

# Animal Welfare

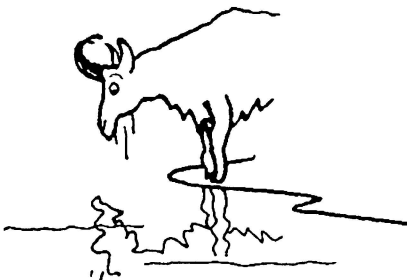
Vol 10 Supplement

2001

## CONSCIOUSNESS, COGNITION AND ANIMAL WELFARE

*Proceedings of the UFAW Symposium*

*held at the Zoological Society of London's Meeting Rooms,  
London, UK*



11–12 May 2000



UNIVERSITIES  
FEDERATION  
FOR  
ANIMAL  
WELFARE

# Animal Welfare

ISSN 0962-7286

*Editor-in-Chief:* James K Kirkwood

*Editorial Assistant:* Sara Oakeley

*Typesetter:* Samantha Griffin

Universities Federation for Animal Welfare

The Old School, Brewhouse Hill, Wheathampstead, Herts AL4 8AN, UK

Tel: 01582 831818 Fax: 01582 831414

Website: [www.ufaw.org.uk](http://www.ufaw.org.uk)

## Section Editors

### *Farmed mammals and fish*

**Professor Berry M Spruijt**

Animal Welfare Centre

Utrecht University

Yalelaan 17

3584 CL Utrecht, The Netherlands

### *Zoo and wild animals*

**Dr Miranda Stevenson**

Ashlea

Dean Lane

Bishops Waltham

Hampshire SO32 1FX, UK

### *Ethics, philosophy and social science*

**Professor Peter Sandøe**

Department of Animal Science and Animal Health

The Royal Veterinary and Agricultural University

Groenegaardsvej 8

DK-1870 Frederiksberg C, Denmark

### *General animal welfare studies*

**Professor David Fraser**

Animal Welfare Program

Faculty of Agricultural Sciences and Centre

for Applied Ethics

University of British Columbia

2357 Main Mall, Vancouver, Canada V6T 1Z4

### *Editorial Advisers*

**Dr Robert Baker** - ANZCCART, University of Adelaide, Australia

**Dr M F Bouisson** - INRA, Nouzilly, France

**Professor D Broom** - University of Cambridge, UK

**Professor M Stamp Dawkins** - University of Oxford, UK

**Mr Roger Ewbank** - Ealing, London, UK

**Dr Michael Festing** - University of Leicester, UK

### *Companion animals*

**Dr Dennis C Turner**

Institute for applied Ethology and Animal Psychology  
(IEAP)

Vorderer Siten 30

Postfach 8816 Hirzel, Switzerland

### *Laboratory animals*

**Professor Jann Hau**

Department of Comparative Medicine

University of Uppsala

Box 570

75123 Uppsala, Sweden

### *Poultry*

**Dr Linda Keeling**

Department of Animal Environment and Health

Swedish University of Agricultural Sciences

PO Box 234

SE-532 23 Skara, Sweden

*Animal Welfare* (ISSN 0962-7286) brings together the results of scientific research and technical studies related to the welfare of animals kept on farms, in laboratories, as companions, in zoos or managed in the wild.

**Subscription rates:** Individuals £50/US\$100 per Volume; Corporate/Institutes/Libraries £70/US\$140 per Volume.

**Orders:** Can be made direct to UFAW and are accepted by Volume, which consists of four issues per year.

**Papers:** Instructions for authors are summarized on the inside back cover; comprehensive instructions are available from our website, or on request from UFAW. Manuscripts should be submitted preferably to the appropriate Section Editor, or to the Editor-in-Chief.

*Animal Welfare* is abstracted in *Biological Abstracts*; *CAB Abstracts*; *Current Contents/Agriculture, Biology and Environmental Sciences*; *Current Primate References*; *Focus on: Veterinary Science & Medicine*; *Humans & Other Species*; *Research Alert*; *SciSearch*; *Sociological Abstracts*; *Toxicology Abstracts*; *Veterinary Update*; is indexed in *Zoological Record*, and is covered by the *Science Citation Index*.

