

Does distress matter?

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Abstract

Most individuals engaged in modern animal based research recognise the importance of pain both as a factor impacting animal welfare as well as a contributor to experimental variability. Less widely recognised is the role of distress, particularly that which is unassociated with pain, in both these respects. Stress is widely considered to be an important factor in an animal's ability to respond effectively to its environment. However, when the animal becomes unable to adapt completely to stressors, and manifests abnormal physiological or behavioural responses, we recognise this as distress. This paper considers the definition of distress, and the ways in which animals mount biological responses to deal with distress. It is very difficult to precisely measure distress which is one reason why it may often be ignored. However the signs are recognizable to the experienced eye. Furthermore, a range of devices can be employed to minimise the level of distress which an animal may experience during a procedure.

Keywords: animal welfare, stress, distress, refinement, veterinarian

Introduction

Many readers will be familiar with the 1992 ILAR Report entitled Recognition and Alleviation of Pain and Distress in Laboratory Animals. The report has proven to have had a remarkable effect on the field but, nevertheless, has become dated and somewhat inaccurate over time. Therefore, in 2004, ILAR Council considered a revision of the report. However it was felt that the two issues of Pain and Distress were sufficiently different that they deserved separate consideration and reports. Hence it is that the ILAR Report on the Recognition and Alleviation of Distress in Laboratory Animals was published in early 2008. In addition, a further ILAR report focusing on pain in laboratory animals will be published in 2008. This presentation therefore anticipated the publication of the new report on distress which is available from the ILAR website (http://dels.nas.edu/ilar_n/ilarhome).

Definition of Non-Pain Distress

Distress does not occur without stress and may or may not be accompanied by pain. In this paper, I restrict my consideration to non-pain distress since recognizing the discomfort associated with pain is generally more easy. There is no universally accepted definition of distress in animals. The UK Nuffield Council Working Party on Research Involving Animals reverted to the Oxford English Reference Dictionary which defines distress as "severe pain, sorrow or anguish". However it is difficult to see how this can be scientifically applied

to animals, particularly when we are considering non-pain distress. Perhaps a little more helpfully, the Australian Code on animal welfare defines distress as "the state of an animal that has been unable to adapt completely to stressors and that manifests as abnormal physiological or behavioural responses. It can be acute or chronic and may result in pathological conditions".

So why is it so difficult to reach agreement on a definition? Perhaps because, philosophically, some are skeptical whether animals feel distress and consider that incorporating feelings and emotions is anthropomorphic and scientifically unsound. Counter to this is the fact that some legislation, for example the UK Animals (Scientific Procedures) Act (UK Home Office, 1986), refers to "pain, suffering, distress and lasting harm" which obligates scientists to recognize and acknowledge the possibility. Although we believe we know how animals respond physiologically to stress, we still lack objective criteria by which we can reliably measure the response. Likewise, if we rely on monitoring clinical and behavioral responses, there are considerable difficulties in validating these measures.

Furthermore there is marked variation between species, and even between animals within a species, in the responses to stress. This may be affected further by the age and gender, and the genetic and environmental background of the individual animal. An extreme of this is seen in Harlow's studies in the 1950s in young primates which had been deprived of

parental contact. Early socialization experience in an animal plays a major role in subsequent manifestation of anxiety disorders. Nevertheless, although we cannot apparently precisely define distress, many experienced animal care-givers would profess to reliably recognize it when they see it.

Moberg (1987, 1999, 2000a, 2000b) has perhaps come closest to a definition of distress through his model of animal stress. The model is based upon the fact that animals, under stress, exhibit biological responses in an attempt to cope with the threat to their homeostasis. The stressors fall into two broad categories; those associated with the experimental manipulation, and those resulting from husbandry practices. Four major defense systems exist to mount biological responses to stressors. These are behavioral responses, the autonomic nervous system, the neuroendocrine system, and the immune system. However none of these has proven, either alone or in combination, to be a reliable measure of stress, let alone distress which is a more subtle biological response.

How should we deal with Distress?

It is a widely held view that a degree of stress is a positive factor for both animals and man. Distress is a sign that the animal's attempts to cope are being overwhelmed. During severe, lengthy, or cumulative stress, an animal will divert resources from other, less essential biological functions and these changes may lead to overt pathology or symptomatology. Under these circumstances, the animal experiences distress and its welfare becomes threatened. But measuring this distress with confidence can be very difficult and we are led to consider each animal on a case-by-case basis. In addition, distressed animals may respond to pain differently, and failure to alleviate distress may adversely affect scientific quality and possibly lead to the use of more animals than necessary. In this sense, it is clearly unethical to ignore distress as a possible experimental variable.

Morbidity and mortality are not acceptable signs for monitoring distress. To effectively assess an animal's welfare it is important that observers are familiar with the normal behavior of the species and, where appropriate, of the individual animal. It is also important to identify potential alarm signals beforehand based on the type of experimental or husbandry intervention, and to ensure careful observation and recording are taking place, especially at times of greater risk whether before, during or after procedures have been performed. Any evidence of stereotypic behavior should be taken as a warning sign, and clinical examinations and diagnostic investigations should be performed as appropriate. And humane end-points should be defined in

advance. All of this requires good teamwork which involves the Principal Investigator or Study Director communicating well with both the animal care staff and the veterinary care staff.

In addition, steps should be considered which will reduce the level of distress caused, whether as part of the normal husbandry practices or during procedures. For example, well trained husbandry staff who provide consistent care and minimize disruption to the animals are critically important. They can use social housing systems and environmental enrichment to minimize distress. They can also provide appropriate care following procedures, such as assisted feeding and additional warmth where appropriate.

Likewise, in preparing animals for experimental procedures, much can be done to minimize distress by good planning. Often animals can be trained using operant conditioning to perform tasks for reward. Providing buddy animals can also alleviate distress in social species, especially if they undergo painful procedures. Planning through appropriate pilot studies and selecting the least invasive methods and allowing the animal to remain in, or return promptly to, its home environment are also all important.

Conclusions

In conclusion, it is obvious that distress surely does matter, both from the perspective of the animal and its welfare, but also as a potential experimental variable. It may be difficult to define and precisely measure distress but it can be recognised by experienced observers. Nevertheless, it is clear that we need more research in this area of animal welfare to better understand distress. However, few sources are currently funding such research and only very small sums are generally available. In the meantime, there are three ways in which those working with animals in research can best ensure that distress is minimised. Firstly, through careful planning, they can minimize distress during husbandry procedures and experimental interventions. Secondly, good teamwork is essential to ensure good communication between all those responsible for the care and welfare of the animals. Finally, good observation can pick up signs of distress before they may become moribund or even die.

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