Review

Welfare of working equids in the European Union

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Each EURCAW *Ruminants & Equines* review provides background information on the biological relevance of the welfare topic. It then presents the most important key areas to focus on during welfare inspections, describes why welfare issues occur and lists specific animal-based indicators that can help official inspectors to identify these welfare issues. Finally, the review summarises good and better practices that can help to solve the previously described welfare issues, and deals with related legislative requirements.

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1 Executive summary

Social contact, companionship, free movement and access to roughage are considered as basic needs for horses (Krueger et al., 2021). When equines are used for sport and racing activities or as necessary workforce by humans, some of the above needs are restricted and welfare is usually impaired due to working conditions and management practices. In this review we present the current situation and summarise the literature on welfare issues of working equids in the European Union. The review further outlines the necessary practises for minimising welfare issues. Recommendations for training of personnel working with equids, access to feed and water, provision of shelter and resting areas, protection from heat and cold stress, preventive health care, appropriate workloads, respect of behavioural needs and general management practices are provided. Furthermore, direct (animal-based) and indirect (resource-based and management-based) indicators for welfare assessment are summarised. Lastly, the review highlights the gaps in the existing knowledge.

2 Foreword

The European Union Reference Centre for Animal Welfare - Ruminants and Equines (EURCAW *Ruminants & Equines*) develops and disseminates knowledge and tools to assist the Competent Authorities (CAs) in performing better official controls and enforcing EU animal welfare rules. It covers a range of farm animal species including those used for dairy (cows, goats, sheep, buffaloes, horses) and meat (cattle, sheep, goats, deer, horses) production and ruminants and equines kept for other purposes. EURCAW *Ruminants & Equines* proposed to review the available knowledge on welfare of working equids in the EU. Council Directive 98/58/EC for the protection of farmed animals refers to the basic principles of animal welfare status and assessment, without covering the protection needs of Equidae sub-categories that are kept for other purposes. Directive 1/2005/EC is focused only on the conditions and welfare standards during transport of registered and domestic Equidae. More recent Equidae-specific regulations mainly address identification methods (504/2008/EC), health conditions during transportation and import from third countries (688/2020/EC) and condition of donor animals that are used for the collection of semen, ova and embryos (846/2014/EC). The aim of the present document is to review the main welfare issues of working equids in the EU, as well as to propose practices for the improvement of welfare inspections and reduction of risk factors.

3 Definitions

The term ***Equid (also equine and equine animal)*** refers to a member of the genus Equidae, understood to mean horses (*Equus ferus caballus*), donkeys (*Equus asinus*, originated from the African wild ass *Equus africanus*) and their hybrids (i.e. mules and hinnies). A ***mule*** is the result of breeding between a male donkey and a female horse/pony; a ***hinny*** is the result of the breeding of a male horse/pony and a female donkey.

Working equid: for the purpose of the present review a working equid is defined as an equid that performs physical activity in service of the person(s) who owns, keeps or hires them. Working equids may be used in production (e.g. in agriculture, for carrying or pulling loads and transporting of firewood and other supplies, horse skidding), leisure (e.g. in tourism industry for transporting people) and sport activities (e.g. performing riding exercises, competitions, races, equine assisted therapies).

4 Present situation in EU countries

The EU's equine population is estimated between 4.16 million to 7.74 million (Eurogroup for Animals, 2015). As for the population of working equids, no reliable data exist today, probably due to the different interpretation of the term "working" equids.

Working Equidae in the EU perform various roles in transport, tourism, rehabilitation therapies, sports, forestry work and agriculture. Approximately 900,000 jobs are created in the EU solely by the equestrian sports industry, where five to seven Equidae create one full-time job typically in economically vulnerable rural areas (Committee on Agriculture and Rural Development, 2017). Moreover, they are used as pack animals and for pulling heavy weights, such as tree trunks, carts and agricultural implements, especially in mountain areas or on islands where the road network is underdeveloped or does not yet exist (Haddy et al., 2021). Working equids, especially on islands and in remote communities, are commonly considered as part of the family and the landscape, but also contribute to the family income in a significant way.

Extensive research has been conducted on the welfare of working equids in rural activities, especially in African countries (Khan et al., 2022; Merridale-Punter et al., 2022; Arega et al., 2023) and in sport activities, especially in EU countries (e.g. Dalla Costa, 2017; Henry et al., 2017; Lesimple et al., 2020). The present review focuses on European conditions.

Poor management practices such as limb tethering, hobbling, use of abrasive metallic pieces in the nose band or chin strap regions, and lack of foot trimming have been reported in donkeys in Italy, Portugal, Spain, Greece and the United Kingdom (Dai et al., 2016). As a consequence, donkeys are often affected by skin lesions and injuries (scars, open wounds, alopecia, swelling) and overgrown claws. Lameness, dental problems, eye discharge and high parasite load are also common (Arsenos et al., 2010; Dai et al., 2016; Haddy et al., 2020). Moreover, equid abandonment is continuously increasing, due to raised costs for keeping, maintenance and healthcare (Committee on Agriculture and Rural Development, 2017).

Viksten et al. (2016) conducted a study to assess horse welfare kept in 26 different stables in Sweden. The majority of the horses (355/497) were used in riding schools. Water availability issues, wounds, skin conditions, ocular discharge and dental problems were identified. Those findings are in accordance to the observations of Popescu and Diugan (2017) in working horses used for carrying loads with carts in the rural areas of Romania; limited access to drinking water, body dirtiness, hip point lesions, thickened skin with missing hair, lip corner lesions, abnormal hoof horn quality and shape, inadequate horseshoes, dyspnoea and mild ocular discharge were observed. Back pain is commonly reported to working horses, due to bad saddle fitting, lameness, weight distribution of the rider or the load and riding techniques (Visser et al., 2014).

