

# Tutorial Article

## The role of the veterinary surgeon in equine welfare cases

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### Introduction

Equine welfare cases can arise not only because of wilful cruelty or neglect, but also because of ignorance or inexperience on the part of the owner, delegation of care or economic hardship (Finocchio 1994; Witham 1998). The veterinary surgeon in equine practice may be called by an officer of a welfare charity or Local Authority or by the police to examine a horse that appears to have been neglected or cruelly treated.

**The responsibilities of the veterinarian in this situation are critical**, since any subsequent legal action against the owner or keeper will rely heavily upon veterinary evidence. **It is essential for the clinician** to be familiar with the necessary procedures, informed of the **relevant legislation** and **aware of the pitfalls** in cases of this nature. Prominent equine welfare cases have been successfully defended in court by discrediting the veterinary evidence or because of poor clinical standards during the initial examination.

The role of the veterinarian is to provide clear and irrefutable evidence of clinical findings and to aid the court in deciding in retrospect whether the apparent condition of the horse was the result of neglect, abuse or disease. The officers of the welfare charity or Local Authority have limited powers when a potential welfare case is examined and current legislation places responsibilities upon the veterinarian to make a clinical assessment of the status of the horse and make recommendations about the potential euthanasia, seizure or further care of the animal.

**The normal professional responsibilities of animals 'under the care'** of the examining veterinarian apply to welfare cases and individuals must be sufficiently experienced in equine work and current equine medicine to become credible witnesses in court. They must be aware that the horse differs from other species with respect to clinical and laboratory indicators of malnutrition. The **possibility of incipient or actual diseases** that may cause very rapid weight loss in the horse must always be considered. For all these reasons, the

examination and investigation of potential equine welfare cases on behalf of charities, Local Authorities or the police must be undertaken to the highest possible standards.

### The legal basis for prosecution of equine welfare cases in the UK

Most cases of equine abuse or neglect in the UK are brought under the **Protection of Animals Act** (1911) and the amendments flowing from it, which makes it an offence to treat an animal cruelly or to fail to provide suitable care and attention so that the animal suffers. Prosecutions may also be brought under the terms of the **Riding Establishments Acts** of 1964 and 1970, since obligations are placed upon proprietors of licensed premises to provide suitable curative care for horses that are diseased or injured and such horses must not be worked. Occasionally, veterinarians may be asked to give evidence under the terms of the **Farriers Registration Act** (1975) and Amendment (1977).

In the UK, the principal agents in the prosecution of equine welfare cases are the animal charities, such as the **Royal Society for the Protection of Cruelty to Animals** (RSPCA) and the **Scottish Society for the Protection of Cruelty to Animals** (SSPCA), or the **Local Authority**. In particular, the Riding Establishments Acts are enforced by local council officers. The police may be involved in the initial entry of premises and examination of horses, or they may be called by the inspectors of the charity to assist in collection of evidence or taking of witness statements.

The veterinarian called to examine a horse that may have been neglected or abused becomes a **material witness to the case**. This means that he or she must faithfully report the findings of the examination and investigation. As the further course of action will be based upon the opinion of the veterinarian, **he or she must be able to give reasons for any opinion expressed** at the time of the initial examination and may be required to make recommendations about seizure or euthanasia of the horse. A statement or an accurate clinical report must be produced by the veterinarian, who may then be required to give evidence in the court case. It is possible for the attending veterinarian also to act as an expert witness, giving the court the benefit of opinion upon the whole of the

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veterinary evidence in the case. **Experts may be appointed by the prosecution or the defence** in addition to the veterinary material witness(es). Whether acting as a material witness or as an expert witness, it is essential for the veterinarian to be aware that his or her duty is to the court, not to either party in the case. **Evidence and opinion must be objective, accurate and unbiased.**

The subject of 'unnecessary suffering' from the legal point of view is comprehensively summarised by Radford (1999).

## Initial examination of possible equine welfare cases

### *Experience and qualifications*

When called by a welfare charity inspector or police officer to attend and examine a horse or horses that may have been neglected or abused, veterinarians should be confident of their experience and knowledge of equine medicine and surgery. **It is unwise for recent graduates or veterinarians in small animal practice** to agree to attend such cases, since defence lawyers are quick to expose shortcomings in qualifications. Unless a significant part of normal professional activity is concerned with equine work, it is better to advise the inspector to seek the services of a more suitably qualified colleague. Equine welfare cases are rarely an emergency, since by their nature they usually involve neglect or abuse over a period of time. National charities such as the RSPCA have agreed that it is better to await the services of an experienced equine practitioner rather than proceed with a veterinarian with limited equine knowledge. **If the veterinarian agrees to attend, sufficient time must be allowed for full clinical examination of all the horses involved.**

### *Entry to the premises*

Animal welfare inspectors, such as RSPCA officers, have no powers of entry to premises in the UK. If they have reason to believe that an offence may have been committed, they may seek authority from a police officer to enter the premises and inspect the animals. For this reason, it is normal practice for both an inspector and a police officer to be present when the veterinarian first attends the horse(s) in question unless an earlier visit by the inspector has gained the permission of the owner or the police to call a veterinarian.

