

## **Assessing quality of life in older horses**

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### **Abstract**

The equine population is ageing and equine geriatric medicine is a growing field. With increasing horse age, provision of several preventive health care measures and the frequency of veterinary attention are reduced. Moreover, owners appear to under-recognise several prevalent age-associated diseases, often considering clinical signs as normal signs of ageing. There is a high burden of chronic disease within the geriatric equine population, which may have a detrimental effect on quality of life. In the absence of a validated equine quality of life measurement scale, this review aims to highlight factors and domains that should be evaluated in a comprehensive assessment of the quality of life in older horses. The potential benefits of assessing quality of life as a routine component of veterinary care for older horses are also summarised.

## Assessing quality of life in older horses

**Key words:** activities of daily living; equine; geriatric; health-related quality of life; welfare

### Abstract

The equine population is ageing and equine geriatric medicine is a growing field. With increasing horse age, both the frequency of veterinary attention and the provision of several preventive health care measures are reduced. Moreover, owners appear to under-recognise several prevalent age-associated diseases, often considering clinical signs as normal signs of ageing. There is a high burden of chronic disease within the geriatric equine population, which may have a detrimental effect on quality of life. In the absence of a validated equine quality of life measurement scale, this review aims to highlight factors and domains that should be evaluated in a comprehensive assessment of the quality of life in older horses. The potential benefits of assessing quality of life as a routine component of veterinary care for older horses are also summarised.

### Introduction

As is the case in the human population (ONS 2019), through increasing life expectancy, the equine population is ageing (Welsh *et al.* 2016), comprising a considerable proportion (28-34%) of geriatric animals (McGowan *et al.* 2010; Ireland *et al.* 2011a; Bushell and Murray 2016). Similar to the situation described for the human population (Haywood *et al.* 2005), older horses represent a very diverse sector of the equine population and this diversity is reflected across age, health status and health care requirements. As horses get older, owners frequently make considerable changes to their management practices, including diet and exercise (Ireland *et al.* 2011a). However, there is limited available information regarding the reasons for, and impact of, horse owners making these changes. Weight management and use of supplements were reported to be the most common aspects of daily management that owners changed as their horse aged (Bushell and Murray 2016).

Dietary alterations such as the increased use of hay replacers and complete chopped fibre or mash feeds are likely to be beneficial in older horses with advanced dental disease (Ireland *et al.* 2011a). Whereas the widespread use of in-feed supplements, despite a paucity of evidence regarding their oral bioavailability and efficacy, may represent an area for improved owner education (Bushell and Murray 2016). Furthermore, with increasing horse age, the frequency of routine veterinary attention and several preventive health care measures, including farrier care and vaccination, are reduced (Mellor *et al.* 2001; McGowan *et al.* 2010; Ireland *et al.* 2011b).

The term “quality of life” (QoL) is used extensively in human and veterinary healthcare. Despite this, there is a lack of consistency regarding its definition in the literature and in veterinary medicine, QoL is often considered synonymously with welfare (Broom 2007; Taylor and Mills 2007). However, QoL is a broader concept with a slightly different emphasis to welfare, encompassing physical health, psychological state (including negative and positive affective states) (Taylor and Mills 2007) and “general enjoyment of life” (Broom 2007). Although the vast majority of owners consider their older horses to have good/excellent QoL, increasing horse age is associated with reduced owner QoL rating (Ireland *et al.* 2011c).

### **Assessing quality of life**

Quality of life assessment is well established in human medicine, with a large number of published generic and disease-specific measurement scales (Bowling 2001). For example, different QoL assessments have been validated for monitoring the effect of pain management (Skevington *et al.* 2001) and chronic disease in human patients (Sprangers *et al.* 2000; Osborne *et al.* 2003; Öztürk *et al.* 2011) and used to evaluate age-related changes in QoL (Blane *et al.* 2004; Wiggins *et al.* 2004).