Another increasingly prevalent welfare issue that is associated with improper nutritional management in sport horses, is equine gastric ulcer syndrome (EGUS), which affects over 90% of racehorses in training and 36-53% of leisure horses (Hepburn, 2011). Horses with severe gastric ulcers showed a more stressed pattern of behaviour and heart rate variability, suggesting pain (Perron et al., 2023). Additional nutritional management practices should be implemented to prevent this syndrome; access to pasture, providing a high-fibre and high-fat diet, diets low in non-structural carbohydrates and feeding concentrates in more frequent and smaller meals (Andrews et al., 2017; Böhm et al., 2018).

Equids have specific needs beyond basic needs for health, comfort and nutrition. In natural environments, equids usually form large social groups, hence the need for social contact. Daily contact with conspecifics reduces the development of behavioural problems (Landsberg, 2013; Popescu and Diugan, 2017). Free movement and access to roughage are also considered as needs (Löckener et al., 2016; Krueger et al., 2021). These needs are not always fulfilled in working equids. Freedom of movement is usually impaired in sport horses, as they are often housed in individual boxes for > 20 h/daily (Lesimple et al., 2020). The use of individual boxes for housing is associated with stress-related behaviours, i.e. stereotypies and aggressiveness (Normando et al., 2011; Ruet et al., 2019).

Behavioural indicators of welfare have been investigated, mainly in sport horses. Stereotypic, abnormal (e.g. cribbing, head nodding, repetitive licking) or apathetic behaviours and aggressiveness toward humans are more prevalent in horses kept in single housing in indoor facilities with limited exercise opportunities or with no tactile contact with their conspecifics (Lesimple et al., 2019; Ruet et al., 2019). Riding horses living in a confined environment (single housing, limited provision of roughage, ridden by inexperienced riders) are also more prone to pessimistic judgements (as measured by cognitive bias tests), reflecting a negative mood, than horses living in more natural conditions (group housing, access to pasture, ridden for recreation) (Henry et al.,2017). In sport horses, abnormal behaviour can be reflected in the repetition of postures with variations in the angle formed between head and neck, such as a flat or hollow dorsal profile (Sénèque et al., 2019). Additionally, horses suffering from pain due to body lesions (swollen tendons/joints) or inadequate horseshoes also adopt a depressed attitude and are more fearful of humans or even aggressive towards humans (Popescu and Diugan, 2013).

The welfare of working equids varies largely even within EU Member States. There is a risk that working equids are "pushed beyond their biological limits" due to inadequate feeding, watering, housing, disease and injury management, handling, behaviour towards animals, workloads and equipment used (Upjohn and Wells, 2018). Climate also plays a role; in areas with higher rainfall, the risk of parasite infections is greater, while in drought areas the risk of poor forage quality is greater (Meana et al., 2005, Haddy et al., 2021).

Many tourists have increased their awareness of this issue over the last 10 years and request improvements in working conditions or even a ban on working activity for those animals (EU Platform on Animal Welfare, 2022). Online petitions are a common tool to raise interest towards the welfare of working equids, e.g. in the Greek island of Santorini, where over 100 donkeys and mules are used for the transport of tourists up to a steep cliff (Figure 1, Thiemann and Foxcroft, 2016).

Figure 1: Transportation of tourists up a steep cliff to the main town of Santorini by mules and donkeys (Thiemann and Foxcroft, 2016).

5 Minimising welfare problems/promoting best practices

5.1 Training of involved personnel and human-animal interactions

Training and competence of personnel working with equids is essential since it is considered to be the most important risk factor for the welfare of equids. Horse keepers and managers usually treat animals based on convenience, beliefs and individual experience and not on evidence-based decisions (Mazzola et al., 2021). Animals should be handled only by trained personnel, who have attended training programmes incorporating knowledge about horses' needs and welfare. Horses should be aware of the presence of the handler and approached calmly, in a non-hesitant way. During grooming, riders should always have the horse in their field of view, observing the horse's behaviour and facial expressions and adapting the brushstrokes accordingly (Lansade et al., 2019). The use of stressful equipment (tacks and mouth bits that don't fit properly) should not be used (EU Platform on Animal Welfare, 2022). Saddle fit should be checked every 3-6 months by a qualified fitter (Hockenhull and Creighton, 2013b). Type of bits, bridles and saddles should be differentiated according to the type of equid and exercise (Hockenhull and Creighton, 2012). There are numerous questionable horse-training techniques (increased rein pressure, rapping, rollkur, over-bitting, rectal gingering, skin soring, use of electric shock collars, water deprivation, etc.) that impair horse welfare and should be abandoned or adapted (McLean et al., 2010; Horseman et al., 2016). Horses should be trained using positive reinforcement (reward, such as wither scratching or food) rather than punishment (such as applying rein tension until the horse stops). Positive reinforcement leads to a positive human-horse relationship, whilst punishment increases horses' anxiety and retreat reactions (Sankey et al, 2010a and b; Hockenhull and Creighton, 2013a; McLean and Christensen, 2017; Larssen and Roth, 2022).