Once the veterinarian is in attendance upon the animal, he or she should confidently take charge of the clinical examination. **The welfare charity inspectors and police officers will expect to be directed by the veterinarian in the process of assessing the horse(s) and collecting evidence.**

### *Contemporaneous records*

It is absolutely essential for the attending veterinarian to make full contemporaneous notes of all that occurs and all that is discovered at the initial examination. These notes are likely to be scrutinised in court and may be discredited if made up at a later time. To avoid the pitfall of forgetting some detail, it is

wise to have a list or proforma for the examination. This should include the following:

- **A full graphic and written description** of the horse in accordance with normal vaccine certificate and passport standards. The age, type, gender, colour and markings of the horse must be recorded.
- **The case identification number** given to the horse by the inspector or officer.
- **The place, date and time of the examination.**
- **Details of:**
  - i) All other people present at the examination or on the premises.
  - ii) Any history or previous veterinary treatment supplied by the owner, keeper or inspector.
  - iii) The owner's or keeper's own veterinarian.
  - iv) The full clinical examination of the horse, which must include:
    1. bodily condition
    2. condition of the mouth and teeth
    3. lesions and abrasions of the skin
    4. body temperature
    5. pulse rate and character
    6. respiratory rate and character
    7. appearance of mucous membranes
    8. mobility and signs of weakness
    9. alertness, responsiveness and behaviour
    10. condition of the feet and shoeing
    11. abnormalities of the limbs
    12. abnormalities of the neck, back and pelvis
    13. abnormalities of the thorax and abdomen (including auscultation)
    14. evidence of lameness
    15. faecal consistency
    16. evidence of internal and external parasites
    17. ability to eat
  - v) Any samples taken for laboratory analysis.
  - vi) Any photographs taken.
  - vii) The provision of food, water and bedding.
  - viii) Description of the premises (**Fig 1**).
  - ix) Other horses or livestock on the premises.

The notes made at the time of the examination will form the basis of the primary veterinary evidence, used to prepare a statement or report and give evidence in court. Acting as a material witness, the veterinarian will be given permission by the court to take these notes into the witness box and refer to them. **Reliance upon memory or upon computer records entered later** will not corroborate the veterinary evidence, **although notes dictated contemporaneously and transcribed later are acceptable.**

### *Clinical examination*

**It is clear that the examination of the horse must be thorough and complete.** Simple inspection of the horse and a cursory assessment of bodily condition are inadequate for the purposes of prosecution evidence. In cases where several



**Fig 1: Full details and an accurate description of the premises must be carefully recorded.**



**Fig 2: A thick winter coat may confuse the assessment of bodily condition.**

horses are involved, each horse must be given a full clinical examination and separate clinical notes made for each individual. The full and accurate identification of each horse is then essential, since welfare cases of groups of horses often involve animals that look superficially similar. **Records of markings, whorls and other identifying features are essential.** Welfare inspectors experienced in equine cases usually provide tagged head collars or even tamperproof tags for the mane or forelock to enable continuity of identification. If these are not available, **nondescript horses should be marked by clipping distinctive marks into the coat or by indelible stock markers**, where appropriate. **It is normal practice to photograph** the horse(s) and the clinician should ensure that **each horse is distinctively identified within the photograph.** Police 'scene of crime' photographers may be available, or the charity inspectors may be responsible for taking the photographs. The horse(s) must initially be viewed at rest to assess demeanour and behaviour, then examined while restrained in a headcollar or bridle and then walked and trotted in hand.

In certain cases, the horse or horses will not be handled easily (for instance in the case of youngstock) and full clinical examination may therefore be impossible. This fact must be



**Fig 3: The same colt as in Figure 2, taken 24 h after the first photograph. Bodily condition is now much more obvious. The animal was clipped to remove the long matted coat and aid in the control of louse infestation.**



**Fig 4: Chronic laminitis and/or hyperadrenocorticism are no excuse for the neglect of normal hoof care.**

recorded and the limitations of the examination specified. Decisions to prosecute based upon incomplete examination are fraught with difficulty unless there is clear and irrefutable evidence of suffering. Veterinarians inexperienced with stud practice may be unaware that weanlings and yearlings are often deliberately kept in poor condition to prevent developmental orthopaedic disease, particularly in the Warmblood breeds.

### **Assessment of bodily condition**

**Body scoring systems** are in general use in farm animals, but no single scoring system has been agreed or adopted for horses. **The examining veterinarian must avoid the use of terms** such as 'emaciated' or 'pitifully thin' without having an objective and repeatable system for the assessment of horses. Poupard (1993) proposed a 5-point system of body condition scoring, while Carroll and Huntington (1998) adopted a



**Fig 5:** The neglect of youngstock may cause significant welfare problems. This headcollar caused deep damage to the skin, soft tissues and bones of the face.



**Fig 7:** This 13-year-old Thoroughbred gelding was emaciated as a result of starvation alone. There was no evidence of disease. The ratio of urea:creatinine was normal.



**Fig 6:** The differential diagnosis of a horse in this condition must include cyathostomiasis, equine dysautonomia (grass sickness) and intestinal neoplasia, as well as frank malnutrition or neglect. Note the clear identification of the case number.



**Fig 8:** Penile prolapse (paraphimosis) with emaciation is regularly seen in cases of cyathostome disease. Such signs can occur acutely and weight loss may be very rapid.

