

Pain Management – an International Perspective.

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Abstract

Pain in animals occurs in a range of vastly differing circumstances. Perhaps the most obvious is the pain which may follow a major (or even relatively minor) surgical procedure. However significant pain also accompanies many diseases such as tumours and chronic inflammatory diseases. And pain may equally be associated with common husbandry practices such as castration and tail docking, rapid growth leading to lameness in broiler chickens, or excessive metabolic demands on dairy cattle.

Increasingly we also consider pain to include those emotions and sensations which might be more accurately described as distress. Differentiating the two experiences can become an academic question. Nevertheless, it is clear that pain tends to be more readily recognized and acknowledged than is the more indefinable concept of distress.

Society's perception of the pain and distress we cause to animals, and what is acceptable, is constantly changing and is strongly influenced by the environment within which the society operates. In emerging nations, where human poverty and distress is still commonplace, the structures that protect animals may be fairly rudimentary. Even within the developed world, where animal welfare issues are a well accepted part of the political manifesto, there are important national differences in the acceptable levels of pain and distress we expect animals to bear. The levels of acceptability are many times ethically justified based upon the potential or real benefit to humans that may result from the painful or distressful procedures applied to the animals.

Clearly there are pharmacological approaches to managing pain and distress. However this paper will focus on broader approaches which address husbandry, behavioural and managerial issues, as well as exploring the societal influences in differing countries.

Introduction

Many attempts have been made to define pain in animals but none has improved upon the definition developed by the International Association for the Study of Pain in 1979 with reference to pain in humans:

"Pain is an unpleasant **sensory and emotional** experience associated with actual or potential tissue damage or described in terms of such damage"

In this presentation, I will explore the various situations in which pain may occur in animals whether they are being used for food, companionship, entertainment or research. I will consider changing demographics in various countries which suggest that public opinion rejects the unnecessary infliction of pain in animals. I will explore some of the science which now allows us to measure pain and thus to define ways in which refinements to our practices may effectively reduce the level of pain inflicted. And I will finally consider how our understanding of pain can better inform policy development – whether by governments or by other stakeholders.

When does pain occur?

Perhaps the most obvious time when pain may occur is post-operatively associated with major or minor surgical procedures. Surgery may be performed for clinical reasons or for research purposes. In both cases, we know that the use of analgesia is often inadequate. For example, Richardson and Flecknell (2005) reviewed publications describing experimental surgery in 1990-92 compared with 2000-02 and showed that use of post-operative analgesia had increased from 3% to 23% during this period while use of anaesthetic methods with analgesic effects has also increased. However this still left well over half the animals receiving no post-operative analgesia or other pain relief.

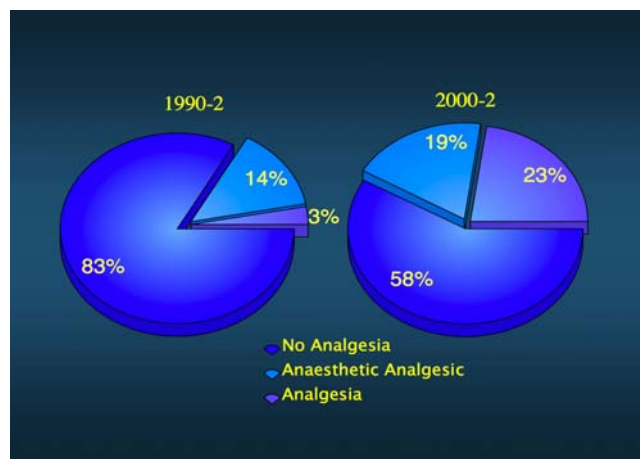


Figure 1: Administration of analgesics, or anaesthetics with analgesic action, post-operatively in animals subjected to experimental surgery

Studies of the percentage of animals receiving analgesia in veterinary clinical practice (Lascelles, 1999; Capner, 1999) show high levels of use following orthopaedic operations, moderate levels of use following laparotomy, but very low levels of use following ovarohysterectomy in cats, castration in both cats and dogs, or in small animals for all procedures. A more recent review (Flecknell, 2007) suggests that the situation in veterinary clinical practice may

be improving however. In addition, pain in animals may also be associated with clinical disease, including tumours and chronic inflammatory diseases, and pain management in such cases can be very challenging.