5.2 Feeding

Fibre, protein, mineral (including trace minerals) and vitamin content in the diet of working equids are essential for their welfare. Working equids need to have access to an appropriate quantity of safe, balanced feed, to cover their energy requirements depending on the intensity and duration of their work. As a result, the diet content of carbohydrates is usually higher for working equids than that for non-working ones, e.g. by providing more grains (Hilmo, 2013). The energy requirements can be calculated according to the level of exercise (NRC, 2007, cited by Hilmo, 2013). Nevertheless, a minimum forage requirement of 1.5% of the horse's bodyweight is necessary to obtain good digestion and minimise the risk of gastric ulceration (Ermers et al, 2023). It is estimated that a medium sized mule on medium work should get 2.7-5.4 kg of energy concentrate and 4.5-7 kg roughage per day (Guyo et al., 2015). Providing horses access to roughage or a fibre-based diet is crucial. Insufficient opportunities to express foraging behaviour results in abnormal behaviours, such as oral stereotypies, aggressiveness and increased reactivity (Krüger et al 2021, Ermers et al., 2023). The distribution of concentrated diets and forages throughout the day should be adapted to when horses work. It is recommended that sport horses are offered small quantities of feed 2 to 3 h before intensive exercise (Harris, 2007). Oil as a supplementary energy source and salt supplements for electrolyte replenishment are also important (Brunner et al., 2012). Access to food and water especially after work should be guaranteed.

5.3 Watering

Working equids need regular and adequate access to drinkable water that meets their physiological and work requirements (Popescu and Diugan, 2017; Terrestrial Animal Health Code, 2019). Working horses might need 20-70 L of water per day depending on the season, size and age of animal and the type of work performed. Working donkeys need approximately 20 L of water per day. Equids must not be denied water access during their working periods but they should not drink water while actively working and making strenuous efforts, because they may suffer from colic (American Association of Equine Practitioners, 2023).

5.4 Shelter and resting places during work

Shelter should provide protection against adverse weather conditions, predators and injuries, as well as good ventilation and a comfortable resting and lying space. Resting spaces provided either for intervals during work or while waiting between rides and tours should be dry, clean and large enough for the animals to lie down, get up and turn around easily (Terrestrial Animal Health Code, 2019). These areas should maintain appropriate hygiene measures and be disinfected with appropriate materials. Recommended temperatures (5 °C to 28 °C) should be maintained at all times (Kosla and Porowska, 2013).

5.5 Heat and cold stress

Heat stress may occur in places with high temperature and humidity when horses are unable to maintain their body temperature within the normal range (Kang et al., 2023). Increased shade usage, increased frequency of respiration, flared nostrils, profuse sweating, head nodding and apathy are behavioural expressions of impaired thermal comfort (Dalla Costa et al., 2014). National rules have been issued in many Member States that define both the number of working days and hours (with intervals), as well as which hours are permitted for working when temperatures are excessive. For instance, in Greece, when temperatures > 35 °C, working hours between 13.00-17.00 should be avoided (national circular), while for temperatures > 39 °C, equids should not be permitted to work. Furthermore, wet-bulb globe temperature is a thermal index that is used in many international horse events for the assessment of thermal environments; values > 30 °C are used as warning signs for preventative measures (water sponges, towels, chiller bins, etc.) to overcome heat stress of the animals or even cancelling of the race/meeting (Racing New South Wales, 2018). In contrast, at colder temperatures (<4 °C), protection should be provided by extra bedding, blankets or shelter. Care should be taken that, in an attempt to protect against the cold, ventilation and air quality are not compromised (Terrestrial Animal Health Code, 2019).

5.6 Infectious diseases and biosecurity

Working equids in poor health show an unresponsive behavioural profile, consistent with sickness behaviour, exhaustion, chronic pain, or depression-like states (Burn et al., 2010). The global distribution of equine infectious diseases has increased, mainly due to transportation and internationalisation of trade. Most of the emergent outbreaks usually remain localised to the geographical region where they were first reported (Timoney, 2014). Equine influenza virus, *Leptospira* spp, West Nile virus, methicillin-resistant *Staphylococcus aureus* (MRSA) and

Anaplasma spp are some of the infectious agents that have been identified in horses in European countries (Cuny et al., 2006; Passamonti et al., 2010; Woodward et al., 2014; Malalana, 2019; de Heus et al., 2020). Respiratory outbreaks are common in performance horses attending large equestrian events (Couroucé et al, 2023). Preventative measures are necessary to minimise the risk of health disorders and their impact on the welfare of affected equids. Cleaning and disinfection of stables and transportation vehicles, good ventilation of facilities and vaccination protocols should be implemented in order to prevent the spread of infectious diseases (European Commission, 2020). During isolation of animals with clinical signs of illness (quarantine period for at least 3 weeks), handlers should use protective overalls and separate equipment, as well as check the clinical condition of the animal daily (World Horse Welfare, 2020).

5.7 Health management

Working equids should be annually checked for dental health and disorders (Górski et al., 2022). For young (2-5 years), elderly (>20 years) and those with known dental problems, examination protocols must be performed more frequently (American Association of Equine Practitioners, 2015). Furthermore, as hoof disorders are the most common cause of lameness (Ireland et al., 2013), management practices, such as picking out hooves on a daily basis should be implemented. Even in horses without lameness, there is a need to determine the change in the hoof conformation during the routine hoof trimming or horseshoe application and its effect on the horse's gait (Kelleher et al., 2021). Shoeing should not be mandatorily implemented and the option of alternative solutions for the protection of hoof wall, such as modified hoof casts, should be investigated (O'Grady and Poupard, 2021). The personnel involved in shoeing must be properly trained to perform correct hoof preparation and follow the existing standards for hoof angle, hoof length and alignment of the hoof-pastern axis, based on the breed and type of work (Waldern et al., 2020). Furthermore, access to pasture, straw or wood shaving bedding should also be considered (Holzhauer et al., 2017).