6-point system for horses. The Department for Environment, Food and Rural Affairs (DEFRA) has adopted this system in the **Equine Industry Welfare Guidelines Compendium for Horses, Ponies and Donkeys** (Anon 2002), while also adopting a system for the donkey based on a very similar system modified by The Donkey Sanctuary, Sidmouth, Devon.

Kronfeld (1993, 1998) suggested a 9-point system based upon a standardised palpation of neck, ribs, spinal column and tailhead, emphasising that the use of such a system is crucial (Table 1). **The USA National Research Council: Nutrient Requirement of Horses** (quoted by Rooney 1998) also proposes a 9-point system, but gives the lower scores significantly different titles from Kronfeld (1993, 1998). A score of 1 is labelled 'poor' in one system and 'extreme



**Fig 9:** Failure to seek appropriate veterinary advice may be an offence, even if the horse is in good bodily condition.

**TABLE 1: Nine-point body condition scores of horses (from Kronfeld [1998] with additional material from Naylor [1999]). Body scoring should be undertaken on the basis of palpation, not visual inspection**

Score	Description	Features
1	Extreme emaciation	No fatty tissue. Protuding bones. Wasted muscles, especially noticeable over the bones. Spinous processes prominent. Flat shelf over transverse processes. Bones clearly visible in neck and tailhead. <i>Tubera coxae</i> angular.
2	Emaciation	Some fat at base of spinous processes. Transverse processes feel rounded. Muscles wasted. Pelvic bones and ribs prominent. Neck bones faintly visible. Tailhead vertebrae visible. <i>Tubera coxae</i> angular.
3	Thin	Spinous processes visible, fat covering transverse processes and halfway up spinous processes. Tailhead prominent but vertebrae not individually visible. Ribs sharply visible. <i>Tubera coxae</i> rounded. Neck lean but bones not visible.
4	Moderately thin	Some palpable fat at tailhead. Ribs faintly visible. <i>Tubera coxae</i> not visible. Profile of loins concave between spinous and transverse processes. Some fat in neck.
5	Moderate	Ribs easily palpable but not visible. Profile of loins flat. Obvious palpable spongy fat at tailhead. Neck blends smoothly with shoulders.
6	Moderately fleshy	Profile of loins and rump rounded. Ribs palpable, but some fat present. Some fat palpable in crest.
7	Fleshy	Crease apparent along back. Ribs well covered, but individual ribs just palpable. Obvious soft fat at tailhead and in neck and rump.
8	Fat	Obvious crease along back and over rump. Ribs not palpable. Tailhead thick with fat. Obvious fat in neck, withers and inside thighs.
9	Obese	Bulging, creasing fat tailhead. Bulging fat in neck, withers and thighs. Deep crease along back and rump. Lumps or pads of fat on neck and thorax.

emaciation' in the other. Similarly, a score of 2 is called 'very thin' by one system and 'emaciation' by the other.

**This illustrates the importance of objectivity**, and these authors have now adopted the 9-point system in their assessment of equine body scoring as suggested by Kronfeld (1998) and given in **Table 1**. This system is preferred over the Anon (2002)/Carroll and Huntingdon (1998) scheme, since the latter fails to emphasise the importance of palpation of the horse, rather than visual appearance and may therefore be less consistent. **Palpation rather than visual inspection is essential**, as long and shaggy winter coats may obscure very poor condition, particularly in ponies, while lean Thoroughbreds with thin coats may appear to be in poor condition when they are not (**Figs 2, 3**).

In horses it is the **wastage of muscle, not the absence of fat**, that is the significant factor in assessing malnutrition, malabsorption and suboptimal food intake (Finocchio 1994; Kronfeld 1998). Although girth tape measurements may be 90% accurate in providing bodyweight data (Henneke *et al.* 1983), **bodyweights are of little help in providing evidence of emaciation**, as speculative data about the optimum bodyweight for the horse in question may be disputed in court.

**The veterinarian examining the potential welfare case is therefore advised to become familiar with an accepted bodily scoring system and be able to justify the assessment of bodily condition from it.**

### **Examination of particular lesions or clinical abnormalities**

In many cases, the equine welfare case will present as nothing more specific than a **very thin horse**, which may or may not show signs of depression or weakness. In some cases, however, the cause of concern will be **particular injuries or abnormalities** such as grossly overgrown hooves (**Fig 4**), **wounds** (**Fig 5**) or evidence of **disease** such as diarrhoea. The examining veterinarian must not be diverted to the examination of the particular problem alone, but should conduct a full clinical examination of the whole horse in addition to careful assessment of the specific problem. **It is important that a full and accurate description of the injury or problem is then made** and, if possible, close-up photographs are obtained, with correct identification.

### **Sampling for laboratory investigation and further investigation**

In the case of specific wounds or injuries, it may not be necessary to take samples, although the laboratory culture of swabs may corroborate an opinion of localised infection and aid treatment. **It is essential for the veterinarian to take appropriate samples** where systemic or internal disease is suspected or where the principal presenting sign is debility or poor condition. **Clinical examination alone may give a strong indication of a diagnosis, but the clinician is open to criticism if the putative diagnosis is not supported by further investigation;** poor condition or emaciation is not a disease, but an indicator of disease or malnutrition. It is not possible to make a diagnosis of starvation by clinical examination alone.

