for veterinary students and graduate veterinarians, and the lack of resources for research and education devoted to animal pain and analgesia. The main gap identified in the report is the lack of agreed upon standards for assessing pain; determining whether a treatment has been successful relies on being able to measure the effect of the treatment. To address this issue, the report's authors present guidelines for developing pain scales in animals and for the use of animals in pain research (see appendices). In addition, workshop participants developed several action plans based on the other major gaps in knowledge:

• to support a multidisciplinary approach to treating animal pain

• to create a special interest group in the International Association for the Study of Pain (IASP)

• to improve funding for pain research

• to inform the public about animal pain

The report concludes that *"we need to work together to achieve a future in which the study of pain and analgesia is a collaborative, multidisciplinary effort that recognizes that animals experience pain."*

The need for a cross-species approach to the study of pain in animals (2004). Vet Med Today: Special Report. Paul-Murphy J, Ludders JW, Robertson SA, Gaynor JS, Hellyer PW and Wong PL. *Journal of the American Veterinary Association 224(5)*: 692-697

Improving sheep welfare in extensively managed flocks

There is a common belief among members of the public that extensively farmed sheep experience higher standards of welfare than species kept in intensive systems. However, whilst sheep may usually be free to express natural behaviour, they may also be at risk of suffering through extremes of temperature, increased prevalence of disease or injury, and associated neonate mortality.

In February 2003, the Scottish Agricultural College (SAC), and Macaulay Institute organised a workshop in Aberdeen, Scotland, to discuss issues relating to the improvement of sheep welfare in extensively managed flocks. The proceedings of this meeting, edited by Dr Pete Goddard, have now been published and comprise nine chapters covering a variety of topics, including the importance of the stockperson–animal interaction (X Boivin), consideration of how sheep respond to different welfare compromises (MW Fisher & DR Scobie), on-farm welfare assessment systems (D Main), and stakeholder opinion of foot-rot control (S Peddie, P Goddard & A Stott). Papers from different stakeholder groups are also presented in order to bring a range of perspectives to the discussion on sheep welfare: the food retailer/consumer (R Layton), farmer (DR Raine), and welfare organisation (J Wrathall). To enable delegates to contribute, four sessions were scheduled following each introductory paper, summaries of which are included in the report.

At the conclusion of the workshop, delegates were invited to submit their views on key issues associated with the welfare of sheep in extensive systems. The main welfare concerns identified relating to health were ectoparasites and lameness, whilst stockmanship and quality of facilities were seen as the main factors affecting welfare during handling. Overall, the top threats to welfare were those associated with nutrition and lameness/foot-rot.

Given the broad spectrum of views and experiences of delegates, these proceedings represent a valuable contribution to the field of sheep welfare.

Proceedings of a workshop on improving sheep welfare on extensively managed flocks: economics, husbandry and welfare (February 2003). 80 pp A4 paperback (ISBN 0 7084 0654 8). Edited by Dr P Goddard and published by the Macaulay Institute, Aberdeen, UK. Available at: http://www.sac.ac.uk/ envsci/external/hill&mountain/defraproject/non_members/proceedings.pdf

Zoo research guidelines: monitoring stress in zoo animals

The second of a series providing guidelines on zoo research, which is aimed at assisting zoo staff, scientists and students planning studies on zoo or captive animals, has recently been published by the Federation of Zoological Gardens of Great Britain and Ireland (who describe themselves as the principal, professional zoo body representing the responsible zoo community of Britain and Ireland). Following the first set of guidelines on project planning and behavioural observation, this publication is concerned with non-invasive physiological measures of stress, concentrating on the measurement and use of glucocorticoids.

The guidelines begin by defining stress as *"the biological response elicited when an individual perceives a threat to its homeostasis"* (Moberg 2000). A discussion then ensues on the importance of monitoring stress in zoo animals. The position adopted here is that *"it is essential that zoo animals experience good welfare and minimal stress for ethical reasons, to maximise reproductive output and longevity and for the conservation of essential natural behaviours through successive generations."*

Although attention is focused particularly on the role of glucocorticoids, and especially cortisol, there is a short discussion on how to select appropriate indices for the assessment of stress. This outlines the use of other components of the stress response, including parameters of immune function, cardiovascular output, and behaviour. The guidelines describe how to plan and formulate a study to assess stress, and discuss variables that might confound cortisol measurements. The latter section includes topics on dealing with individual variation in cortisol levels and the frequency and timing of sample collection. There is also discussion of invasive versus non-invasive sampling, sample collection methods, and the analysis and interpretation of results. With regards to sample collection, the advantages and disadvantages of the different media used to collect cortisol are listed. The procedures necessary for handling and preparing various samples (saliva, blood, faeces, urine) are outlined.

These guidelines will be very useful to those new to the methodologies of stress assessment in zoo and other captive