Deworming frequency should be based on faecal egg counts and not on rotation of anthelmintics on fixed intervals of 3 months (Neves et al., 2023). Painful husbandry procedures (e.g. castration) should be conducted under veterinary supervision with the administration of the necessary dosage of analgesics, such as NSAIDs prior to surgery and after 3 days of surgery, opioids and sedatives (Love, 2009; Bowen et al., 2020). When working horses are aged with health issues, painful conditions with poor prognosis or in emergent conditions, euthanasia should not be delayed and should be performed by a veterinary practitioner that uses sedatives for general anaesthesia before injecting overdose of barbiturates intravenously (Aleman et al., 2015; Gehlen et al., 2020; Pollard et al., 2020; Rioja-Lang et al., 2020).

5.8 Working practices

Equids should not start working before achieving a balance of physical development, training, experience, and maintenance to perform their work effectively, comfortably, and safely. Equids continue to develop until over the age of five years, so consideration should be given regarding the beginning of their working life and appropriate workload. In general, this should be three years

of age or more, and never less than two. Animals that are subjected to excessive work too young will usually suffer from leg and back injuries later in life.

Animals should be trained well in advance of the commencement of their duties. Working times should not exceed six consecutive days of work and thereafter be followed by at least one, ideally two, full day of rest (Terrestrial Animal Health Code, 2019). Equids should work a maximum of 8 h a day, and have breaks at least every 4 h of work, for at least 30 min, during which they are watered and fed, and can rest in a quiet place with protection from adverse weather (DEFRA, 2018; EU Platform on Animal Welfare, 2022). The owner should remove the horse's tack or harness during rest periods in working shifts. Unfit animals (e.g. injured or pregnant animals three months before and after foaling) should not work (EU Platform on Animal Welfare, 2022). It would be beneficial to acquire veterinary diagnosis in order to start working again following a period of injury or illness.

The duration and intensity of exercise must be adapted to the capacity of the animal. In cases of intense and/or extended exercise (more commonly in equestrian sports), the animal can become tired. Signs of fatigue commonly described in horses include:

- Reduced speed
- Reduced responsiveness to the aids, including unwillingness to increase the speed or gait
- Frequent changes of lead in canter or gallop
- Increased head and neck movement
- Hitting fences / obstacles
- Increased breathing effort
- Intense sweating
- In more pronounced cases: Reduced coordination – this could be stumbling, tripping, overreaching, brushing, losing balance, etc.

Exhaustion occurs when horses are pushed beyond their capacity, especially in the case of endurance exercises and in extreme working conditions (e.g. heavy loads under very high temperatures (Pritchard et al., 2009)). In addition to signs of fatigue, exhausted horse syndrome includes (Foreman, 1998; Munsterman, 2019):

- Abnormal sweating (inappropriate or absent)
- Signs of dehydration (poor skin turgor, sunken eyes)
- Persistent increased heart and respiratory rates despite rest
- Elevated rectal temperature (> 42 °C)
- Lameness
- Signs of myopathy (rigidity, hard muscle belly, pain on palpation)
- Recumbency
- Unresponsiveness to surrounding
- Diarrhoea
- Loss of appetite

In cases of exhaustion, the exercise must be stopped, and the animal must be cooled (e.g. by running cold water over the body or using electric fans) and rehydrated (by administering electrolytes).

The signs of fatigue and exhaustion are not specific. They can also occur in cases of pain, joint disorder, or disease. Diagnosis should be based on the observed signs and the conditions under the signs were observed (during or after exercise).

Incorrect loading should be avoided. Equids should be individually assessed to determine the maximum weight they can carry (including the rider's weight (e.g. Dyson et al., 2020)) according to the animal's size, age and body condition. Special considerations regarding workloads should be given to old animals and to mares three months before and after foaling, to avoid putting the pregnancy at risk and to allow the foal sufficient suckling access and resting time (Terrestrial Animal Health Code, 2019). As a general rule, horses should not carry more than 20% of their body weight (Powell et al., 2008, Ram et al., 2013). Donkeys seem more suited to carry heavier loads than horses and it is often accepted that a donkey in good condition can carry 30% of its body weight (Burden and Thiemann, 2015; Bukhari et al., 2021). In any case, weight should be evenly distributed and tourists should be guided by animal handlers regarding the correct way to ride (EU Platform on Animal Welfare, 2022). Moreover, owners and caretakers should carefully observe gait alteration and behavioural changes that are indicative of back disorders and pain, such as sudden changes in temperament, increased aggressiveness towards humans, signs of escape attempts or particular postures at work for pain relief (Lesimple et al., 2013).

All carriages using working equids should be frequently maintained and calibrated. Furthermore, they should have proper signage with a "live animals" notice and have adequate lighting during the night for visibility (American Association of Equine Practitioners, 2023; British Horse Society horse care and welfare, 2023).