In the authors' experience, there has been much debate in court about the sensibility or necessity of taking extensive samples and performing wide-ranging tests. Experience has proved that routine blood and faecal samples should be taken, if only to be screened and stored pending the progress of the clinical case. **Duplicate blood samples** in plain, heparinised and EDTA tubes should be taken and **fully labelled in the presence of a witness**. Duplicate faecal samples should be collected and any swabs, skin plucks or other samples should also be duplicated and properly labelled. **One set of samples must be offered to the owner or keeper of the horse for independent assay**, with instructions about handling and

storage. In the case of horses found dead or subjected to euthanasia, it is sensible to arrange for transportation of the carcass to a centre of excellence offering equine pathological services, since few practitioners have sufficient experience and expertise of full *post mortem* examination to provide credible testimony to a court of law.

**Evidence of previous or current veterinary attention**

The attending veterinarian should enquire of the owner or keeper **whether the horse is currently under veterinary care** and, if not, when the horse was last seen by a veterinarian. This information is important for 2 reasons:

1. It will enable the attending veterinarian to contact the owner's veterinarian to fulfil ethical responsibilities under the Royal College of Veterinarians Guide to Professional Conduct.
2. It will also indicate whether the owner is currently acting under veterinary advice.

Failure to determine whether the horse was receiving treatment or attention has resulted in considerable embarrassment in certain cases when they came to court.

**Decisions arising from the initial clinical examination**

Based upon the full clinical examination, **the veterinarian has a responsibility to make decisions in the interest of the horse.** The principal decision at the time is whether the examination has revealed evidence of suffering, and from that arises the question of whether the owner or keeper was or should have been aware of the suffering. If the owner claims that the horse is under veterinary treatment, the home veterinarian must be contacted to establish whether the owner is acting on veterinary advice. **It is important to emphasise that poor condition, old age or an overgrown coat are not themselves specific indicators of suffering.**

If the attending veterinarian decides that the animal is suffering unreasonably, he or she **must then decide whether to:**

1. **Treat** the horse.
2. **Ensure** that veterinary treatment is obtained for the horse.
3. **Advise seizure** of the horse into the care of the welfare organisation or authority.
4. **Advise euthanasia** of the animal.

It is probable that the attending welfare society inspector will ask for an opinion about the 'period of suffering', as this will be an essential factor when the summons to attend court is prepared. **The veterinarian is well advised to reserve judgement on this matter until all examinations and tests have been completed.**

**The decision to seize the horse** (i.e. to remove it from the care of the present keeper and place it under the care of the welfare society or Local Authority) must be based upon a veterinary opinion that the life or welfare of the animal would be jeopardised by remaining at the present premises, under

the care of the present keeper. The veterinarian has, therefore, to decide whether appropriate care and management can be offered to the animal in the present circumstances. **Seizure of an animal is a serious matter and will need to be justified when the case comes to court.** The welfare society inspectors and police rely upon the veterinarian to recommend seizure. On occasions, the welfare society inspectors will ask, or even pressurise, the present owner to 'make over' or 'sign over' the animal to the society at the time of the initial examination. This will then enable the inspector to remove the horse. If the owner is not present or not willing to give the horse to the society, the veterinarian may recommend seizure on welfare grounds, but under such circumstances the animal remains the property of the owner until the case comes to court. **Seizure is justified** in cases where the horse needs to be removed for intensive treatment, nursing or care.

The **decision to advise euthanasia** of a horse at the time of initial examination is also wholly the responsibility of the veterinarian and **must be based upon an informed opinion** that the condition of the animal is hopeless, that the animal is suffering and that removal to a place of safety for intensive treatment would be cruel and would not salvage the horse. In such circumstances the permission of the owner is not required for euthanasia, but **the veterinarian should ensure that a police officer is present and informed of the decision to destroy the animal.** Under the strict terms of the Protection of Animals Act (1911), a written note or certificate should be produced in which it is made clear that the police officer is requesting the veterinarian to destroy the horse based upon the veterinary opinion. **Both the veterinarian and the police officer should sign the note.** An example of a suitable form of words would be:

*Bay 3-year-old half-bred colt, approximately 13.2hh, white frontal star and stripe, white to fetlock left hind, at.....(Details of premises).*

*On the basis of the advice given to me by (veterinarian's name), I have requested that (veterinarian's name) should euthanase the horse specified above to prevent further suffering.*

*Signed ..... (Police officer's signature, rank and number) .....(Date and time)*

*I have euthanased the horse specified above to prevent further suffering.*

*Signed.....(Veterinarian's signature) .....(Date and time)*

In practice, the veterinarian is unlikely to be deemed to be at fault if full contemporaneous notes are kept and if a police officer is present, who is also keeping notes. If a horse is destroyed under such circumstances, **it is wise to take samples** before euthanasia and then to **arrange for the carcass** to be removed for **independent expert post mortem** examination.

### ***Diagnosis of the cause of suffering***

**Presented with obvious specific injuries or wounds**, the experienced equine veterinarian should have little difficulty in making a firm diagnosis of the cause of suffering, even though the cause of the injury may not be apparent. Caution should be exercised in the estimation of the age of an injury, since sepsis and fly strike may become established within hours of an injury. The presence of granulation tissue suggests that a wound is at least 4 or 5 days old (Stashak 1991), although oedematous connective tissue may be mistaken for granulation without careful examination.

