Papers and Articles

Guidelines on the recognition of pain, distress and discomfort in experimental animals and an hypothesis for assessment

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Under the 1876 Cruelty to Animals Act it is necessary to recognise pain so that an assessment may be made to determine if it is 'an experiment calculated to give pain' and 'to prevent the animal feeling pain'. Under the conditions of the licence it is also necessary to recognise 'severe pain which is likely to endure' and 'suffering considerable pain'.

In the White Paper May 1983 (Command 8883) it is stated that: 'in the application of controls the concept of pain should be applied in a wide sense' and 'the Home Secretary's practice has been to interpret the concept of pain to include disease, other disturbances of normal health, adverse change in physiology, discomfort and distress'.

The draft European Convention for the Protection of Vertebrate Animals used for Experimental and other Purposes, aims to control, subject to specific exceptions, any experimental or other scientific procedure which 'may cause pain, suffering, distress or lasting harm'. (The White Paper states that UK control will be stricter than the Council of Europe proposals.) Thus, there is a considerable onus on the experimenter to recognise pain (not to define it) and to alleviate it.

It is intended that this article should be of help, not only to newcomers inexperienced in the recognition of pain, but also possibly to those relatively experienced workers who may be called upon to evaluate the pain involved in a new model or an individual animal. The clinical signs and observations detailed in this paper have been based on the experience of animal technicians, animal nurses, research scientists and veterinary surgeons who have looked after experimental animals for a number of years. Some of the signs referred to will appear conflicting and this may reflect the types of physiological abnormality that exist in a broad spectrum of progressive debilitation in an animal.

Anticipating when signs of pain may occur is an important part of minimising and preventing unintended suffering in animals. The prevention of pain by the use of analgesics at critical time periods is important but the effect these might have on the experiment should be considered. Analgesics may not affect the research but those that are anti-inflammatory or have central effects may be unacceptable and an alternative method of controlling the pain will have to be instituted.

If an animal is thought to be experiencing moderate or severe pain it is important that professional and experienced advice be sought as soon as possible. Good communication between all parties involved should lead to the prevention and effective treatment of suffering. An agreement as to the time (based on the signs) and methods of treatment should be reached before an experiment is started whenever possible and certainly after experience of a novel experiment has accrued. It should be noted that conditions such as pain and stress may introduce unwanted variables into an experiment and complicate the results obtained.

THE assessment of pain or suffering in animals is difficult but an approach to the problem is set out in this paper. Anecdotal evidence is often used to support the idea that pain can be recognised in animals and should be prevented by the use of anaesthetics and relieved with analgesics.

It has proved difficult in humans (Smith 1984) to quantify pain where physical factors are complicated by psychological factors. Analgesia is not, however, refused to human patients purely because quantification is unreliable and subjective. Similarly, in animals the responsibility to relieve pain should not be avoided because it cannot be quantified. The animal may not be able to say that it is in pain but there are many clinical signs to guide the observer which, with diligent and intelligent use, are unlikely to be misleading.

There are many similarities between animals and humans in anatomical and chemical pathways of pain perception. These similarities are used to justify the validity of animal research for the benefit of man but the reverse may also be true. Therefore, conditions which are painful in humans should be assumed to be painful in animals until behavioural or clinical signs prove otherwise. However, there are species differences, eg, animals appear to recover far quicker after operations than humans and seem to tolerate some disease conditions better.

Pain, suffering and distress are subjective phenomena and with the present state of knowledge it is often possible to recognise these states but less easy to define them. Suffering and distress describe unpleasant emotions which people would normally prefer to avoid. Such feelings may or may not be a consequence of severe pain or lasting harm. Pain may be more easily appreciated when it has an obvious cause such as injury to somatic or visceral tissue and in humans the perception of such injury may influence the pain experienced.

Pain can present in mild and severe forms (quality) and in acute and chronic forms (temporal). Compare the pain of an animal with a paw trapped, or a puppy having its tail docked or dew-claws removed (where the response is short lasting and appears severe with the animal squealing and struggling vigorously) with that of arthritis (where the pain seems less intense but long lasting and is seen as lameness or tenderness on palpation). How do we take account of other conditions in this spectrum that may not involve such obvious tissue damage such as fear, distress and discomfort? These conditions may involve mild pain such as avoidance conditioning (eg, use of low level electric shocks) used in some experimental behavioural studies, or considerable distress as in conditioned (learned) helplessness studies (not allowed in the UK), or denying animals fulfilment of their instincts by breaking pair-bonding or maternal deprivation. Where does

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one place deprivation of food and, or, water in the pain 'spectrum', how can it be quantified by the side of these other pains? It is difficult but many would agree that in some of the instances cited above the animal will have undergone some element of suffering, certainly enough under different circumstances to correct the situation (that is if it were our pet, or one was being consulted as a veterinary surgeon).