5.9 Social contacts and housing conditions

Horses are social animals and group housing is recognised as a best practice to fulfil their physical and behavioural needs and reduce aggressiveness (Hartmann et al., 2012). When working equids are housed individually, they should have access to physical contact with their neighbours (at least muzzle contact, Søndergaard et al., 2011). Increased access to pasture or paddocks, roughage, and contact with conspecifics can reduce stereotypies (Rochais et al., 2018, Lesimple et al., 2020). To prevent injuries during horses' interactions, appropriate density and food provision in several places should be considered (Majecka and Klawe, 2018). When contact with conspecifics is not an option, the presence of other species, such as goats, minimises the effects of social isolation (Wiśniewska et al., 2022).

Appropriate stable design includes increased visual horizons and the opportunity to engage in social behaviours; for example, through a barred window wall or a half wall between paired horses (Borthwick et al., 2023). To ensure free movement of working horses when they are kept in the barn, stall size should be sufficient to allow moving around comfortably, stretching and lying down. When horses cannot satisfy their behavioural needs, they might express stereotypies. When the

previously mentioned practices are not routinely applied, environmental enrichment should be used for stimulation. Environmental enrichment within the stall may include the provision of multiple types of feeds, the distribution of hay nets or hay racks in different locations, the provision of various bedding materials, and the provision of mirrors (Jonckheer-Sheehy and Houpt, 2015).

To conclude, **best working practices** encompass a range of considerations aimed at ensuring the health, safety and welfare of the horses, while optimising their performance and longevity. The most critical principles are summarised in Table 1.

Table 1: Best practices to enhance welfare status of working equids

Area of concern	Best practice
Training of animals	Training is tailored to each animal's abilities, temperament and intended tasks Training is based on clear communication, positive reinforcement and the gradual development of skills
Workload	Animals start to work after 3 years old Females do not work from 3 months before foaling Animals carry less than 20% (horses) or 30% (donkeys) of their bodyweight The weight is well balanced Animals work a maximum of 8h/d with a break in the middle (at least 30 min) and are given 2 d of rest per week
Equipment	Equipment and tack fit to the horse's size, conformation and intended use to prevent discomfort or injury The equipment is regularly checked for wear and tear and adjusted or replaced when necessary
Healthcare	Healthcare includes regular veterinary examinations, vaccinations, medical treatments, dental care and parasite control
Feeding and watering	Animals have free access to roughage The diet is balanced and tailored according to age, workload, and body condition Clean, fresh water is available ad libitum, especially during periods of intense work or hot weather
Environment	Temperature, humidity, and terrain are considered when work is planned Shelter, shade and appropriate underfoot conditions are provided
Monitoring	The animal's condition is regularly checked to prevent fatigue and injuries
Training of workers	Professional workers are continuously trained to stay informed about equine welfare and best practices

6 Key factors to focus on during inspections

The proposed welfare assessment protocol for donkeys by the AWIN project (Minero et al., 2015), the Horse Welfare Assessment Protocol (Viksten et al., 2017) or the Standardised Equine Based

Welfare Assessment Tool (Sommerville et al., 2018) can be applied to assess the welfare of working equids.

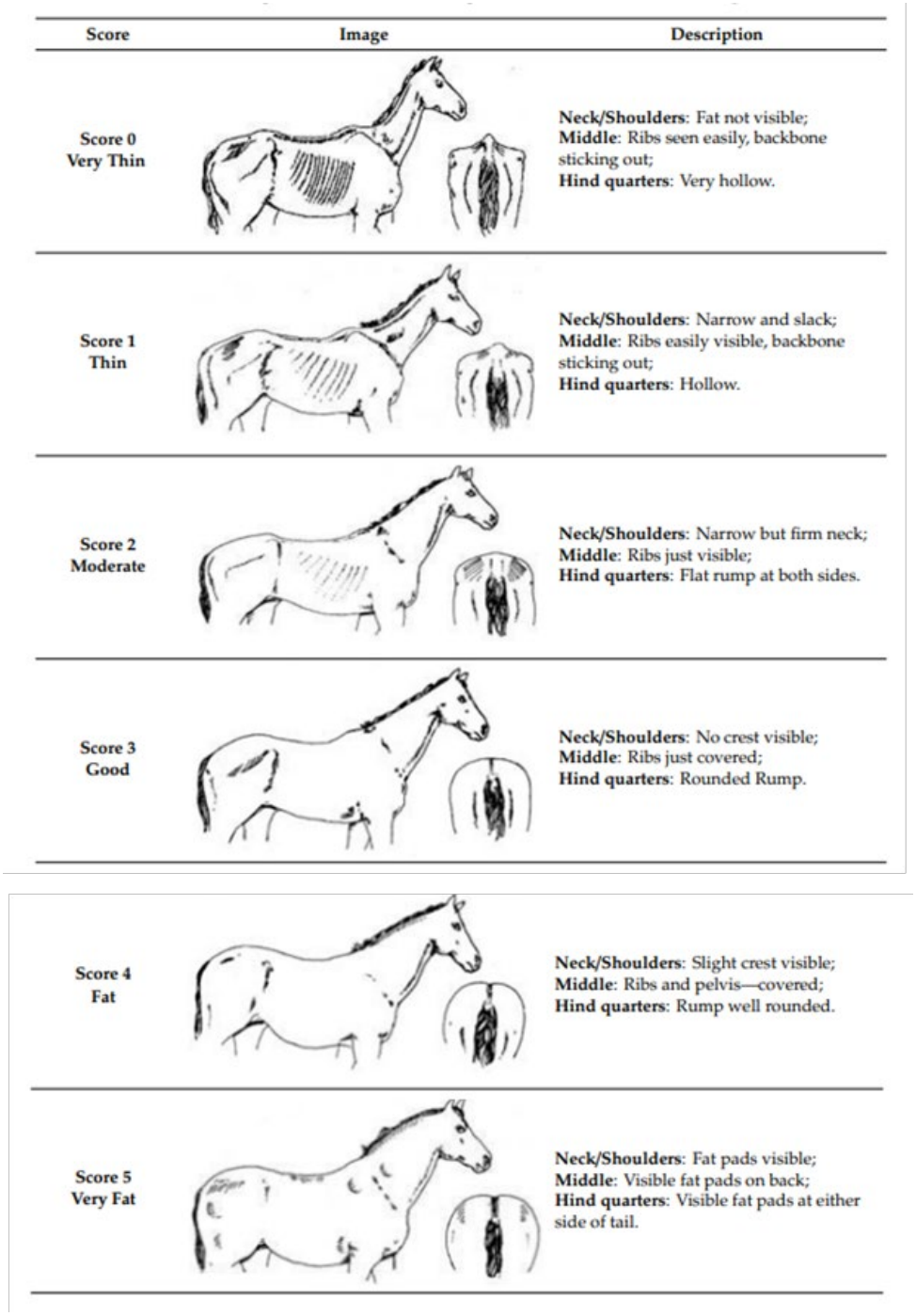
The key factors to focus on should be direct (animal-based) and indirect (resource-based and management-based) indicators. Among the animal-based indicators:

- Assessment of body condition. This is an indicator of body weight/mass adapted to assess the correct state of nutrition of the animal. An evaluation of the animal's alteration or stability of body reserves is important and is visually performed by observation, from different angles, of the back, ribs, neck, space among thighs and back. A tactile assessment may be useful, if the condition of the coat does not allow full visualisation. Examples of rating scales in horses and donkeys are depicted in Figures 2 and 3.
- Evaluation of all body parts for evidence of wounds, lacerations, abrasions or scars, especially areas in contact with the harness or other devices. Therefore, attention should be focused on evaluating the withers, back, chest and thighs in order to differentiate from those which are induced by an operator due to the use of spurs or whips.
- Assessment of the presence of lameness, which is defined as an alteration in gait. The best way to evaluate the presence of lameness is by observing the animal at rest first to note the load (weight distribution, i.e. balanced/evenly distributed or unbalanced/presence of a limb injury) on the limbs and then by proceeding to assess the animal in motion. Indicators of lameness include failure to land squarely on all four legs and unnatural shifting of weight from one limb to the other, shortening of stride, irregular foot placement, head tilt, stiffness and weight shifting. According to the AAEP rating scale, a lameness grade from 0 (lameness not evident) to 5 (inability to move) can be assigned to assess the severity of the issue.
- Assessment of hoof condition, check for signs of disease or injury, such as thrush, cracks or foreign bodies.
- Evaluation of the nasal area, mouth and lips for the presence of lesions. Palpable bone deposition of the nasal bones and bone thinning may result from tightly fitted nosebands (Pérez-Manrique et al., 2020). For proper evaluation, examine the oral cavity looking for the presence of lesions on the labial commissures, tongue, buccal mucosa and bars is always useful. In addition to an assessment of the animal, focusing on bit design is also appropriate. The use of bits that do not fit properly has been shown to be the main cause of these types of lesions (Seck et al., 2023).
- Evaluation of the equine emotional state. There are some behavioural responses that are indicative of positive or negative emotions. Appetitive behaviour and reward seeking are indicative of expectations for positive outcomes, while avoidance behaviours, absence of motivation, fear and aggression during approach are indicative of negative subjective experiences (Elliot et al., 2013; McBride et al., 2017, Hall et al., 2018). Ears, head and neck positions are physical markers of the physiological state of the equines (Fureix et al, 2011, Lesimple et al., 2012; Sénèque et al., 2019; Corujo et al., 2021; Maurício et al., 2023). For instance, low or asymmetrical ears and visibly increased tension of the muscles of the mouth, lips and chin are considered expressions of pain (Andersen et al., 2018). The development of Equine Facial Action Coding System (Wathan et al., 2015) and the Equine Pain Face coding

system (Gleerup et al., 2015) are two useful tools for the assessment of facial movements and recognition of the expressions that are related to pain and discomfort (Figure 4).

Indirect indicators (resources and management); focusing on interviewing working animal owners to obtain useful information to assess welfare (Luna et al., 2017) such as:

- Feeding practices. Request information about the type of food and the frequency of feeding. Same information about the administration of water.
- Working practices. Ask about the work frequency the animal is subjected to. Ask how many times a week or how many hours a day, and when appropriate, workload in relation to the animal size.
- Shoeing practices. Ask the owner how often the equid is trimmed and/or shoed, and if this practice has been done by a farrier or by the owner. Two months should be considered a reasonable time interval.
- Preventive management. Ask the owner how often deworming is performed. A reasonable time is no more than 6 months and the performance of laboratory tests before the drug is administered is currently considered as optimal.
- Veterinary consultation. Ask the owner how often the equid is examined by a veterinarian. An unfavourable response is the answer "never", while less than a year ago is considered as a reasonable time interval.
- Training of handlers. Ask the owner if the handler is properly trained.