In the case of the thin horse, a diagnosis may not be possible on the basis of clinical examination alone, but the **veterinarian is under an obligation to make every effort to arrive at a diagnosis of the cause of the poor condition**, even if the diagnosis must await laboratory results. If there were no need to diagnose the cause of weight loss there would be no need for veterinary involvement in such cases, since an experienced, inspector or even horsekeeper would be able to state that the horse was underweight. **The veterinarian should be aware** of the range of conditions that cause weight loss in horses and be aware that, in certain conditions, the weight loss may be very rapid indeed. A further and critical reason for the veterinarian to pursue the diagnosis is that rehabilitation of the starved thin horse will require very different diets and therapy from those necessary in the case of emaciation due to disease (Naylor 1999).

### ***Other enquiries at the time of initial examination***

Having completed the full clinical examination, **the veterinarian should inspect the premises for evidence of the current provision of food and bedding and for evidence of food stored in bins, sacks or stacks**. He or she should make enquiries about **anthelmintic treatment** of the horse. **A rough plan** of the premises with details of stables, yards, fences and paddocks will be useful later. Numbers of horses in each stable or paddock should be recorded. **All other stock on the premises** should be inspected carefully and any that give rise to suspicion of neglect, disease or injury should be examined fully.

### **Subsequent veterinary responsibilities**

#### ***Handling and processing of laboratory samples***

Correctly labelled samples should be submitted to and processed by a veterinary laboratory with regular experience of equine sample analysis. **It is unwise to use the practice laboratory** unless the technicians are professionally trained and qualified and the equipment is properly, regularly and recently calibrated. Small in-house laboratories have been discredited in court and the interpretation of a **trained pathologist** is important.

**The samples should not be posted**, since an unbroken 'chain of evidence' from horse to the result sheet is essential. With this in mind, the authors deliver samples to the laboratory by hand or send them by courier and insist upon a signed

confirmation of receipt by the laboratory. **The laboratory should be notified that the sample results might be used in court proceedings**. Although it is unusual, in the authors' experience, the technician or pathologist processing the samples may be called to give evidence. **The laboratory should be requested in writing** to perform specific tests and to store remaining samples in an appropriate manner.

### ***Care and treatment of the horse***

Whether or not the horse has been seized, if the attending veterinarian has diagnosed a pathological problem or deemed that the horse is suffering, he or she has a duty to ensure that suitable veterinary care is provided for the animal. No treatment should be administered until all appropriate samples have been obtained, but then the horse should be treated either by the veterinarian acting for the welfare society or Local Authority, or by the home veterinarian.

In practice, the welfare society usually agrees to be responsible for the cost of treatment and, if the horse is seized, to bear the cost of maintaining the animal until the case comes to court. **The horse falls squarely within the definition of an animal 'under the care'** of the attending veterinarian, who would be failing in his or her duty if he or she simply diagnosed suffering and directed that the animal be treated. **The case should be passed on to another veterinarian in the normal ethical manner**, providing all details of clinical findings and recommendations. **The attending veterinarian should make certain that the owner or keeper is given the opportunity to call their own veterinarian** to give an opinion on the horse and, unless extreme urgency dictates, treatment should be withheld for a few hours to afford this opportunity.

**It is important to remember that, pending proceedings coming to court**, the horse remains the property of the original owner, who should be kept informed at all times of the progress of the case. If the animal is 'signed over' to the welfare society this responsibility ceases, but full contemporaneous clinical notes must be maintained at all times.

It is usual for the same veterinarian to make further examinations as the horse either recovers or declines. On each occasion, the duty to perform full clinical examinations and to keep full contemporaneous records remains the same. **It is probable that the prosecuting agency will prepare 'before and after' photographs of the horse to include in the prosecution papers.**

### ***Preparation of a statement or report***

If the case forms the basis of a prosecution, **the veterinarian will be asked to provide a statement and to act as a prosecution witness. The authors recommend that a full clinical report is prepared on practice notepaper, including:**

- **All details** of the case.
- **A full description** of the horse.
- **Details of the initial examination.**
- **Personnel present.**

**TABLE 2: Common causes of weight loss in horses in the UK**

Condition	Features
Deprivation of food	Reduced metabolic rate, depression, poor growth in youngstock.
Dental disease	Older horses, quidding, oral ulceration, halitosis, obvious dental abnormalities.
Cyathostomiasis	Seasonal. More common in younger horses, but may affect any age. Pyrexia, oedema, diarrhoea, neutrophilia. Very rapid weight loss.
Strongylosis	Older than weanling. Faecal samples valuable. Arterial aneurysms. Possible diarrhoea.
Parascaridosis	Weanlings. Faecal samples valuable.
Neoplasia	Will affect individual horses, not groups.
Enterocolitis	Malabsorption or protein-losing enteropathy. Usually diarrhoea or other signs.
Endotoxaemia	Possible rapid weight loss. Other signs of severe illness are obvious.
Grass sickness	Very rapid weight loss. Other obvious diagnostic signs, with rapid progression.
Cushing's syndrome	Older horses and especially ponies. Possible concurrent laminitis and secondary diabetes mellitus.
Liver disease	Especially ragwort toxicosis in older ponies.
Pain	Especially chronic orthopaedic pain. Other signs of disability obvious.
Chronic infection	Especially respiratory disease in youngstock. Internal abscessation. Peritonitis
Acute infection	<i>Post partum</i> sepsis in mares, pneumonia, pleuritis. Other signs obvious.
Senility	Evidence of age from teeth and demeanour.