Perhaps a gradation in the degree of pain, distress or suffering can be recognised. At one end of the spectrum there is trivial and momentary pain, such as that evoked by a simple injection. There is also trivial distress and discomfort such as the restraint involved to clip a dog's toe nails. This trivial short-lasting procedure is acceptable and requires no treatment other than a humanitarian approach. However, technical incompetence or undue repetition could escalate the degree of suffering to one that would be considered moderate or even severe.

At the other end of the spectrum there is severe pain which has been described as 'that produced by procedures to which normal humans would not voluntarily submit without appropriate analgesia or anaesthesia' (Wall 1984, personal communication). One would expect to encounter such pain as a result of extensive soft tissue injury or with certain malignant tumours. Severe distress, on the other hand, might be that associated with conditioned helplessness experiments, or with deprivation of food and water or social contact for long periods.

In between these extremes there is a grey area that is more than trivial yet less than severe – a moderate pain which often may be relatively long lasting. Here one might think of arthritic conditions, headaches or repetitive minor pain resulting from multiple simple procedures such as injections or persistent vomiting. The ability to differentiate between 'pains' could well help assessing these grey areas and will be discussed later.

Unless one adopts a hard line Cartesian attitude (which purports that animals cannot feel pain), it could be suggested that one can recognise various signs of pain in animals in a clinical sense.

The Home Office has stated that it will continue to interpret pain in its 'broadest possible sense' in any new legislation (see White Paper May 1983, Command 8883). As well as including discomfort, distress, disease and other disturbances of normal health it has added, 'any adverse change in physiology'. The latter point particularly raises the question of how this sort of pain can be determined. Suffering cannot be biochemically measured by analysing a compound in the blood or by recording electroencephalogram patterns. Studies on blood levels of free fatty acids, glucagon, catecholamines and corticosteroids, however, have been carried out to try to associate biochemical variation with pain. In horses and humans the association with clinical signs was unreliable (Silver Report 1982, Smith 1984). Corticosteroid and many other hormone levels are elevated by stress in the rat (Gartner and others 1980) and more studies should be carried out in other species as there may be important, unforeseen experimental variables.

There are examples where it is likely that an animal will be suffering, as in certain disease conditions; local and systemic microbiological infections, uraemia, anaemia, toxaemia, diabetes mellitus, etc. These conditions are treated in general practice but if disease is part of an experiment it may often be possible only to alleviate some of the symptoms. In most experiments, however, the animals are ostensibly healthy but occasionally latent disease can be induced by the stress associated with the experiment. If animals have any intercurrent disease, steps must be taken to eliminate it for the benefit of the animals and the research.

At present there are no reliable biochemical markers for pain and we are left solely with clinical assessment. For this reason signs commonly seen by those people who are actively looking after animals which are sick and which 'suffer' on occasions have been collated.

Signs of pain, distress and discomfort, corollaries and aids in their interpretation

Tables 1 to 4 provide details of signs based on the experience of animal technicians, animal nurses, research workers and veterinary surgeons who have worked with animals for many years.

Not all the signs may indicate pain or distress but if found a second look should always be taken to ensure that they are explicable in other ways. If there is any doubt then the benefit of that doubt should go to the animal. If one can extrapolate from animals to humans then it is equally legitimate to do the reverse and, therefore, painful conditions in humans should be assumed to be painful in animals until evidence can be produced to the contrary.

It is essential to be aware of the normal physical appearance, performance and pattern of behaviour of the species under study. Signs vary, not only according to the species studied, but also between strains within the same species. Furthermore, individuals within the same strain will show differing responses.

The following signs may be indicative of discomfort, of stress or of pain. Experimental conditions may moderate these signs; they may mask them or lead to unnatural responses.

Not all signs may be present at one time and no single sign can indicate the degree of pain.

Some signs cannot be interpreted as being present or absent and must be considered in the light of previous knowledge of the animal's behaviour or physiology, etc. For example, a change in temperament, a change in mobility or a change in response to a given stimulus.

A comatose or moribund state in itself may not be painful or distressful to the animal but it may indicate that earlier signs have been missed.