Score	Image	Description
Score 0 Very Thin		**Neck/Shoulders**: Fat not visible; **Middle**: Ribs seen easily, backbone sticking out; **Hind quarters**: Very hollow.
Score 1 Thin		**Neck/Shoulders**: Narrow and slack; **Middle**: Ribs easily visible, backbone sticking out; **Hind quarters**: Hollow.
Score 2 Moderate		**Neck/Shoulders**: Narrow but firm neck; **Middle**: Ribs just visible; **Hind quarters**: Flat rump at both sides.
Score 3 Good		**Neck/Shoulders**: No crest visible; **Middle**: Ribs just covered; **Hind quarters**: Rounded Rump.
Score 4 Fat		**Neck/Shoulders**: Slight crest visible; **Middle**: Ribs and pelvis—covered; **Hind quarters**: Rump well rounded.
Score 5 Very Fat		**Neck/Shoulders**: Fat pads visible; **Middle**: Visible fat pads on back; **Hind quarters**: Visible fat pads at either side of tail.

Figure 2: Body condition scoring of horses (adopted from Carroll and Huntington, revised by Rowland et al., 2019)

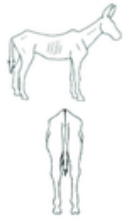
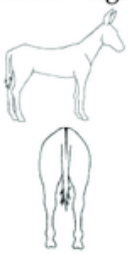
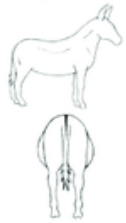
Condition Score	Neck and Shoulders	Withers	Ribs and Belly	Back and Loins	Hindquarters
1 Poor (Very thin) 	Neck thin, all bones felt easily. Neck meets shoulder abruptly, shoulder bones felt easily, angular.	Dorsal spine and withers prominent and felt easily.	Ribs can be seen from a distance and felt easily. Belly tucked up.	Backbone prominent, dorsal, and transverse processes felt easily.	Hip bones visible and felt easily (dock and pin bones). Little muscle cover. May be cavity under tail.
2 Moderate (Underweight) 	Some muscle development overlying bones. Slight step where neck meets shoulders.	Some muscle development overlying bones. Slight step where neck meets shoulders.	Ribs not visible but can be felt easily.	Dorsal and transverse processes felt with light pressure. Poor muscle development either side of midline.	Poor muscle cover on hindquarters, hip bones felt easily.
3 Ideal 	Good muscle development, bones felt under light cover of muscle/fat. Neck flows smoothly into shoulder, which is rounded.	Good cover of muscle/fat over dorsal spinous processes, withers flow smoothly into back.	Ribs just covered by light layer of fat/muscle, ribs can be felt with light pressure. Belly firm with good muscle tone and flattish outline.	Can feel individual spinous or transverse processes with pressure. Muscle development either side of midline is good.	Good muscle cover over hindquarters, hip bones rounded in appearance, can be felt with light pressure.
4 Overweight (Fat) 	Neck thick, crest hard, shoulder covered in even fat layer.	Withers broad, bones felt with pressure.	Ribs dorsally only felt with firm pressure, ventral ribs may be felt more easily. Belly overdeveloped.	Can only feel dorsal and transverse processes with firm pressure. May have slight crease along midline.	Hindquarters rounded, bones felt only with pressure. Fat deposits evenly placed.
5 Obese (Very fat) 	Neck thick, crest bulging with fat and may fall to one side.	Shoulder rounded and bulging with fat. Withers broad, bones felt with firm pressure.	Large, often uneven fat deposits covering dorsal and possibly ventral aspect of ribs. Ribs not palpable dorsally. Belly pendulous in depth and width.	Back broad, difficult to feel individual spinous or transverse processes. More prominent crease along midline fat pads on either side. Crease along midline, bulging fat either side.	Cannot feel hip bones, fat may overhang either side of tail head, fat often uneven and bulging.

Figure 3: Donkey-specific body condition scoring (Donkey Sanctuary, 2020).

Pain face feature	Detailed description
Asymmetrical/low ears	Both ears are moving in different directions or are placed in asymmetrical positions with neither of the ears facing directly forward or back. There may be lowering of both ears (increased distance between them) with the opening of the ears facing the sides or slightly back. The ears may be both asymmetrical and low.
Angled eye	There is tension of the *m. levator anguli oculi medialis*
Withdrawn and tense stare	The quality of the glance changes to become withdrawn and tense.
Nostrils – square-like	The nostrils are dilated mediolaterally; especially the medial wing of the nostril may be tense. This is most obvious during inspiration.
Tension of the muzzle	There is increased tonus of the lips and tension of the chin resulting in an edged shape of the muzzle.
Tension of the mimic muscles	There is tension of the muscles visible on the lateral aspect of the head, especially *m. zygomaticus* and *m. caninus*, but *m. masseter* may also be tense.

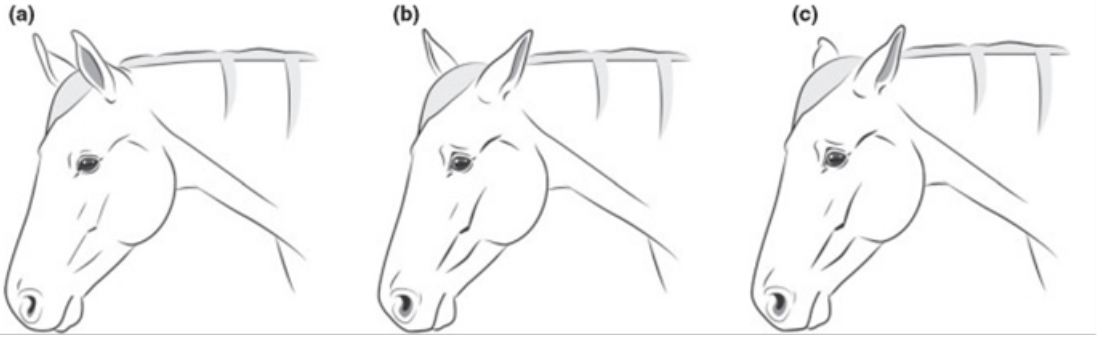


Figure 4: Equine pain face (Gleerup et al., 2015). (a) Facial expression of a pain free, relaxed and attentive horse; (b) Facial expression of a horse in pain, comprising all features of the pain face including asymmetrical ears; (c) Facial expression of a horse in pain, comprising all features of the pain face including low ears