- **Clinical findings.**
- **Reasons for diagnosing suffering** and/or seizing the horse.
- Description of **subsequent laboratory analysis.**
- **Final diagnosis.**

The **progress of the case** should be documented and the **date of the report** and signature noted.

The dictation or preparation of a statement on official paper under the terms of the Criminal Justice Act (1967) and other legislation is less than satisfactory and courts are fully prepared to accept proper professional reports. It is most unlikely that the defence will accept the written statement in court unless the accused pleads guilty to the offence. **The veterinarian must therefore be prepared** to attend court and give evidence in person. It is worth repeating that the veterinary witness should not be biased and has no authority to assume the guilt of the accused simply because suffering has been diagnosed. The duty of the veterinary material witness is to report the facts about the case and about the decisions taken in respect of the horse.

## Diagnosis of the cause of poor condition in equine welfare cases

### Interpretation of laboratory results

**It is impossible to make a diagnosis of the cause of emaciation or poor condition in horses by clinical examination alone, since there is a wide range of**

**medical conditions that will cause emaciation and these must be ruled out before a diagnosis of starvation can be made** (Kronfeld 1993, 1998; Poupard 1993; Witham *et al.* 1998) (**Fig 6**). **Table 2** gives a list of causes of emaciation regularly encountered in routine equine practice in the UK. Although there is some disagreement in the literature about the value of laboratory investigation of emaciation, **it is clear that certain parameters are more valuable than others** and that changes in laboratory parameters in other species must not be extrapolated to the horse. Although Finnochio (1994) states that research into the systemic effects of starvation is somewhat lacking, Baetz and Pearson (1972), Gronwall (1975), Bauer (1983), Naylor and Kenyon (1981) and Rumbaugh *et al.* (1982) all provide valuable information about biochemical and physiological changes in horses and ponies deprived of food and water.

Kronfeld (1998) **emphasises the need to assess the whole horse** and not simply to interpret the laboratory report, or the clinical picture in isolation. He states that the **clinical signs of starvation include** muscle wastage, weakness, reduced metabolic rate and dehydration, since reduced food intake reduces water consumption in the horse. In the absence of concurrent disease, the heart rate, respiratory rate and temperature are indicative of metabolic rate but, unfortunately, starvation in the horse leads directly to immunosuppression and increased susceptibility to bacterial infection (Naylor and Kenyon 1981), which may confuse clinical parameters.

In contrast to other species, **ketosis is not a feature of starvation in horses and hypoalbuminaemia is not a consistent feature and should not be relied upon** (Kronfeld 1998). Of the globulin fractions, alpha-1 globulin is likely to increase in cases of starvation, while alpha-2 globulins, beta globulins and gamma globulins remain unaffected (Baetz and Paerson 1972).

Kronfeld (1998) states that the **most sensitive indicator of reduced protein intake in the horse** is the ratio of urea to creatinine (**Fig 7**). Creatinine is maintained by the constant breakdown of creatine phosphate and urea is a function of protein intake. As both are also affected by renal clearance, the effect of renal clearance can be devolved from serum urea levels by reference to the ratio of the two. It has been demonstrated that feeding horses different diets of varying protein levels can alter their urea:creatinine ratio when subjected to training over 9 weeks using a standard exercise test (Graham-Thiers *et al.* 2000). Kronfeld states that a urea:creatinine ratio, comparing both in mg/dl, of less than 15 is indicative of protein deprivation/starvation (D.S. Kronfeld, personal communication). In the UK, using standard SI units (creatinine  $\mu\text{mol/l}$ ; urea  $\text{mmol/l}$ ), this would be the equivalent of a ratio of less than 0.07.

However, it is the authors' experience (P. Green and J.M.J. Tong, unpublished data) that, while horses that have been subjected to starvation, without concurrent disease regularly have a urea:creatinine ratio of less than 0.07, this may also be seen in horses suffering from disease alone. Although it is worthwhile calculating this ratio in a welfare case, a level of

