

# Animal Welfare

Volume 25 Issue 4

November 2016

## Articles

*Technology for improving zoo animal welfare*

*Attitudes of equestrians to sport horse welfare*

*Harmless stress assessment in gilthead bream*

*Attitudes of beef producers to disbudding and pain*

*Welfare issues among pig farmers in Tanzania*

*Reliability of the Welfare Quality® protocol*

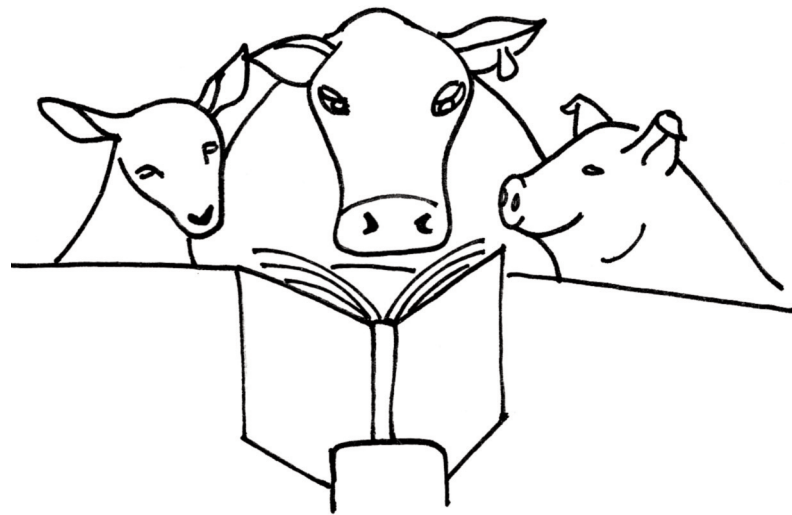
*Compliance with farm animal welfare legislation inspections*

*Euthanasia of goat kids*

*AWIN approach to horse welfare assessment*

*Stunning crustaceans with electricity prior to slaughter*

*Standardising assessment of legislation compliance for pigs*



Reports and Comments

Book Reviews

2015-2016 Referees

Index to Volume 25

100th issue

# Animal Welfare

ISSN 0962-7286

**Editor-in-Chief: Robert C Hubrecht**  
**Editorial Assistant: Steve Weddell**  
**Administrative Officer: Samantha Griffin**  
**Administrative Assistant: Wendy Goodwin**

## Section Editors

### Laboratory animals

Professor Jann Hau  
Department of Experimental Medicine, University of Copenhagen  
Faculty of Health Sciences and University Hospital  
3B Blegdamsvej, DK-2200 Copenhagen N, Denmark

### Ethics, philosophy and social science

Professor Peter Sandøe  
Danish Centre for Bioethics and Risk Assessment  
Rolighedsvej 25, DK-1958 Frederiksberg, Denmark

### General animal welfare science

Dr Isabelle Veissier  
Herbivores Joint Research Unit  
French National Institute for Agricultural Research  
F-63122 Saint-Genès-Champanelle, France

### Farmed pigs

Dr Yolande M Seddon  
Large Animal Clinical Sciences  
Western College of Veterinary Medicine,  
52 Campus Drive, Saskatoon, SK, S7N 5B4, Canada

### Farmed ruminants

Professor Marina von Keyserlingk  
Animal Welfare Program  
The University of British Columbia  
2357 Main Mall, Vancouver, Canada V6T 1Z4

### Farmed fish

Professor Victoria Braithwaite  
School of Forest Resources and Department of Biology  
Penn State University, University Park, PA 16802, USA

### Companion animals other than horses

Professor Xavier Manteca  
School of Veterinary Science  
Universitat Autònoma de Barcelona  
08193 Bellaterra (Barcelona), Spain

### Horses and other equines

Professor Natalie Waran  
Faculty of Education, Humanities and Health Science  
Eastern Institute of Technology  
Private Bag 1201, Hawkes Bay, New Zealand

### Poultry

Dr T Bas Rodenburg  
Behavioural Ecology Group  
Wageningen University  
De Elst 1, 6708 WD, Wageningen  
The Netherlands

### Wild animals

Dr Kate E Littin  
Animal and Animal Products, Regulation & Assurance  
Ministry for Primary Industries - Manatū Ahu Matua  
Pastoral House,  
25 The Terrace  
PO Box 2526, Wellington 6140, New Zealand

### Zoo animals

Dr Fay Clark  
Bristol Zoological Society,  
Bristol Zoo Gardens  
Clifton, Bristol BS8 3HA, UK

## Editorial Advisers

Dr MF Bouissou — 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

Professor Benjamin Hart — University of California, Davis, USA  
Professor David Morton — University of Birmingham, UK  
Dr James Serpell — University of Pennsylvania, USA  
Professor John Webster — University of Bristol, UK  
Professor Piet Wiepkema — Oosterbeek, The Netherlands

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 £85/US\$170 per Volume; Corporate/Institutes/Libraries £315/US\$630 per Volume.

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

Papers: Instructions for authors are summarised on the inside back cover; comprehensive instructions are available from our website, or on request from UFAW. Manuscripts should be submitted online at <http://mc04.manuscriptcentral.com/ufaw-aw>.