There are numerous applications beyond evaluating the status of an individual patient. In a practice setting, QoL instruments are used as an adjunct to more objective clinical indicators for evaluating the effectiveness of medical treatments (Higgenson and Carr 2001). For example, a simple QoL assessment using linear visual analogue scales (VAS) to measure eight variables including appetite,

dyspnoea, feelings of well-being, and social activity, was evaluated in geriatric patients with chronic obstructive pulmonary disease (Katsura *et al.* 2013). When used in an outpatient clinic, the QoL scale was reported to correlate well with more complex health-related and respiratory specific QoL instruments and to improve alongside improvement in several clinical parameters following a pulmonary rehabilitation programme (Katsura *et al.* 2013). In pharmaceutical development, QoL assessment is increasingly utilised as an outcome measure in clinical trials and drug licencing applications (Chassany *et al.* 2002). QoL measures are also used in veterinary pharmaceutical development, as well as randomised controlled clinical trials in small animal medicine, such as owner completion of a cardiac-specific questionnaire to measure QoL in a trial comparing two diuretics in dogs with congestive heart failure (Peddle *et al.* 2012).

In human medicine, the gold standard QoL assessment instrument is a validated questionnaire with well-established reliability (Chassany *et al.* 2002; Varricchio and Estwing Ferrans 2010). Ideally information about an individual's perspective or subjective feelings would be gathered directly from that individual, for example using patient self-assessment questionnaires. However, in veterinary medicine, this information must necessarily be obtained from human observers, interpreting an animal's behaviour or physiological characteristics in order to assess QoL indirectly. Generic QoL instruments using owner questionnaires have been developed in small animal medicine (Wojciechowska *et al.* 2005; Mullan and Main 2007; Bijsmans *et al.* 2016). Table 1 shows some of the World Health Organization (WHO) QoL domains and facets, together with examples of how these could be adapted for use in an equine veterinary setting.

### **Health-related quality of life**

Ageing is characterised by an increasing susceptibility to the development of multiple chronic diseases (Fabbri *et al.* 2015). Geriatric cats and dogs rarely have a single disease, but instead have a unique combination of diseases together with varying degrees of organ dysfunction (Fortney 2004). In human medicine, more than 55% of elderly people have multi-morbidity (defined as the

coexistence of two or more chronic diseases), which is associated with poor QoL (Marengoni *et al.* 2011).

Multi-morbidity is also highly prevalent in older horses and there is a high burden of chronic disease within the geriatric equine population (Ireland *et al.* 2012a; Welsh *et al.* 2016). For example, pituitary *pars intermedia* dysfunction (PPID; Figure 1) was a co-morbidity in nearly half of horses with more than one chronic disease (Welsh *et al.* 2016). Although the study population included animals of all ages, cases of multi-morbidity frequently involved conditions that are prevalent in older horses: 26% of horses diagnosed with osteoarthritis also had a history of laminitis, and 8% of laminitis cases had severe equine asthma as a co-morbidity (previously recurrent airway obstruction (RAO)) (Welsh *et al.* 2016). Where therapeutic and management recommendations for concurrent conditions are potentially contradictory, the treatment of multi-morbidities in older horses may be particularly challenging.

Owners frequently consider many clinical signs of disease as benign changes associated with normal ageing (Ireland *et al.* 2012b), meaning that some chronic diseases may be unrecognised by owners. While owners report a high degree of confidence in their ability to recognise obesity and weight loss (Bushell and Murray 2016), owner underestimation of body condition in older horses is common (Ireland *et al.* 2012b). Additionally, clinical signs associated with some highly prevalent conditions in geriatric horses, including dental disease, ocular pathology and cardiac abnormalities, may not be apparent to owners based on external observations of their horse (Ireland *et al.* 2012a). Therefore the health status of an older horse will be an important determinant of its QoL, and inevitably, health is likely to be the primary focus of veterinary assessments.

While veterinary surgeons are well placed to assess the health-related QoL (HRQoL) of their patients, it is important to recognise that this includes more than a thorough clinical examination. Assessment of person's health status will primarily encompass evaluation of the impact of specific clinical signs or physical limitations resulting from disease, such as pain or fatigue, whereas measures of HRQoL are broader, including mental and social well-being (Haywood *et al.* 2005).