**TABLE 3: Suggested schedule of laboratory analysis for equine welfare cases**

	Comments on diagnostic value
<b>Haematology</b>	
RBC (x 10 <sup>12</sup> /l)	A regenerative anaemia often accompanies starved or malnourished horses and may also be present in horses with intestinal parasitism.
PCV (l/l)	
Hb (g/l)	
McV (fl)	
McHc (g/l)	
McH (pg)	
WBC (x10 <sup>9</sup> /l)	-
Bands (x10 <sup>9</sup> /l)	-
Segs (x10 <sup>9</sup> /l)	Marked neutrophilia in cyathostomiasis.
Lymphs (x10 <sup>9</sup> /l)	Lymphopenia seen in starvation.
Monos (x10 <sup>9</sup> /l)	-
Eos (x10 <sup>9</sup> /l)	An unreliable indicator of internal parasitism.
Basos (x10 <sup>9</sup> /l)	-
Platelets (x10 <sup>9</sup> /l)	-
<b>Proteins</b>	
Total protein (g/l)	Hypoalbuminaemia not consistently present in starved horses but is a feature of protein-losing enteropathy, including acute cyathostomiasis, hepatic or renal disease.
Albumin (g/l)	
Globulin (g/l)	
alpha1 globulin (g/l)	Alpha-1 globulin elevation seen in starvation, alpha-2 globulin elevations in migrating strongyle larval infestation.
alpha2 globulin (g/l)	
beta1 globulin (g/l)	
beta2 globulin (g/l)	
gamma globulin (g/l)	
Plasma fibrinogen (g/l)	Elevation in chronic parasitism and bacterial infections
Serum amyloid A (mg/l)	
<b>Biochemistry</b>	
AST (iu/l)	-
CK (iu/l)	Mild elevations due to catabolic state.
LD (iu/l)	Spurious mild elevations in GGT and LD seen in starvation that spontaneously resolve and must be differentiated from hepatopathy.
GGT (iu/l)	
GLDH (iu/l)	
SAP (iu/l)	
IAP (iu/l)	-
Urea (mmol/l)	Estimation of the urea:creatinine ratio has been advocated in cases of starvation.
Creatinine (mol/l)	
Urea:creatinine ratio	
Total bilirubin (mol/l)	Elevated levels of direct and indirect bilirubin seen in cases of starvation.
Direct bilirubin	
Indirect bilirubin	
Bile acids (mol/l)	-
Triglycerides (mmol/l)	Starvation causes elevations in horses and especially ponies.

0.07 or less confirms reduced protein intake because of malnutrition or disease, **but cannot be relied upon as a specific indicator of starvation.**

**Both direct (conjugated) and indirect (unconjugated) bilirubin levels** are likely to be increased in cases of starvation (Gronwall 1975; Bauer 1983; Kronfeld 1998; Barrelet and Ricketts 2002), **but liver function tests may be necessary** to rule out liver disease as the cause of the emaciation and hyperbilirubinaemia. Fasting alone may reduce BSP clearance (Gronwall 1975).

Malnutrition also results in **hyperlipaemia**, and the increase in triglycerides and cholesterol seen in cases of starvation is

unique to the pony (Morris *et al.* 1972; Baetz and Pearson 1972; Naylor *et al.* 1980; Bauer 1983). **Haematological changes** in cases of equine starvation may include a fall in lymphocyte counts with maintenance of neutrophil levels (Naylor and Kenyon 1981) and anaemia, but the absolute anaemia may be masked by **dehydration** (Finnocchio 1973). **Changes in serum mineral and electrolyte** estimations are often not present or are difficult to interpret (Rumbaugh *et al.* 1982); they are also subject to errors due to transportation and delays in the analysis of the samples (Kronfeld 1998).

A proposed laboratory profile for the equine welfare case is suggested in **Table 3**, with the proviso that the results of laboratory tests must be interpreted as an integral part of the clinical case in conjunction with a thorough clinical examination. **A broad spectrum of laboratory tests evaluating multiple organ systems is deemed necessary in many cases to be able to rule out systemic disease as a cause of emaciation** or to evaluate its contribution to the horse's condition if it is considered that a pathological process may concurrently be present.

### **Evidence of disease as a cause of emaciation**

Before making a diagnosis of starvation, the veterinarian should eliminate from the differential diagnosis diseases that are known to cause weight loss (**Fig 7; Table 2**). In some cases the disease process causes a **protein-losing enteropathy**, in others **malabsorption** or **depressed metabolism** and, in others, **severe pain** of the disease leads to debility and weight loss (Naylor *et al.* 1984). Some of these diseases can be ruled out by the full clinical examination. For example, the **state of the teeth** and **age** will be assessed by correct inspection of the incisors and molars with a gag and light; evidence of **severe degenerative joint disease** becomes apparent as the limbs are examined and the horse is asked to move. **Other clinical findings**, such as diarrhoea, respiratory distress, ventral oedema or poor membrane perfusion, may suggest particular disease processes and will also be revealed by full clinical examination.

In the authors' experience, the following 4 diseases in the UK commonly occur in cases presented for welfare assessment and potential criminal actions; **the examining veterinarian should be alert to the possibility that the debilitated horse is suffering from one of these conditions before diagnosing starvation.**

### *Intestinal parasitism*

Neglected horses on poor diets are likely to have been denied routine anthelmintic treatment and crowded on poor pasture. In these circumstances, **internal parasitism is very likely and may be the single most significant cause of the poor condition.** Although large strongyles are universally sensitive to routine anthelmintics, the **small strongyle group** (cyathostomes) are widely reported to be resistant to benzimidazole anthelmintics (Kelly and Fogarty 1993; Lyons *et al.* 1994; Mair 1994). **The thin horse may therefore be suffering from cyathostomiasis despite adequate feeding**

**and worming.** Moreover, **weight loss may be extremely rapid**, with a significant proportion of bodyweight lost in a matter of a few days with no early signs of diarrhoea (Kelly and Fogarty 1993; Mair 1994). There will, however, be other clinical signs (**Fig 8**), such as pyrexia, ventral and limb oedema and, eventually, diarrhoea, with accompanying changes in biochemical parameters including very marked neutrophilia, hypoalbuminaemia and possible alpha-2 globulin elevation. **Veterinarians examining pyrexia thin horses should have cyathostomiasis high on the list of differential diagnoses, especially if the animals are young.** They should also be aware that elevations in serum beta globulins are not reliable indicators of this form of parasitism, since an initial overwhelming challenge with cyathostomes and subsequent emergence of encysted larvae may not stimulate this serum protein change, which becomes marked after repeated challenge (Round 1969). **The authors have experience of fatal outbreaks of this disease with normal serum protein profiles.**

It is possible for the veterinarian to eliminate cyathostomiasis in cases of thin horses by reference to other clinical signs and response to repeated doses of fenbendazole, ivermectin or moxidectin with faecal monitoring. Concurrent prednisolone and codeine phosphate should be given with the anthelmintic if cyathostomiasis is suspected.