Animal Welfare is abstracted in Biological Abstracts; CAB Abstracts; Current Contents/Agriculture, Biology and Environmental Sciences; Focus on: Veterinary Science & Medicine; SciSearch; Biosis Previews; Toxicology Abstracts; Veterinary Update; is indexed in Zoological Record; and is covered by the Science Citation Index.

© 2016 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.

**Published by**  
**Universities Federation for Animal Welfare**  
**The Old School, Brewhouse Hill, Wheathampstead, Herts AL4 8AN, UK**  
**Tel: +44 1582 831818 Fax: +44 1582 831414 Web: [www.ufaw.org.uk](http://www.ufaw.org.uk)**

# Animal Welfare

ISSN 0962–7286

Volume 25 Issue 4

November 2016

## Contents

### Articles

- Using technology to monitor and improve zoo animal welfare 395  
*JC Whitham and LJ Miller*
- Factors influencing the attitude of equestrians towards sports horse welfare 411  
*C Ikinger, A Spiller and M Kayser*
- A preliminary approach on the stress assessment through harmless procedures in farmed seabream (*Sparus aurata*) 423  
*M Herrera, J López and A Hervas*
- Attitudes of beef producers to disbudding and perception of pain in cattle 429  
*I Wikman, A-H Hokkanen, M Pastell, T Kauppinen, A Valros and L Hänninen*
- Awareness concerning optimal pig production management and animal welfare among smallholder farmers in Tanzania 439  
*UC Braae, M-L Penrith, HA Ngowi, F Lekule and MV Johansen*
- Test-retest reliability of the Welfare Quality® animal welfare assessment protocol for growing pigs 447  
*I Czyncholl, C Kniese, K Büttner, E Grosse Beilage, L Schrader and J Krieter*
- Farm membership of voluntary welfare schemes results in better compliance with animal welfare legislation in Great Britain 461  
*CCA Clark, R Crump, AL KilBride and LE Green*
- Evaluation of the efficacy of a non-penetrating captive bolt to euthanase neonatal goats up to 48 hours of age 471  
*MA Sutherland, TJ Watson, CB Johnson and ST Millman*
- Welfare assessment of horses: the AWIN approach 481  
*E Dalla Costa, F Dai, D Lebelt, P Scholz, S Barbieri, E Canali, AJ Zanella and M Minero*
- Electrical stunning of edible crabs (*Cancer pagurus*): from single experiments to commercial practice 489  
*B Roth and E Grimsbø*
- Standardising the assessment of environmental enrichment and tail-docking legal requirements for finishing pigs in Europe 499  
*B Hothersall, L Whistance, H Zedlacher, B Algers, E Andersson, M Bracke, V Courboulay, P Ferrari, C Leeb, S Mullan, J Nowicki, M-C Meunier-Salaün, T Schwarz, L Stadig and D Main*
- Reports and Comments** 511
- Wild animals in circuses*
- Welfare of working equids*
- Horses in our hands*
- Book Reviews** 515
- Domestic Animal Behaviour and Welfare, Fifth Edition*
- Comfortable Quarters for Laboratory Animals, Tenth Edition*
- 2015-2016 Referees** 519
- Index to Volume 25** 521

On the cover: 'Farmyard study' courtesy of GT Wickens.

Universities Federation for Animal Welfare



Science in the Service of Animal Welfare

# Animal Welfare

## Journal Subscription Order Form

Please photocopy or cut out and complete in BLOCK capitals, then return form(s) by post to the address below. Subscriptions and UFAW Memberships may be requested from the Administrative Office by email: [ufaw@ufaw.org.uk](mailto:ufaw@ufaw.org.uk).

Subscriptions are accepted by Volume, which comprises 4 issues per year, and are payable in advance. Prices are subject to annual review.

**Journal Subscription Category** (please mark as appropriate)

**Individuals**

UFAW members.....£85/US\$170    Non-members.....£125/US\$250

**Institutes/Libraries/Corporate**

UFAW members.....£225/US\$450    Non-members.....£315/US\$630

Please contact the Administrative Office for details of back-issue availability and cost.

---

**UFAW Membership Application**

I hereby apply to join the Universities Federation for Animal Welfare as a member subject to the provisions of the Memorandum and Articles of Association. Under the Articles of Association and Current Byelaws of UFAW, members can become eligible for election by Council to voting membership after three years. I agree to my name being entered in the Register of Members.

Membership category (please mark as appropriate)

Standard.....£30/US\$60    Student.....£10/US\$20

Signature..... Date.....

---

**Payment Options**

I wish to pay by cheque:                    (    )

I enclose my cheque for ..... made payable to UFAW.

**OR**

I wish to pay by credit card:            (    )

(We can accept Visa/Delta/Mastercard — minimum £10)

Name of Cardholder.....

Card number																			
-------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Type of Card (eg Visa/Delta/Mastercard)..... Expiry date.....

Signature..... Amount to be debited.....

Name.....

Address.....

..... POST/ZIP CODE.....

**Universities Federation for Animal Welfare**  
**The Old School, Brewhouse Hill, Wheathampstead, Herts AL4 8AN, UK**  
**Tel: +44 1582 831818    Fax: +44 1582 831414    Web: [www.ufaw.org.uk](http://www.ufaw.org.uk)**