Questionnaires for assessment of HRQoL have been developed for use in dogs (Reid *et al.* 2013) and cats (Freeman *et al.* 2016; Noble *et al.* 2019). In addition to physical domains, these instruments include domains that assess mental well-being such as distress, anxiety (Reid *et al.* 2013) and emotions (Freeman *et al.* 2016; Noble *et al.* 2019), and also social functioning, as determined based on the animal's engagement with the owner/carer and their environment (Freeman *et al.* 2016). Several specific instruments have been described in small animal medicine for assessment of HRQoL in a range of conditions including canine chronic pain (Wiseman-Orr *et al.* 2004), idiopathic epilepsy (Wessmann *et al.* 2014) and atopic dermatitis (Favrot *et al.* 2010) and feline diabetes mellitus (Niessen *et al.* 2010) and cardiac disease (Freeman *et al.* 2012). Since welfare requirements of horses differ from those of small animals, direct extrapolation of these published tools is not possible; however collectively they provide a valuable resource from which to derive some domains that should be included in equine HRQoL assessment.

### **Activities of daily living and social interaction**

While poor health has been used as a proxy measure of QoL in human geriatric medicine, it is increasingly recognised that health represents only one component. Patients with significant medical problems do not necessarily have QoL ratings proportionate with their health (Carr and Higginson 2001). This is important since simply equating poor health with poor QoL neglects people's ability to adapt and overcome or cope with illness, and suffering from chronic disease may not necessarily lead to poor QoL. Therefore many of the health and utility tools widely used to measure QoL in geriatric patients include a large component devoted to activities of daily living (ADL), mental health and social interactions (Haywood *et al.* 2005), which are considered more frequently by older people as determinants of their QoL.

Similarly, ADL are important for older horses: ADL such as level of activity when turned out at pasture or lying down when stabled or resting (Figure 2), were significantly associated with increased risk of mortality in older horses where owners reported some degree of compromise or

impairment (Ireland *et al.* 2011d). Importantly, owners are readily able to assess ADL, and consider these to be major determinants of QoL. Several management factors related to ADL and social interactions (such as nutrition, comfort, company of other horses, regular field turnout and human contact), were more frequently considered by owners to influence QoL of older horses than health-related factors such as preventive health care and effective analgesia (Ireland *et al.* 2011c). Using PPID and osteoarthritis, Table 2 summarises some potential components of HRQoL assessment in animals diagnosed with a chronic disease/disorder. In addition to taking a thorough history and performing a comprehensive clinical examination, HRQoL assessment should include disease-specific clinical assessments as well as evaluation of general health (both physical and mental), the horse's environment and its ability to perform key (Table 2).

### **Individualised quality of life assessment**

The major challenge in measuring QoL lies in its uniqueness to individuals. In human medicine, there is concern that many of the existing assessment tools fail to take account of this by imposing standardised models of QoL, with preselected domains. Therefore, there is growing awareness of the importance of individualised assessments, where patients identify key life activities relating to their own QoL. Early examples of this are the Subjective Domains of Quality of Life Measure (SDQLM) (Bar-On and Amir 1993) and the Schedule for the Evaluation of Individual Quality of Life – Direct Weighting (SEIQoL-DW) (O'Boyle *et al.* 1993), where respondents identify areas of importance in their life, rate these areas on an individually generated scale and rank their importance. The SEIQoL-DW has been reported to be a feasible and valid QoL instrument (Wettergren *et al.* 2009), which is of particular use for exploring determinants that contribute to individuals' QoL (Moons *et al.* 2004). This method has been successfully adapted for owner-perceived QoL assessment in dogs, where owners of both healthy dogs and those with spinal cord injuries volunteered the same broad domains of mobility, play or mental stimulation, health and companionship (Budke *et al.* 2008), which could be readily be adapted to apply to older horses (Figure 3).

## **Equine quality of life assessment**

While it is an area of on-going research, no validated QoL instrument is currently available in equine medicine. However, various equine welfare assessment tools are available, focussing primarily on environmental assessment or health indicators, including body condition score, hydration status, cardiorespiratory parameters, and lameness (reviewed by Hockenull and Whay 2014) or pain scales (reviewed by Van Loon and Van Dierendonck 2018). Additionally, there is growing interest in behavioural ethograms and evaluation of horses' emotions (Henry *et al.* 2017). Independently these tools cannot provide a comprehensive QoL assessment, however they provide a useful framework for selecting domains to include when assessing QoL in older horses.