The presence of verminous arterial aneurysms caused exclusively by large strongyles, or heavy infestations of ascarids, are both indicators of neglect, since these parasites are sensitive to routine anthelmintics.

### *Grass sickness*

Horses may lose weight rapidly if affected by grass sickness and owners may be excused a failure to notice early signs of disease, especially as the horses are likely to be at grass (Swan 1991). There are no reliable laboratory indicators of this disease, **but other clinical signs** such as sweating, trembling, dysphagia, colic and snoring respiration are characteristic of the condition. If grass sickness is diagnosed, the veterinarian attending the case on behalf of the welfare society or police will have to decide urgently whether euthanasia or intensive nursing are indicated. Severe early cases carry a very grave prognosis and **euthanasia should be undertaken swiftly to prevent suffering** (Milne 1991). In such cases, the veterinarian is advised to confirm the diagnosis by correct *post mortem* sampling or refer the carcass to a competent pathologist (Ricketts 1991).

### *Ragwort poisoning*

Horses, especially ponies kept in poor conditions on marginal land, are likely to scavenge and to eat weeds. **Ragwort** (*Senecio jacobaea*) is a very common weed and represents a cumulative hepatic poison, which gives rise eventually to weight loss, depression and signs of weakness; true hepatic encephalopathy may or may not occur (Pearson 1999). **In cases of potential welfare prosecution**, the attending veterinarian may be faced with the dilemma of attempting to decide for how long the pony has been affected by the disease, and it is possible that a defence

may be mounted on the basis of poisoning predating the current ownership. The clinical signs may not become apparent until a year after ingestion of the toxic alkaloid has ceased (Craig *et al.* 1991). In such cases, **it may be difficult to establish that the pony has been neglected**, since adequate feeding and care may have been provided and there may be no evidence of pain or distress. **Serum liver enzyme levels**, particularly gamma glutamyl transferase (GGT) and bile acids, are likely to be very high indeed in cases of ragwort poisoning, and histological findings on routine liver biopsy are diagnostic.

### *Hyperadrenocorticism (Cushing's disease)*

**Elderly ponies** presented with depression, weight loss, laminitis, overgrown hooves and bizarre coat abnormalities may be suffering from equine Cushing's disease, especially if the disease is complicated by *type 2* diabetes (van der Kolk 1997). **Again, the attending veterinarian should beware of rushing to a diagnosis of starvation, cruelty or neglect**, since the owner may have cared properly for the pony and taken veterinary advice. Responses to treatment are variable and drugs such as bromocriptidine, cyproheptidine, pergolide and trilostane are currently used to moderate the clinical signs. If the pony is not in unreasonable pain because of laminitis, it may be difficult to satisfy the court that suffering or neglect has occurred.

### **Assessment of other horses on the premises**

It is most unlikely that a single horse in a group will be emaciated because of starvation or malnutrition. **If other horses are in acceptable condition under the same conditions**, the veterinarian **should look carefully for evidence of disease in the affected horse.**

### **A suggested protocol for the diagnosis of the cause of emaciation**

Based upon the literature and our experience of many equine welfare prosecution cases, the authors suggest the following as a basis for making a diagnosis of starvation or malnutrition as the cause of emaciation:

- **Perform a full clinical examination** to eliminate signs of disease or injury.
- **Take blood samples** and submit them to the laboratory for assay in accordance with the schedule in Table 3.
- **Take faecal samples** and submit them to the laboratory for internal parasite egg counts.
- **Assess the evidence** of the provision of adequate food and water on the premises.
- **Assess the condition** of other horses or stock on the premises.
- **Assess improvement in the condition** of the horse when no treatment other than adequate food, shelter and routine anthelmintics is provided.
- **Monitor faecal evidence** of parasitic clearance over the first week.

**A diagnosis of starvation is safe if other signs of disease are eliminated, the horse improves in condition within 10 days and no further signs of disease become apparent.**

### **Diagnosis of suffering or neglect in cases of apparent disease**

If a specific disease or injury is diagnosed, the veterinarian may be of the opinion that the owner or keeper of the horse should have obtained veterinary attention earlier. The existence of such a condition does not excuse the owner or keeper from a charge of neglect, since **the law requires that appropriate care and attention is provided** in the case of sick or injured animals (Fig 9). The case is stronger if signs of disease are obvious to the layman and the veterinarian is satisfied that they have been present for a significant length of time. Under current codes of practice for animal welfare, horses at grass should be inspected at least every 24 h and stabled horses fed at least twice daily. Tethered horses should be inspected at least twice daily and semiferal horses grazed on heath and moorland inspected at least once a week. Based on this rule, it is the experience of the authors that courts will normally find in favour of the prosecution and convict the accused **if it is established beyond doubt that the horse has suffered unreasonably for more than a full day.**

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