In some instances physiological parameters may be used (eg, cortisol levels and blood cell counts). Physiological parameters may be of use especially if 'normal' values have been evaluated beforehand, eg, white blood cell counts, body temperature, cardiovascular parameters and circulating levels of cortisol, free fatty acids, glucagon and acute phase reactant proteins.

If pain (or distress) is suspected in an animal, a beneficial response to the administration of an analgesic (or tranquiliser) provides an informative and easy test. However, on occasions interpretation may be confounded by other effects of these drugs (such as central depression with some potent analgesics).

If animals are suspected to be suffering, they should be observed more frequently and carefully. They may have to be individually caged and food and liquid intake monitored by weighing. Expert advice should be sought.

The assessment of pain should initially be carried out at a distance before handling (or even approaching) the animal. Its appearance and unprovoked behaviour should be noted first and food and water intake can be assessed later. The clinical signs can be evaluated, although parameters such as respiration rate should be assessed from a distance to avoid disturbing the animal.

The experimental procedure being carried out will enable the observer possibly to predict what signs are likely to occur. These signs can then be drawn to the attention of those tending the animals.

Appearance

Changes in the overall appearance of a group of animals, the way in which they interact and the deportment of an individual may indicate the first signs of abnormality. Failure to groom may form the basis for many of these signs. The coat stands on end and loses its natural shine; there may be discharges from the eyes and nose. The animal may appear

TABLE 1: Species specific signs of behaviour indicating pain, distress or discomfort in experimental animals

Species	Posture	Vocalising	Temperament	Locomotion	Other
Rat*	Persistent dormouse posture	Squeals on handling or pressure on affected area	May become more docile or aggressive		Abdominal writhing in mice Eats bedding; eats neonates
Rabbit	Looks anxious, faces back of cage (hiding posture)	Piercing squeal	Kicks and scratches or 'dozey'		No spillage of food or water; eats neonates
Guinea pig		Urgent repetitive squealing	Rarely vicious; usually quiet; terrified, agitated	Drags back legs	No spillage of food or water
Dog	Anxious glances; seeks cold surfaces Tail between legs Hangdog look	Howls, distinctive bark	Aggression or cringing and extreme submissiveness, runs away		Penile protrusion; frequent urination
Cat	'Tucked in' limbs, hunched head and neck	Distinctive cry or hissing and spitting	Ears flattened; fear of being handled; may cringe		
Monkey	Head forward, arms across body	Screams	Facial grimace		

* Many signs in rats may also be seen in mice

sleepy or hunched up, the ears may be flattened or not carried normally (eg, hangdog look). If weight loss has been marked the backbone will stand out and the animal will be light to handle. The eyes may be sunken and the abdomen may look pinched. A sick animal is often on its own and may be less mobile. The breathing may be abnormal, eg, laboured, panting, grunting or shallow and rapid.

Food and water intake

Reduced food intake may be observed depending on the method of feeding the animal, eg, full food hopper or bowl or a reduced weight of food consumed. Before weaning, bodyweight before and after sucking is also a guide. A lowered food intake will result in a reduced faecal output. This is usually noted by the number of faecal pellets in the cage, pen or dirt tray or the decreased volume of stools (for dogs, cats and monkeys). Reduced bodyweight or poor growth rates may also be observed.

Reduced fluid intake will be detected only with difficulty as daily intake is often low in relation to the volume of water provided. Automatic watering should be avoided in cases causing concern. Full water bottles and water levels in bowls should be noted and it may be useful to record the weight of fluid offered. The consequences of reduced fluid intake may be manifest in the clinical signs such as skin tenting and reduced urine output.

Behaviour

Table 1 gives the species specific signs relating to behaviour. It is particularly important to be familiar with the normal behaviour pattern of the individual or strain of animal because one is often looking for a change and not just a set pattern of behaviour.

Clinical signs

Tables 2 and 3 give the common and species specific clinical signs indicating suffering. To assess many of these the animal should be observed carefully before being handled. If it can be picked up, body muscle tone can be assessed and its bodyweight estimated (one may detect an unexpected lightness if much weight has been lost). Thereafter a clinical examination based on measurable signs and provoked behaviour patterns can be made.

Quantitative assessment of pain, distress and discomfort

An experimental scheme for the assessment of the magnitude of 'suffering' is presented below. The scheme is experimental and should not be rigidly interpreted; it needs validation over a wide variety of experimental conditions and assessors.

