

Volume 13 December 2 2012

ISSN 1466-2523

# Animal Health Research Reviews

**CRWAD**  
conference of research workers in animal diseases

**CAMBRIDGE**  
UNIVERSITY PRESS

# Animal Health Research Reviews

## Editor-in-Chief

Carlton L. Gyles

*University of Guelph, Canada*

## Founding Editor

Robert P. Ellis

*Colorado State University, USA*

## Section Editors

**Physiology and Pharmacology** Gerhard Breves, *Veterinary School of Hannover, Germany*

**Parasitology** Katherine M. Kocan, *Oklahoma State University, USA*

**Bacteriology** Janet MacInnes, *University of Guelph, Canada*

**Food and Environmental Safety** Qijing Zhang, *Iowa State University, USA*

**Epidemiology** M. D. Salman, *Colorado State University, USA*

**Virology** Y. M. Saif, *Ohio State University, USA*

## Editorial Board

Franklin A. Ahrens, *Iowa State University, USA*

Chris Chase, *South Dakota State University, USA*

Lynette B. Corbeil, *University of California-San Diego Medical Center, USA*

David H. Francis, *South Dakota State University, USA*

Joachim Frey, *University of Berne, Switzerland*

Ian Gardner, *University of California-Davis, USA*

Richard Isaacson, *University of Minnesota, USA*

Mario Jacques, *University of Montreal, Canada*

Jeff LeJeune, *The Ohio State University, USA*

Jun Lin, *The University of Tennessee, USA*

Joan K. Lunney, *USDA-Livestock and Poultry Sciences Institute, USA*

Rodney Moxley, *University of Nebraska-Lincoln, USA*

Prem S. Paul, *University of Nebraska-Lincoln, USA*

Brian Perry, *International Livestock Research Institute, Kenya*

Donald L. Reynolds, *University of Prince Edward Island, Canada*

Linda J. Saif, *Ohio State University, USA*

Ronald D. Schultz, *University of Wisconsin, USA*

J. Glenn Songer, *University of Arizona, USA*

Bert E. Stromberg, *University of Minnesota, USA*

Francisco Suárez-Güemes, *Universidad Nacional Autónoma de México, México*

Amelia Woolums, *University of Georgia, USA*

Dongwan Yoo, *University of Illinois at Urbana-Champaign, USA*

## Aims and Scope

*Animal Health Research Reviews* provides an international vehicle for the publication of reviews and commentaries on all aspects of animal health. The Journal covers both infectious and non-infectious diseases in companion, production and wild animals. Articles may be in-depth reviews of a specific aspect of a disease or pathogen, or may cover all aspects of a disease, but must include new findings or advance new concepts and hypotheses. The Journal publishes both solicited and unsolicited articles. Reviews will normally be 5000–6000 words in length. The Journal is also produced electronically and is available on the Internet. If you wish to write a review please contact the editors at [ahrjournal@cambridge.org](mailto:ahrjournal@cambridge.org).

## Subscriptions

*Animal Health Research Reviews* (ISSN 1466-2523) is published twice a year. The subscription price for institutions of Volume 13 (2012) which includes electronic access and delivery by air is £310 (US \$575 in the USA, Canada and Mexico); the electronic only price for institutions is £236 (US \$440 in the USA, Canada and Mexico).

Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent or direct to the publisher: Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, UK; or in the USA, Canada and Mexico: Cambridge University Press, Journals Fulfillment Department, 100 Brook Hill Drive, West Nyack, New York, 10994-2133. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from Kinokuniya Company Ltd, P. O. Box 55, Chitose, Tokyo 156, Japan.

Copies of the journal for subscribers in the USA, Canada and Mexico are sent by air to New York to arrive with minimum delay. Periodicals postage paid at New York, NY, and at additional mailing offices. Postmaster: send address changes in the USA, Canada and Mexico to: *Animal*, Cambridge University Press, 100 Brook Hill Drive, West Nyack, New York 10994-2133. Claims for missing issues should be made immediately on receipt of the subsequent issue.

## Advertising

Advertising queries for all parts of the world *except* the USA, Canada and Mexico to the Journals Advertising Co-ordinator: Rebecca Curtis, [ad\\_sales@cambridge.org](mailto:ad_sales@cambridge.org). Address enquiries in the USA, Mexico and Canada *only* to: [journals\\_advertising@cup.org](mailto:journals_advertising@cup.org)

## Copying

This journal is registered with the Copyright Clearance Centre, 222 Rosewood Drive, Danvers, MA 01923, USA.

Organizations in the USA who are also registered with C. C. C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of U.S. Copyright law) subject to promotional or commercial purposes. Code 0266-4674/2012 \$16.00.

*ISI Tear Sheet Service*, 3501 Market Street, Philadelphia, PA 19104, USA is authorized to supply single copies of separate articles for private use only.

Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions. *For all other use*, permission should be sought from Cambridge or the American Branch of Cambridge University Press.

## Internet Access

This journal is included in the Cambridge Journals Online Service which can be found at [www.journals.cambridge.org/ahr](http://www.journals.cambridge.org/ahr)

# Animal Health Research Reviews

## Contents

Animal Health Research Reviews – the past 10 years <i>Carlton L. Gyles</i> . . . . .	143
Birds and bornaviruses <i>Susan L. Payne, Pauline Delnatte, Jianhua Guo, J. Jill Heatley, Ian Tizard and Dale A. Smith</i> . . . . .	145
Methicillin-resistant staphylococci: implications for our food supply? <i>M. Ellin Doyle, Faye A. Hartmann and Amy C. Lee Wong</i> . . . . .	157
Vaccine development for protecting swine against influenza virus <i>Qi Chen, Darin Madson, Cathy L. Miller and D. L. Hank Harris</i> . . . . .	181
Relevance of improved epidemiological knowledge to sustainable control of <i>Haemonchus contortus</i> in Nigeria <i>M. B. Bolajoko and E. R. Morgan</i> . . . . .	196
Climate change and animal diseases: making the case for adaptation <i>Sigfrido Burgos Cáceres</i> . . . . .	209