increased bodyweight can also cause other problems, such as laminitis (Thiemann & Rickards 2013; The Donkey Sanctuary 2018). Therefore, it is important to recognise the need for greater education on the risks posed to overweight donkeys.

Appropriate feeding is vital for a healthy life and appropriate welfare. When evaluating BCS, results showed that in north-east Portugal, the ideal score (BCS = 3) was the most prevalent and extreme scores were marginal (BCS = 1 or 5). There were, however, relatively more over- compared to underweight animals. This once again confirms obesity as a common problem amongst European domesticated donkeys. Other studies in Europe have also shown the majority of animals to have a healthy body condition, although the tendency towards being over- or underweight can vary depending on the type of work performed by each animal (Dai *et al* 2016, 2017). For instance, dairy donkeys have higher energy requirements due to lactation and breeding needs, causing them to tend towards being under-weight (Galindo *et al* 2017; Raspa *et al* 2019).

A donkey's digestive system is highly adapted to poor nutritional forage, and can digest highly fibrous foods. Consequently, a donkey is able to thrive on 25% less than a horse's daily digestive energy, with a comparable workload or lactation category (Burden 2011; The Donkey Sanctuary

2018). When subjected to less workload and abundant feed, they tend to attain an unhealthily high BCS. It is the owner's responsibility, within his or her's economic means, to provide a healthy and balanced diet, bearing in mind that a failure to provide adequate sustenance will impact the donkey's health and welfare (Davidson & Harris 2003).

The results of the present study are also in accordance with others conducted in both developed and developing countries which show dental disease to be a common problem, affecting both working and non-working equids (Gallagher *et al* 2008; Toit *et al* 2008; Assefa *et al* 2018). Previous studies in this same region showed cheek teeth disorders to be more common than incisor disorders and that enamel over-growths constituted 73% of all cheek teeth alterations (Rodrigues *et al* 2012, 2013). Dental floating is less likely to be performed in poorer countries (Pritchard *et al* 2005; Fsahaye *et al* 2018). However, our results would suggest it is not being performed as often as it should in this region either.

As with all equids, donkeys' teeth erupt constantly throughout their life. Their unique mastication movements should theoretically cause even wearing of the teeth, meaning that they do not overgrow. However, captive equids have a different tooth-wearing pattern compared to wild equids due to contrasting eating routines and feeds. A quick way to detect most dental problems, without much manipulation, is through cheek palpation (Easley & Tremaine 2011). When this was implemented in the study population, approximately two-thirds of the animals reacted painfully. Compared with the results of other studies elsewhere in Europe, there was a higher prevalence of cheek pressure response in Portugal compared to other countries, such as Italy and the UK (Dai *et al* 2016).

When evaluating the musculoskeletal system, it is important to exam the hooves and joints, both of which can be a source of pain and stress (Reed *et al* 2010). One of the most common hoof alterations observed was overgrown hooves, a problem that can lead to lameness, and which had a prevalence in the study population similar to that of other studies. In developing countries, Amante *et al* (2014) found that 12% of working donkeys showed some degree of lameness grade. Kumar *et al* (2014) attained slightly better results, with 10% of animals being lame. A lower prevalence of lameness was found by Tesfaye *et al* (2016) and even better results were found by Fsahaye *et al* (2018), with only 4.4% of the donkeys being lame. These results do not differ much from those found in Europe. Cox *et al* (2010) found that British donkeys had a lameness prevalence of 10%. When lameness is detected, it is important to locate the source of the problem and take appropriate measures to correct or minimise it, since it is a problem that can severely affect the donkeys' welfare. It is advisable that the donkeys in the population observed have their hooves checked and trimmed more often and in accordance with the needs of each individual donkey, in order to mitigate the risk of discomfort.

When assessing integument, it is important to look for deep or superficial injuries, as these can be suggestive of trauma or provide information on the amount of work the animal is

doing and whether or not the equipment is appropriate (Garrett 2018). Hair coat condition can also aid the evaluation of the animals' general health, as it loses quality when an animal is sick or has poor nutrition. Unnecessarily painful procedures, such as hot branding animals instead of freeze branding them (Schwartzkopf-Geswein *et al* 1997), also reflects negatively on animals' welfare (Minero *et al* 2015a). Alopecia was the most common integumental defect, found in almost 20% of the donkeys, with the highest prevalence in the back, girth and ribs.

The second most common integument problem found was wound presence, predominantly on the legs. Although all skin alterations indicate diminished welfare, not all injuries have the same severity (Lombard *et al* 2010). Diverging results are found in developing countries where wounds accounted for 80% of all integument alterations (Abutarbush *et al* 2014). While there are local frequency differences, the back is the most common site for wounds, which can occur as a result of inappropriate harnessing, long hours of work and excessive loads (McLean *et al* 2012; Melkam 2017). The present study was performed during a period of high lice incidence in this region. Although only 15 animals were diagnosed with these ectoparasites, it is likely that many others might have had them, which may at least partially explain the high prevalence of alopecia. Other possible causes, such as deficient harnessing, should also be considered and corrected where appropriate.

Signs of disorders such as discharges, prolapses or abnormal breathing were uncommon. Results were better than those found in other studies. In Italy and the UK, ocular discharge showed a prevalence of 16% (Dai *et al* 2016); ocular problems had a similar incidence, both in Chile (10%) and Ethiopia (17%) (Tadich *et al* 2008; Fsahaye *et al* 2018, respectively). Neither ocular nor nasal discharges are pathognomonic signs for any diseases, as they can be present in a multitude of different instances, both locally and more generalised (The Donkey Sanctuary 1999, 2019; The Brooke 2013a). Therefore, when observed, a more thorough investigation should be carried out.