In a food production environment, pain often occurs during husbandry procedures such as castration, tail docking and dehorning (i.e. mutilations). However significant levels of pain are also associated with high levels of productivity, e.g. lameness in broiler chickens, sheep and cattle, and the extraordinary metabolic demands on high yielding dairy cows. It is also important to remember that the emotional component of pain, which may be termed distress, is often associated with disturbances such as separation from mother or peer group, exposure to unfamiliar or inappropriate handling, handlers or environments, or provision of living conditions which do not meet the behavioural needs of the animal.

Global perceptions of animal welfare

In recent years many studies have been performed in different countries to better understand the relationship between humans and animals and the public perception of animal welfare. In a recent European study of 44,500 EU citizens, the responses of 2,575 UK citizens showed 67% of respondents felt levels of welfare in the EU were poor and 78% felt more needs to be done to improve welfare. 76% felt food retailers don't provide enough information with 85% wanting to see the use of "welfare labelling". An impressive 93% felt that imports should be produced in similar conditions to domestic production (EU, 2005).

In a similar US survey, Bennett et al (2002) found 76% of respondents were concerned that farm animals might be mistreated or suffer in current food production systems and 83% agreed with the statement "it is wrong to cause farm animals any pain, injury or stress". This suggests a surprising level of ignorance amongst consumers of normal production practices in which almost all animals reared for food will arguably experience a level of pain, injury or stress at some period during their lives.

In a survey of Australian human-animal relationships (Franklin, 2007), 68% of respondents kept an animal on their property with 52% allowing their animals into what may be considered intimate parts of the home including the bedroom. 55% felt animals have the same moral rights as humans. In exploring changes over recent years, 48% were more likely to buy free range eggs, 27% less likely to eat meat and 36% more likely to eat fish. Franklin also explored Australian views on a range of other issues concerned with animals as sources of food (Table 1)

Agree	Issue
93%	It is acceptable to eat meat provided animals are reared and killed humanely
63%	Meat industries can be trusted to ensure the safety of their products
51%	Methods of “factory farming” in production of eggs, milk and meat are unnatural and/or cruel
36%	It is wrong to eat native animals, e.g. Kangaroos & Wallabies
30%	Hunting is an extension of natural processes in the wild and thus is acceptable

Table 1. Responses of Australians to issues concerned with animals as sources of food (Franklin, 2007).

Many non-Western countries have animal welfare legislation which protects animals. For example, in Taiwan the Animal Protection Law of 1998 protects animals from “unnecessary harassment, mistreatment or hurt” and in The Philippines, the Animal Welfare Act of 1998 “regulates the treatment of sentient animal species”. Japanese authorities have recently introduced new regulations specifically controlling pain in research animals, and in China a major driver for the provision of appropriate care for research animals comes from demands from European and North American researchers who are choosing to place studies in Chinese laboratories but only subject to the same welfare standards as in their home countries. A significant move in 2001 was the decision by OIE (the Office Internationale des Epizooties – the World Health Organisation for animals) to address the issue of welfare, initially by drafting standards for protection during transport and slaughter. OIE represents 162 countries globally and this initiative therefore has the potential to change perceptions about animals in most parts of the world (www.oie.org).

How we measure pain and distress – an “index of welfare”

In considering animal pain and distress, we can see that the causal elements of poor welfare fall into three categories:

- Basic health and functioning – the good health of the animal and its ability to function normally;
- “Natural” Living – the provision of features in the animal’s environment which allow it to perform natural behaviours; and
- Affective States – the sensory and emotional aspects which determine well-being.