The assessment scheme may be used under the following circumstances: for the animal user, technician or nurse to assess if treatment is required urgently; to evaluate the effectiveness of any treatment given or any experimental variable; to predict the level of pain likely to be incurred during an experimental procedure and to retrospectively assess the accuracy of that prediction; to reach an agreed score at which an experiment may be terminated; and to retrospectively assess the amount of suffering incurred by a procedure and its acceptability.

Several independent variables are measured as accurately and appropriately as possible and these are scored. Because the variables are, by and large, independent the chances of being wrong are less when two or more variables are considered.

TABLE 2: Common clinical signs indicating pain, distress or discomfort in experimental animals

System	Signs
Cardiovascular	Heart rate altered; pulse quality affected; peripheral circulation decreased, blue and cold extremities (ears, paws)
Respiratory	Abnormal breathing pattern, rate and depth altered, laboured, panting; nasal discharge
Digestive	Bodyweight lost or poor growth; faeces altered in volume, colour or consistency (eg, black with blood; pale, lack of bile pigments, undigested food; diarrhoea/constipation); vomiting, jaundice, salivation
Nervous and musculoskeletal (locomotory)	Twitching, fitting, tremors, convulsions, paralysis, pupils dilated, shivering, hyperaesthesia, reflexes sluggish or absent; unsteady gait, lameness, muscle flaccidity, rigidity or weakness, protecting affected area such as 'boarding' abdomen or reluctant to move a limb (eg, arthritis)
Miscellaneous	Any abnormal swelling, protrusion (hernia, rupture) or abnormal discharges from natural orifices; raised body temperature. Dehydration; sunken eyes, skin tents, urine specific gravity increase, decrease in volume

TABLE 3: Species specific clinical signs indicating pain, distress or discomfort in experimental animals

Species	Cardiovascular	Respiratory	Other
Rat*	Dark claws and feet; eyes bulge and pale	Shallow rapid breathing; grunting on expiration	Red staining around eyes and nose; cyanosis, congestion and jaundice in mucous membranes or non-pigmented and non-hairy areas. Square tail (dehydration).
Rabbit		As rat	White discharge from eyes, nose and on inside fore paws; cyanosis, congestion and jaundice in mucous membranes, or non-pigmented and non-hairy areas
Guinea pig		As rat	Cyanosis, congestion and jaundice in mucous membranes or non-pigmented and non-hairy areas
Dog		As rat. Salivation and panting.	As guinea pig. Raised body temperature; increase in specific gravity of urine and decrease in volume; sweaty paws, pupils dilate, eyes glazed
Cat		As dog	As dog. Circumanal gland discharge; third eyelid may protrude.
Monkey		As dog	As dog

* Many signs in rats may also be seen in mice

The independent variables are: bodyweight; appearance; clinical signs; unprovoked behaviour; and responses to an appropriate stimulus.

Scores of 0 to 3 are assigned to each of these variables in an animal. (The criteria for each score are given later.) While more precise quantitative assessments would be preferred this is not possible. Consequently, one has to try to group clinical observations into broad categories and the following have been assigned for this purpose: No obvious deviation from the normal range; possibly abnormal, ie, minor change; a definite change from normal but not marked; and a gross change from normal.

Scores of 0 to 3 are assigned to these four groups with 0 given when no abnormal variation is detected.

Bodyweight

This criterion has the distinct advantage that it can be objectively measured. By and large it will measure the amount of food and water consumed by the animal – a decreased consumption of the former will lead to reduced bodyweight – and decreased consumption of water alone is highly unlikely. A failure to maintain bodyweight in adults, or a failure to reach expected weight in growing animals will indicate some abnormality. There will be other markers indicating food and water consumption, eg, faeces and urine in tray, and food hopper and water bottle levels. However, false positives may arise, eg, pancreatic exocrine insufficiency, conditions increasing metabolic rate (eg, burns), decreased gut absorption and diabetes mellitus; these may all lead to a decreased bodyweight with a normal or increased food and water consumption. Conversely bodyweight may increase with a normal or increased consumption because of conditions which lead to fluid retention or abnormal tissue growth, eg, ascites (monoclonal antibody production, peritonitis) and tumour growths.

The four categories may be classified as follows: 0 – Bodyweight is maintained or increased, normal consumptions and excrements. 1 – Uncertain; growth rate is not maintained or change of bodyweight is minor, less than 5 per cent of maximum previous weight. 2 – The animal is eating and drinking but food consumption is often reduced and water intake may be increased or decreased. Bodyweight loss is 10 to 15 per cent of starting weight, faeces may be altered in amount or consistency. 3 – Starvation conditions, no food or water being consumed. Total loss is greater than 20 per cent of the starting weight.