**QoL assessment undertaken by a veterinary surgeon** is likely to represent the most practical option, typically requiring less time and effort to complete compared to owner questionnaires. However, a veterinary examination is unlikely to result in a comprehensive, reliable assessment of the horse's QoL in its normal environment, performing a full range of activities. On the other hand, owners have a long-term perspective and considerably greater knowledge of their horse's history and normal daily activities, and more awareness of how these matter from the horse's perspective (Yeates and Main 2009). Therefore, owners are potentially better placed to assess the horse's mental well-being, making them useful proxies for QoL assessment.

Together with a thorough veterinary examination, asking owners to identify QoL domains that they consider to be important for their older horse could be a useful and practical way to inform a tailored assessment for rating and monitoring QoL in that individual. Using these owner-reported factors to design a small series of single-item questions could provide a valid, rapid assessment of QoL, which is feasible to use in a clinical setting (McGowan and Ireland 2016; **Figure 3**).

## **Value of assessing quality of life**

Formal QoL assessment in older horses has an array of benefits. Including owners in assessment of their horse's QoL can increase their level of reflection, encouraging them to consider the impact of



management, health care and health problems. It can facilitate communication around geriatric health concerns, such as weight management or provision of analgesia, and allow owners to identify problems or possible improvements (Yeates and Main 2009).

QoL evaluations can help inform management and treatment options, and can help to prioritise therapeutic interventions where animals have multiple concurrent conditions. It plays a major role in owner decision-making, with owners of geriatric horses ranking QoL following treatment as the most important factor when considering potential treatment options for a severe illness or injury (Ireland *et al.* 2011). QoL assessment can also be utilised in evaluating response to treatment, where it may be a more important measure of success than prolongation of life.

Decreased scores for QoL measures may also help to identify detrimental side-effects of treatment.

QoL ratings can be useful prognostic indicators: QoL has been reported to be highly predictive of outcome in human geriatric patients with conditions such as myeloid leukaemia (Deschler *et al.* 2013). Several QoL factors were associated with increased risk of mortality in geriatric horses (Ireland *et al.* 2011c). QoL assessment plays a vital role in decision-making for euthanasia, as compromised QoL is a primary reason for equine euthanasia (Preshaw *et al.* 2018). Poor QoL was reported to be a major factor in euthanasia decisions for geriatric horses by 34% of owners, particularly for horses with lameness or chronic diseases where veterinary advice was less frequently identified as influential in the decision-making process compared to other health problems such as colic and acute injury (Ireland *et al.* 2011d). Having a measurable way of demonstrating compromised QoL exists may help to reduce owner distress (McGowan *et al.* 2012) or feelings of guilt surrounding this difficult decision.

## Conclusions

Older horses may have different welfare issues and factors influencing their QoL compared to younger animals. Currently, there is no validated instrument for assessing equine QoL, in animals of any age. However, there is a wealth of resources from human and small animal medicine to help

inform what domains should be included in QoL assessment for older horses. Veterinary surgeons should be proactive in discussing QoL with owners, and a comprehensive assessment of QoL in older horses should involve both the owner/carer and the veterinary surgeon. QoL assessment including evaluation of health-related factors, activities of daily living and mental well-being is beneficial for informing decision-making regarding management, health care and euthanasia.

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**Key points:**

Quality of life assessment in older horses should be a 'team effort', involving both veterinary and owner/carer appraisal.

Although a validated equine quality of life assessment tool is not currently available, there is a wealth of available resources from human and small animal medicine, as well as several equine welfare assessment tools and pain scales, which can be used to inform quality of life evaluation in older horses.

Multi-morbidity is common in older horses, resulting in poorer health-related quality of life, but activities of daily living are also important factors to consider in any assessment, ideally tailored to the individual animal.

Quality of life ratings can inform management and treatment decisions and provide a useful outcome measure of response to therapeutic interventions.

Poor quality of life ratings are predictive for mortality in older horses, and having a measurable way to demonstrate compromised quality of life can aid decision-making around euthanasia.

**Table legends**

**Table 1:** Quality of life (QoL) domains used in human health care with suggested adaptations for use in equine QoL assessment.