7 Gaps in knowledge & further studies needed

7.1 Lack of data

- Due to the diverse nature of the equine sector in the EU and report capacity gaps, it is difficult to establish and analyse accurate population data for working equids (Allan, 2021). Better coordination between international organisations and governments is necessary, in order to prevent ambiguous and duplicated outputs and report more frequent data that are nationally representative.

- Welfare issues of working equids exist also in higher-income European countries, where equids are used as a means of transport on small islands and in mountainous areas or for leisure in agritourism experiences and sports. Field studies are necessary for the assessment of management and husbandry practices applied in working equids in the EU. Furthermore, epidemiological studies regarding working equine diseases and prevention protocols should be undertaken.
- Non-governmental organisations (NGOs) and a variety of nonprofit entities are operating in the working equids sector, defining their own objectives and interventions (Upjohn et al., 2014). An effective monitoring and data analysis system is required to identify and ensure a common framework of activities in improving welfare standards of working equids (Ali et al., 2016; Haddy et al., 2022).

7.2 Gap in knowledge

- There is a gap in knowledge regarding the lifespan of working equids especially the age when they should stop working. Retirement of working equids should be obligatory when physical and mental health conditions interfere with their working activities. Legislation should define age limits.

7.3 Dissemination of knowledge and regulations

- The broad categorisation of equids in EU legislation does not include working equids. Due to such legislative gaps, welfare standards for working equids are not fully recognised. Specific definitions, guidelines and protocols should be mandatorily implemented in each country, to ensure the application of all existing legal welfare regulations to this Equidae category.
- The management of end-of-career animals is a particular area of concern in terms of working equids welfare. Elderly equids or equids that suffer from severe health conditions (e.g. injuries, lameness) should be considered as end-of-career. More data are necessary for EU countries in order to evaluate the magnitude of welfare issues in end-of-career working equids, as well as the development of end-of-life decision making frameworks. As some of these animals are intended for slaughter, individual passports and more restrictions should be obligatory for meat industries, to ensure that animals entering the food chain are fit for human consumption.
- Working equids are not included in national animal health protocols, such as vaccination campaigns or surveillance systems. The incorrect perception, originating from cultural beliefs, that "donkeys do not get sick", has an impact on the level of care these animals receive (FAO, 2014). New legislation and policies are necessary, based on the demands and disease risks of each country.

8 Conclusions

Although working equids fulfil an important role in many European regions, their welfare status is usually overlooked. Common welfare problems include lameness, improper management and feeding practices, parasite infections, poor body condition and skin lesions. It is crucial to widely adopt welfare assessment protocols to identify welfare issues within each country. Furthermore, promoting best practices for the management of working equids should help to minimise the impact of improper procedures on their welfare status. Better coordination between international organisations and governments is necessary to report representative data of the current situation in Europe and to standardise a common framework of activities to improve the welfare of working equids.

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About EURCAW *Ruminants & Equines*

EURCAW *Ruminants & Equines* is the third European Union Reference Centre for Animal Welfare. It focuses on ruminant and equine welfare and legislation, and covers the entire life cycle from birth to the end of life. EURCAW *Ruminants & Equines*' main objective is a harmonised compliance with EU legislation regarding welfare in EU Member States. This includes:

- Directive 98/58/EC concerning the protection of animals kept on farms;
- Regulations 1/2005/EC and 1099/2009/EC conerning their protection during transport an slaughter;
- Directive 2010/63/EU concerning the protection of animals used for scientific purposes;
- Directive 2008/119/EC laying down minimum standards for the protection of calves.

EURCAW Ruminants & Equines supports:

- Inspectors of Competent Authorities (CAs);
- Ruminant and equine welfare policy workers;
- Bodies supporting CAs with scientific expertise, training, and communication.

Website and contact

EURCAW *Ruminants & Equines*' website offers relevant and actual information to support enforcement of ruminant and equine welfare legislation.

We offer a 'Questions to EURCAW' service for official inspectors, policy workers, and other personnel providing advice or support for official controls of ruminant and equine welfare in the EU. For more information go to https://www.eurcaw-ruminants-equines.eu/questions-to-eurcaw/.

Activities of EURCAW *Ruminants & Equines*

- Coordinated Assistance
  Providing support, networking and Questions to EURCAW;
- Welfare indicators, Assessment & Best Practice
  Identifying animal welfare indicators, including animal based, management based and resource-based indicators, that can be used to verify compliance with the EU legislation;
- Scientific and technical studies
  Preparing Scientific Reviews of knowledge on welfare topics and identify research needs;
- Training
  Developing training materials and training standards for official inspectors;
- Communication and Dissemination
  Increasing awareness of our outputs via the website, twitter, and newsletter;

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