Appearance

The appearance of an animal reflects its general condition. The impression an animal gives, however, can appear to be altered by some experimental protocols, eg, metabolic caging, harnesses or jackets, post anaesthetic period, implanted cannulae and electrodes and administration of chemicals such as sedatives and analgesics. Some of these lead to restricted grooming activity which will affect the animal's appearance. Failure to groom can lead to a persistence of secretions/discharges around the eyes and nose, stains on the coat and a non-glossy appearance, soiled anal and urethral orifices and abnormal body odour. The coat stands higher, pupil size is enlarged and there may seem to be increased gland secretion (anal, Harderian, skin). The stance of an animal may also be important, it may be resting a limb, be hunched up (with abdominal pain), or the legs in abnormal positions (eg, front legs apart with chest pain).

The four categories here may be classified as: 0 – Normal; coat is smooth, lies flat and often has a sheen, eyes are clear and bright. 1 – Lack of grooming apparent but no other marked changes. 2 – Coat starey, eyes and nose may have discharges. 3 – Coat very starey, external orifices ungroomed, abnormal posture, eg, may look hunched up, eyes look pale and pupils enlarged.

Measurable clinical signs

Animals in pain seem in part to show activation of their sympathetic autonomic nervous system. Thus cardiac rate, respiration rate and body temperature are frequently elevated and the extremities have a reduced blood supply (limbs feel cold, pale iris in albino animals). Some animals also show muscle tremors possibly as a result of the raised body temperature. In terminal conditions, however, these clinical parameters may be lowered rather than elevated. Thus low body temperature is considered to be a poor prognostic sign, as is a weak pulse and shallow respiration. At this stage a coma may intervene when the animal is not suffering but it may be indicative of earlier suffering. Dehydration may be reflected by the blood packed cell volume and specific gravity of the urine. Raised catecholamine levels or their excretory products may indicate levels of stress.

The categories can be classifed as: 0 – Body temperature, cardiac and respiratory rates are within the physiological norms. (Experience will eliminate increased rates caused merely by measuring these parameters and the associated handling.) The limbs are warm and mucous membranes and non-pigmented areas look normal. 1 – Small change of potential significance. 2 – Body temperature may be changed by ± 1 to 2°C, cardiac and respiratory rates are elevated by up to 30 per cent over expected. 3 – Body temperature change exceeds ± 2°C, cardiac and respiratory rates are increased by more than 50 per cent, or are markedly reduced and shallow.

TABLE 4: Relationship between signs and degree of pain, distress and discomfort

	Normal (0)	Mild (1)	Moderate (2)	Severe (3/4)
Appearance		Coat loses sheen, hair loss, starey – harsh		
		Failure to groom, soiled perineum		
		Discharge from eyes and nose		
		Eyelids partly closed		
			Eyes sunken and glazed	
		Hunched up look		
		Respiration laboured, abnormal panting		
				Grunting before expiration; grating teeth
Food/water intake		Reduced		Zero (prolonged)
		Faecal/urine output reduced		Zero
Behaviour		Away from cage mates, isolated;		Unaware of extraneous activities or bullying from mates
		Self mutilation		
		Restlessness, reluctant to move, recumbent		
		Change in temperament		
		Squealing, howling, etc, especially when provoked		
Clinical signs	Strong pulse			Weak pulse
Cardiovascular		Cardiac rate increased or decreased		
		Abnormal peripheral circulation		
		Pneumonia, pleurisy		
Digestive		Altered faecal volume, colour, consistency		
		Abnormal salivation		
		Vomiting (high frequency)		
				Boarded abdomen as in peritonitis
Nervous (musculoskeletal)			Lameness and arthritis	
		Twitching		Convulsions

Unprovoked behaviour

The behaviour of an animal is best observed from a distance and before any handling is attempted. One is looking for the signs of normal behaviour in that species under the condition of the experiment. Thus, a control rat on analgesics or sedatives in a metabolism cage with a harness would be a valid control for some additional experimental and potentially painful procedure. One would be assessing behaviour and appearance at the same time.