In this welfare assessment study, only two individuals showed signs of thermal stress. This may occur in conditions of either extreme heat or extreme cold. When an animal experiences heat stress, its respiratory rate is increased and other signs may be visible, such as flared nostrils, apathy and sweating. In the case of cold stress, low respiratory rate, apathy and shivering are common signs (Minero *et al* 2015b). Although the results from this study are not particularly concerning in terms of thermal stress, it nevertheless still poses a serious problem and can easily be overlooked in donkeys.

An interesting observation was that most of the animals examined were female while proportionately more geldings were evaluated than stallions. Similar results in sex distribution were found in other studies performed in Europe (Quaresma *et al* 2014; Dai *et al* 2016). This gender tendency can be explained by different behavioural traits. Aggression is more likely to be found in

stallions than geldings (The Donkey Sanctuary 2018). However, in studies performed in developing countries, the majority of the donkeys were stallions (Kumar *et al* 2014; Björkengren 2016; Tesfaye *et al* 2016; Fsahaye *et al* 2018), highlighting different regional preferences. As in the present study, a wide age variation is found in different parts of the world (Kumar *et al* 2014; Dai *et al* 2016). However, the vast majority of individuals were also found to be between the ages of three and 15 (McLean *et al* 2012; Tesfaye *et al* 2016; Fsahaye *et al* 2018), when donkeys are more suitable for working and reproducing (Quaresma *et al* 2005; Kumar *et al* 2014).

Assessment of animal behaviour is an important component of any welfare evaluation (Broom 1986, 2014). The animal-human tests, such as the ones performed in the present study — 'avoidance distance', 'walking down side' and 'tail tuck' — are aimed at recognising the quality of the relationship between the animal, its owner and other humans. When an animal makes a great effort to avoid an object or situation, it can be due to a bad previous experience and may indicate poor welfare (Mills & Riezebos 2005; Broom 2014). The way an animal is treated impacts directly on its welfare and therefore evaluation of human-animal interactions is of upmost importance (Wemelsfelder *et al* 2000; Luna & Tadich 2019). The overall results fall between the results found in donkeys from developing countries, in which the negative responses had a higher prevalence than here (Kumar *et al* 2014) and those previously found in Europe (Dai *et al* 2016). Animal welfare is directly linked with the way owners value animal life and their perception of their animals' feelings and experiences. With regards to the 'avoidance test', various authors explained this behaviour as a reflection of poor handling by the owner (Swann 2006). However, it is important to recognise that tests were performed by someone unknown to the animals, which might cause a negative reaction (Popescu & Diugan 2013). There is a need for owners to be better educated, to make them aware of more appropriate ways to interact with their donkeys.

Around one donkey out of every twelve observed did not come into contact with other animals. Social contact plays an important role in welfare evaluation, as donkeys are by their very nature social beings (Burden & Thieman 2015). The absence of social interaction can be a contributing factor for poor welfare, as all animals should live in contact with other animals, preferably of the same species (Farm Animal Welfare Council [FAWC] 1993; Beaver 2019). The World Health Organisation explains health as being the state of complete physical, mental and social soundness and not merely the absence of disease or injury. This comes very close to the general concept of animal welfare (European Commission [EC] 2000).

Changes in animals' routines can be made to upgrade their comfort and reduce the likelihood of injury or pain. Carrying lighter burdens, resting in areas of shade or wearing equipment that properly fits their bodies are all

measures that not only improve animals' well-being but also help them to work more efficiently. Usually, the purpose of a veterinary consultation is to treat diseases. When doing so, it is important for veterinarians to avoid stressful situations and to tailor their approach to each specific individual. It is important to understand that the welfare of equids is linked to the livelihoods of their owners and to the veterinarian and other animal expert services available in the area (The Brooke 2013b; Luna & Tadich 2019).

In future studies it would also be interesting to evaluate more criteria related to housing, such as shelter dimensions, clean bedding and access to clean water, considering also resource-based criteria instead of solely animal-based criteria. Furthermore, it is vital to emphasise the importance of evaluating all welfare parameters in every animal, this being one of the flaws identified in the present study. Participation in the present study was voluntary and the animals were observed away from their housing, so it is to be expected that the welfare of the animals evaluated would be better than those not presented. Better understanding of donkey welfare can help improve the lives of the donkeys, not simply within the study area but also in other parts of the world. This can be done by educating owners about basic daily needs and procedures, as well as the importance of dental care and hoof trimming. Teaching owners to identify signs of illness and pain can also help to prevent escalation of an existing problem. These are some practical ways to improve animal welfare.

Animal welfare implications

The animals' BCS was the main concern, with almost 50% of the donkeys inspected displaying an inadequate body condition in both years. This can cause various health problems that will reduce quality of life as well as increasing the possibility of life-threatening conditions. Although low BCS remains a major welfare problem in developing countries, in Portugal animals tended to be overweight. Aside from BCS, the most prevalent problems were sub-optimal behaviour, probably related to inappropriate handling, pain reaction to cheek palpation, hoof disease and integument alterations. These issues should be more closely addressed in managing the healthcare of the population and in improving the education of owners in order to encourage more positive human-animal interactions.

Donkey welfare in this population appears in a state of flux, with an incidence of problems lying somewhere between that of developing and industrialised countries. Although slightly better results were seen in 2019, the conclusion that welfare improved from one year to the other cannot be assumed and there is clearly room for improvement. It would be interesting to continue welfare studies in the same population, with the identical animals to better evaluate the development of welfare in the region over time.

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