**Table 2:** Summary of possible components of veterinary assessment of health-related quality of life (HRQoL), in animals diagnosed with conditions prevalent in aged horses, using pituitary pars intermedia dysfunction (PPID) and osteoarthritis as examples.

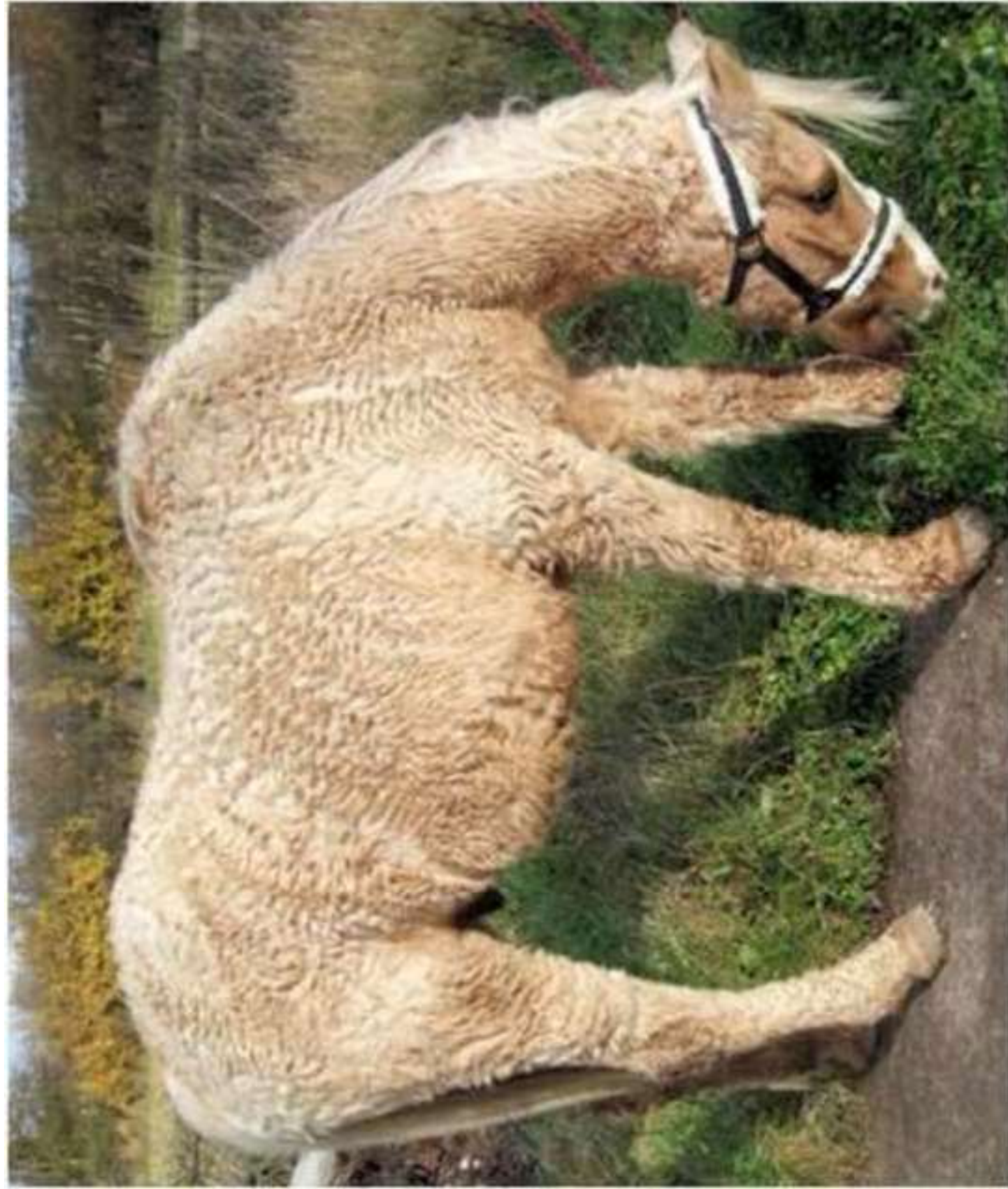
**Figure legends**

**Figure 1:** Aged pony with marked hypertrichosis, consistent with advanced PPID, which is a common co-morbidity in older animals affected by other chronic conditions.