© 2001 UFAW

All rights reserved; no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means; electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the Publisher. **Opinions expressed by authors do not necessarily reflect the views of UFAW, its Council, Staff, Members or Associates, the Section Editors or the Editorial Advisers.**

# Animal Welfare

ISSN 0962-7286

Volume 10 Supplement

April 2001

## CONTENTS

<b>EDITORIAL</b>	S1
<b>ARTICLES</b>	
<b>Animal consciousness, cognition and welfare</b>	S5
<i>J K Kirkwood and R Hubrecht</i>	
<b>Who needs consciousness?</b>	S19
<i>M S Dawkins</i>	
<b>There are no known differences in brain mechanisms of consciousness between humans and other mammals</b>	S31
<i>B J Baars</i>	
<b>Commentary responses and conscious awareness in humans: the implications for awareness in non-human animals</b>	S41
<i>L Weiskrantz</i>	
<b>A neuropsychological and evolutionary approach to animal consciousness and animal suffering</b>	S47
<i>B Bermond</i>	
<b>What do neuronal network models of the mind indicate about animal consciousness?</b>	S63
<i>J G Taylor</i>	
<b>How the hierarchical organization of the brain and increasing cognitive abilities may result in consciousness</b>	S77
<i>B M Spruijt</i>	
<b>Behavioural and neural correlates of mental imagery in sheep using face recognition paradigms</b>	S89
<i>K M Kendrick, A Leigh and J Peirce</i>	
<b>Can invertebrates suffer? Or, how robust is argument-by-analogy?</b>	S103
<i>C M Sherwin</i>	
<b>'Mindreading' mammals? Attribution of belief tasks with dolphins</b>	S119
<i>A J-P C Tschudin</i>	
<b>The inside and outside aspects of consciousness: complementary approaches to the study of animal emotion</b>	S129
<i>F Wemelsfelder</i>	
<b>Animal memory and animal welfare</b>	S141
<i>M Mendl, O Burman, K Laughlin and E Paul</i>	
<b>Are animals capable of deception or empathy? Implications for animal consciousness and animal welfare</b>	S161
<i>S Kuczaj, K Tranel, M Trone and H Hill</i>	
<b>Behavioural reactivity affected by chronic stress: an experimental approach in calves submitted to environmental instability</b>	S175
<i>A Boissy, I Veissier and S Rousset</i>	
<b>Attentional shifts alter pain perception in the chicken</b>	S187
<i>M J Gentle</i>	
<b>Anticipation and memory as criteria for special welfare consideration</b>	S195
<i>S E G Lea</i>	
<b>Studies in social cognition: from primates to pigs</b>	S209
<i>S Held, M Mendl, C Devereux and R W Byrne</i>	
<b>Hooded crows solve a transitive inference problem cognitively</b>	S219
<i>O F Lazareva, A A Smirnova, Z A Zorina and V V Rayevsky</i>	

## ABSTRACTS

- Domestic hens have declarative representations** S235  
*B Forkman*
- Animals - more than sentience: ethical and welfare implications** S236  
*A Antonites*
- Incentive value learning in domestic hens** S237  
*N C A Coerse, M J Haskell and B Forkman*
- Early environmental experience and transferable skills in the weaned piglet** S238  
*J J Cooper, L N Cox and C Whitworth*
- Emotion and successful learning in cattle** S239  
*K Hagen and D M Broom*
- Using discrimination training to assess mental states** S240  
*E J Harding, M Mendl, C J Nicol and E Paul*
- Contrasts and comparisons of incentive situations in domestic poultry** S241  
*M J Haskell, M Vilarino, N C A Coerse and M Picard*
- Compartmentalization: a useful tool or a hindrance?** S242  
*M J Kennedy*
- Object permanence in young hooded crows and budgerigars** S243  
*N V Michnevich, O F Lazareva, A A Smirnova, Z A Zorina and J I Reznikova*
- Dog consciousness: does human companionship make a difference?** S244  
*Á Miklósi, J Topál and V Csányi*
- Individual and temporal differences in the cortisol response of sheep to repeated transport** S245  
*R F Smith and H Dobson*
- The hierarchical organization of the brain as a key to the study of consciousness in human and non-human animals: phylogenetic implications** S246  
*R Van den Bos*
- Possibilities and limitations of the study of the animal mind** S248  
*J Van Rooijen*
- Analysis of the disadvantages of zoos in wildlife conservation** S250  
*W Zhang*

Published by  
Universities Federation for Animal Welfare  
The Old School, Brewhouse Hill, Wheathampstead, Herts AL4 8AN, UK  
Tel: 01582 831818 Fax: 01582 831414