Pain and distress can be caused by failure in any of these elements and animal welfare science is advancing our ability to monitor and assess the consequences of such failure. Through science, we have developed a range of methods for measuring pain and distress in animals which, taken together, can provide an accurate assessment. These include:

- Behavioural methods, including:
 - Clinical observation – in which it is important to eliminate observer bias;
 - Preference testing - which focuses on the motivation an animal has for a preferred condition; and
 - Aversion testing – Which determines what the animal will do to avoid an unpleasant condition.
- Physiological changes – e.g. elevation of heart and respiratory rates
- Autonomic responses – e.g. elevation of cortisone levels
- Neurophysiology – e.g. changes in electroencephalograms (EEGs)

Through these methods, we can now measure the pain associated with procedures such as castration and tail docking, and we can develop what may be termed an “index of welfare” for each procedure or combination of procedures. We can thus perform direct comparisons between techniques, and determine whether there are better techniques that can be used, or a better time to perform the procedures (e.g. in very young or older animals). We can also ask ourselves, in the light of these discoveries, if we can develop husbandry systems which render the painful procedures unnecessary. Nevertheless, underlying all our efforts to measure pain lies the assumption that, in the absence of evidence to the contrary, if a procedure is considered painful in humans we should assume the similar procedure will be painful in animals.

Arguably one of the greatest causes of pain in animals is lameness, particularly in dairy cattle housed indoors. Gait scoring has been used as a method of evaluating lameness and this provides the opportunity to measure refinements in a housing system which may cause improvements in the gait scores. Weary et al (2006) showed clearly the validity of gait scoring in assessing lameness by demonstrating a dose related response to the administration of analgesics. Further studies have been able to use this model to demonstrate the benefits of pasture versus indoor housing (Hernandez-Mendo et al, 2007), and of softer, higher-friction flooring materials versus concrete (Flower et al, 2007).

In relation to mutilations performed on farm animals, Petrie et al (1996) demonstrated the pain associated with dehorning, showing a rise in cortisol levels peaking at about one hour after the procedure. If local anaesthesia was administered prior to the procedure, this peak was avoided but a lesser peak occurred about five hours after the procedure, presumably coinciding with the loss of anaesthetic effect. From this we can deduce that pain relief with extended activity is needed. In a subsequent study, Faulkner & Weary (2000) used behavioural measures of pain. A peak of “ear-flicking” occurred about six hours after the procedure, and this was entirely eliminated with the pre-administration of a long acting non-steroidal anti-inflammatory drug. More recent evidence using electroencephalography in minimally anaesthetised calves (Gibson et al, 2007) has clearly demonstrated the acute pain associated with scoop dehorning.

We can now also ask ourselves questions about the pain and distress associated with maternal separation and whether we can make this event less distressing, possibly by altering the timing of separation, or determining ways to supplement the causal factors of the distress. Thomas et al (2001) observed vocalisation in day old dairy calves following separation from their dams. The level of vocalisation increased markedly approximately sixteen hours after separation. However, by supplementing the feeding of the calves from the time of separation with *ad lib* milk from an artificial nipple, they were able to prevent this rise in vocalisation. A relatively easy refinement step to achieve significant welfare benefit.

One of the hen's strongest instincts is to seek out a nest to lay her eggs (Duncan, 1970). Although genetic selection has substantially reduced this broody behaviour, commercial hens are motivated to perform a substantial amount of work to gain access to a nest at the point of lay (Duncan et al, 1987). Hens are also strongly motivated to peck, scratch, forage and dustbathe (Nicol et al, 1990), all behaviours which conventional cage systems do not permit. This is an example of the complexity of "natural" living needs which animals have, defined not only by availability but sometimes also by precise timing of the demands.

How science can help develop policy for animal welfare

Within the European Union, member states have increasingly regulated farm animal husbandry practices, such as phasing out conventional battery cages for laying hens and gestation crates for sows, and requiring group housing for veal calves (Wilkins, 1997). In 1997, the Treaty of Amsterdam recognised animals as sentient beings, a significant development for animal protection in Europe (EU, 1997). A further consideration is the application of the precautionary principle to animal welfare "where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment, or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection" (Commission of the European Communities, 2000). Thus the burden of proof about whether a particular husbandry practice causes suffering is placed upon those wishing to employ that practice and this highlights the importance of scientific evidence. Nevertheless, the danger of exporting production to countries with lower welfare standards has to be considered. For example, banning of veal crates in the UK in the 1990s resulted in the collapse of the British veal industry and poorer welfare for veal calves since British producers transported their calves to production units in continental Europe where veal crates were still used. The use of phase-in periods in EU welfare legislation is an attempt to identify and correct issues that run counter to the intent of welfare regulations.