**Figure 2:** Severe tarsal pathology in an elderly mare, which the owner reported to have had bilateral hind limb stiffness for a prolonged period prior to an increase in the frequency and duration with which she was observed to lie down in the field.

**Figure 3:** Example of a possible approach to individualised quality of life (QoL) assessment for an older horse. Likert-style question responses are shown here, which tend to be more sensitive to change than binary response options. However, depending on the specific factors to be assessed, other options such as visual analogue scales (VAS) may be useful.





**Figure 3:** Example of a possible approach to individualised quality of life (QoL) assessment for an older horse. Likert-style question responses are shown here, which tend to be more sensitive to change than binary response options. However, depending on the specific factors to be assessed, other options such as visual analogue scales (VAS) may be useful.

### Ask owner to nominate factors they consider important to their horse's QoL

- **Owner-reported factors important to horse:**
  - companionship of other horses in same herd when turned out at pasture
  - able to do a variety of easy exercise regularly
  - ability to move freely without pain

### Devise scale or other scoring method for each factor

- **Equine companionship:**
  - How much does [horse name] interact with other horses?
    - Not at all    A little    Quite often    Very often    Always
- **Exercise:**
  - How would you rate [horse name]'s capacity for light ridden exercise?
    - Very poor    Poor    Neither poor nor good    Good    Very good
- **Pain-free mobility:**
  - To what extent do you feel that pain limits [horse name]'s ability to move around during his/her normal daily activities?
    - Not at all    A little    Moderately    Very much    An extreme amount
- Scores can be weighted dependent on the degree of importance that the owner assigns to each factor being evaluated
- Discuss with the owner an appropriate frequency with which they should rate their nominated factors for their horse
- Ask owners to record their ratings to facilitate monitoring
- Incorporate owner scores within future health-related quality of life (HRQoL) assessments

**Table 1:** Quality of life (QoL) domains used in human health care with suggested adaptations for use in equine QoL assessment.

<b>#WHO quality of life domain</b>	<b>Examples of facets incorporated within domain</b>	<b>Possible adaptation for assessment in the equine veterinary setting</b>
Physical health	Pain and discomfort	Pain scores (see Van Loon and Van Dierendonck 2018) Lameness scales Owner assessment of level of discomfort
	Energy and fatigue	Lethargy Exercise intolerance
	Sleep and rest	Owner-observed changes in sleep patterns
Psychological	Negative feelings	Indicators of stress or fear Aggressiveness
	Positive feelings	Interest in surroundings Responsiveness to attention from owner/carer
Level of independence	Mobility	Able to ambulate Able to stand after rolling/lying down
	Activities of daily living	Able to ambulate Appetite and ability to masticate Grooming Thermoregulation
	Dependence on medicinal substances and medical aids	Evaluation of prescribed and alternative therapies
	Work capacity	Current discipline and level of exercise Exercise intolerance
Social relations	Personal relationships	Interaction with other horses Interaction with handlers
Environment	Freedom, physical safety and security	Suitable field and/or stable environment Appropriate herd mates
	Health and social care: accessibility and quality	Provision of preventive health care

#World Health Organisation (WHO) QoL domains included in the WHOQOL-100; available at: <https://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/index4.html>

Table 2: Summary of possible components of veterinary assessment of health-related quality of life (HRQoL), in animals diagnosed with conditions prevalent in aged horses, using pituitary pars intermedia dysfunction (PPID) and osteoarthritis as examples