Questions one might ask are: Is the animal alert? Is it mobile? Is it walking normally? Is it eating and drinking? Are the faeces and urine normal (see bodyweight)? Animals in pain are less mobile (unless the pain is colicky and of gut origin when they tend to be more restless), they may grate their teeth, or grunt before expiration, they may eat their bedding and even injure themselves by chewing or licking excessively at a limb or suture line. They may bury themselves or push their head in a corner. They may face the back of the cage and very often they may not show their normal inquisitiveness. It cannot be over emphasised that the normal behaviour for the species must be known and experience gained before a valid assessment can be made.

The categories may be listed as: 0 – Normal behaviour pattern. 1 – Minor changes. 2 – Abnormal behaviour; less mobile and less alert than normal, inactive when hyperactivity would be expected, eg, feeding times in crepuscular (nocturnal) activity of rodents. In multiple caged animals the animal may be on its own, away from its mates. 3 – Unsolicited vocalisation, extreme self mutilation, expiratory grunts. Very restless or does not move at all. (Exaggerated signs of 2 above.)

TABLE 5: Possible interpretation of total scores from an overall assessment of an experimental animal

Total score	Overall assessment
0 to 4	Normal
5 to 9	Monitor carefully, should consider the use of analgesics and sedatives
10 to 14	Ample evidence of suffering, some form of relief must be seriously considered; should be under regular observation; seek expert advice; consider termination
15 to 20	Relief should be given, unless the animal is comatose. Is it a worthwhile experimental animal because physiologically it is likely to be abnormal? There is ample evidence of severe pain. If likely to endure, terminate the experiment

Behavioural responses to external stimuli

It is generally possible to assess responsiveness by observing an animal's reaction to a variety of stimuli. Often it will show inquisitiveness, with whisker twitching and sniffing, or attempts to escape if frightened. Sometimes it may be difficult to catch. It is imperative to have observed the normal behavioural responses for the species within the experimental conditions. One can also assess body tone and paw grip, etc, on handling; lack of tone is a poor sign.

If an area of the body that is likely to be painful can be identified press it gently and observe carefully, feel for tension of overlying muscles and listen for a response, eg, cessation of breathing, or a grunt or squeak. Another useful test is to blow on the animal; they often respond in a predictable manner.

The categories could be considered as: 0 – Behavioural responses normal for the expected conditions. 1 – Shows some minor depression or minor exaggeration of responses. 2 – Shows moderate signs of abnormal responses; there may be a change of behaviour. 3 – Animal reacts violently to stimuli, or muscular responses may be very weak as in a pre-comatose state.

Overall assessment

Five variables have been described which can be assessed.

and each has been divided into four subgroups. The two extremes (scores 0 and 3) should be easy to recognise and, therefore, the middle groups may be judged by default: Table 4 gives an idea of the score range for each sign.

However, if a score of 3 (ie, the severe group) is recorded more than once, then all scores of 3 are given one extra mark. This is because it is unlikely that two false positive scores in the severe category would be given. It is possible for any one of the variables to be scored incorrectly but unlikely that two independent variables would be wrongly scored. Table 5 gives possible interpretations of total scores from an overall assessment.

Any score of 3 is potentially serious and one should always look for valid alternative explanations. For instance the animal may not have come round fully from an anaesthetic, or the surgery may have directly affected the parameter being measured (eg, fractures and mobility). Chemicals and drugs may have been given which would have an independent and predictable effect (eg, sedatives and metabolic modifiers).

Discussion

This article has dealt with the more common signs of pain, distress and discomfort in some laboratory animal species. It is not comprehensive and it will undoubtedly be improved as knowledge advances and as animal handlers look more carefully and become aware of the more subtle signs of suffering. The assessment scheme should be tried with a broader variety of experimental procedures. Perforce, it has been derived from a limited number of experimental and clinical experiences, however, it should be stated that broad consultation was carried out and as such the scheme has been distilled from many years of experience with many animals.

One aspect that has been difficult to embrace is the question of duration of pain. Common sense will dictate for example that 'starvation conditions' will be 'normal' for one or two days postoperatively but if it persists for three or four days then, even though bodyweight loss in that time may not have been great, there is cause for concern.

References

GARTNER, K., BUTTNER, D., DOHLER, K., FRIEDEL, R., LINDENA, J. & TRAUTSCHOLD, I. (1980) *Laboratory Animals* **14**, 267

SILVER REPORT (1982) The firing of horses. Report to the Horserace Betting Levy Board

SMITH, G. W. (1984) Quality of Care in Anaesthetic Practice. Ed. John N. Lunn. MacMillan Royal Society of Medicine