By contrast, the USA has relatively little legislation aimed at regulating farm animal welfare, and animal protection organisations have used this to criticise animal production industry welfare standards. Many of these criticisms stem from the close confinement of animals in so-called factory farming systems.

But attempts to introduce legislation, at state or federal level, to regulate the treatment of farm animals in the US have been largely unsuccessful, probably due to the widely held belief by US policymakers that decisions about farm animal welfare must be primarily scientifically driven.

It is only recently that science has been successful in identifying and prioritising the needs of farm animals in their living environments by exploring motivational states (Dawkins, 2004). Issues associated with motivation are critically important as they pertain to frustration and psychological suffering in animals. Hence it can be argued that policies for animal welfare should consider not only the procedures, such as mutilations, which are frankly painful but also the living conditions of animals which ignore their motivational needs. The concept of an “index of welfare” is equally applicable to incrementally improving these living conditions of animals as to the painful mutilations. But animal production industries continue to emphasise the economic aspects of their systems and do not address the specific moral concerns raised by critics regarding quality of life and absence of unnecessary suffering.

An approach to solving this dilemma based entirely upon legislation is likely to fail since legislation tends to be inflexible and cannot generally be used to achieve refinement of production systems through incremental improvement. Hence, balancing what ought to be done for farm animal welfare with what is pragmatic from an economic perspective may be best resolved by voluntary regulation which can respond to scientific findings as they emerge and can be driven by all stakeholders including producers, retailers, consumers, and other concerned citizens. Rollin (1995) has long contended that a new social ethic for animal agriculture demands not only that animal production industries provide healthy and affordable products to their consumers, but also that animal interests should also be accorded proper consideration. This same philosophy can be applied to all environments in which humans make use of animals, whether for food, companionship, research or entertainment. It is reflected in a new regulatory focus in many countries requiring that animal owners exercise a “duty of care” versus the older concept of avoidance of cruelty. Accompanied by the introduction of voluntary codes to expand on the elements of welfare, this approach can be expected to lead to improvements in welfare over time whilst maintaining the viability of the production industries.

Conclusions

In this presentation I have described a range of factors which are core to advancing animal welfare and the perception we have of pain in animals. Changing social perspectives of animal welfare mean that society has growing expectations that animals will not suffer unnecessarily for human benefit. This trend applies globally although different countries may be at different stages in the change curve, and the rigour of application of welfare standards may thus differ. The experimental studies I have briefly described demonstrate that animal welfare science, allows us to have a good understanding of what causes pain in animals, how to measure pain, and how pain can be alleviated.

The studies have been performed in laboratories in many parts of the world including the UK, Canada and New Zealand and demonstrate the importance of global collaboration in this field.

I have coined the term “index of welfare” to describe how we can now increasingly accurately measure welfare and the levels of pain inflicted in different systems of animal care and husbandry. This allows us to compare different systems for their welfare cost. But perhaps more importantly, it allows us to measure the incremental improvements in welfare we can achieve through subtle refinements to systems. For too long we have sought to abolish systems we perceive as having welfare issues but often such abolition would simply render the impacted industry non-viable. By applying indices of welfare, we can achieve demonstrable incremental improvements which benefit the animals and establish credibility of intent whilst assuring the ongoing viability of the industry.

Finally, I hypothesise that policy decisions should be based upon good science and good judgement but should also reflect common sense and public opinion. Governments may establish the legal frameworks within which a country determines its standards of animal welfare. However the implementation of those standards is increasingly in the hands of other stakeholders including producers, retailers and consumers, often through mutually agreed voluntary codes of practice and assurance schemes. This creates the environment in which science can influence practice in a flexible and evolving manner for the benefit of the animals.

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