Disease/disorder	Pituitary <i>pars intermedia</i> dysfunction (PPID)	Osteoarthritis
<b>Clinical assessment</b>	<p><b>Veterinary examination</b></p> <ul style="list-style-type: none"> <li>▪ Blood sample for basal ACTH assay and investigation of insulin dysregulation</li> <li>▪ Hoof exam for signs of lamellar pathology (e.g. divergent hoof growth rings, widened white lines etc.)</li> <li>▪ Evaluation of body condition and muscle atrophy</li> </ul> <p><b>Owner-reported factors relevant to HRQoL</b></p> <ul style="list-style-type: none"> <li>▪ History of delayed hair coat shedding and/or regional or generalised hypertrichosis</li> <li>▪ Regional or generalised hyperhidrosis</li> </ul>	<p><b>Veterinary examination</b></p> <ul style="list-style-type: none"> <li>▪ Palpation of limbs</li> <li>▪ Assessment of joint range of motion: subjective and/or objective (e.g. use of goniometry (Ireland <i>et al.</i> 2012a))</li> <li>▪ Lameness evaluation: subjective, using a lameness scale +/- objective (e.g. use of a motion analysis system)</li> </ul> <p><b>Owner-reported factors relevant to HRQoL</b></p> <ul style="list-style-type: none"> <li>▪ Joint stiffness</li> <li>▪ Lameness, abnormal gait or short strides</li> <li>▪ Difficulty lifting limb(s) or maintaining limb position when picking out feet</li> </ul>
<b>Examples of QoL domains and activities of daily living (ADL) that could be assessed</b>	<ul style="list-style-type: none"> <li>▪ General health <ul style="list-style-type: none"> <li>◆ owner perception of, or satisfaction with, horse's overall health</li> <li>◆ regular veterinary examination to identify concurrent disease(s)</li> </ul> </li> <li>▪ Energy/fatigue <ul style="list-style-type: none"> <li>◆ exercise intolerance</li> <li>◆ lethargy</li> </ul> </li> <li>▪ Mental health <ul style="list-style-type: none"> <li>◆ depression or behaviour changes</li> </ul> </li> <li>▪ Emotional behaviour <ul style="list-style-type: none"> <li>◆ owner perception of general 'happiness'</li> </ul> </li> <li>▪ Eating <ul style="list-style-type: none"> <li>◆ appetite</li> <li>◆ quidding or other signs of dysmastication or dental disease</li> </ul> </li> <li>▪ Dependence on medicinal substances <ul style="list-style-type: none"> <li>◆ monitoring response to treatment</li> <li>◆ use of any complementary or alternative therapies and supplements</li> </ul> </li> <li>▪ Home environment <ul style="list-style-type: none"> <li>◆ appropriate pasture turnout, particularly for cases with a history of laminitis or concurrent insulin dysregulation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ General health <ul style="list-style-type: none"> <li>◆ owner perception of, or satisfaction with, horse's overall health</li> <li>◆ regular veterinary examination to identify concurrent disease(s)</li> </ul> </li> <li>▪ Pain/discomfort <ul style="list-style-type: none"> <li>◆ lameness and pain scores</li> </ul> </li> <li>▪ Mobility <ul style="list-style-type: none"> <li>◆ ambulation</li> <li>◆ difficulty getting up after lying down or rolling</li> </ul> </li> <li>▪ Sleep and rest <ul style="list-style-type: none"> <li>◆ increased or decreased frequency of lying down</li> </ul> </li> <li>▪ Dependence on medicinal substances <ul style="list-style-type: none"> <li>◆ monitoring response to treatment</li> <li>◆ use of any complementary or alternative therapies and supplements</li> </ul> </li> <li>▪ Usual activity <ul style="list-style-type: none"> <li>◆ capable of maintaining normal exercise regimen for usual discipline</li> </ul> </li> <li>▪ Social functioning and quality of social interaction <ul style="list-style-type: none"> <li>◆ maintaining place in herd hierarchy</li> </ul> </li> </ul>
<b>Key areas for on-going owner monitoring</b>	<ul style="list-style-type: none"> <li>▪ Progression of existing clinical signs</li> <li>▪ Development of new clinical signs</li> <li>▪ Body condition scoring and weight management</li> <li>▪ Change in ability to perform any ADL</li> </ul> <p>Adequate provision of preventive health care</p>	<ul style="list-style-type: none"> <li>▪ Degree of lameness</li> <li>▪ Change in ability to perform any ADL</li> <li>▪ Changes during farriery <ul style="list-style-type: none"> <li>◆ difficulty flexing, extending or maintaining elevated limb during trimming/shoeing</li> <li>◆ uneven shoe/hoof wear</li> </ul> </li> <li>▪ Weight management</li> </ul>