World’s Poultry Science Journal provides authoritative reviews in poultry science and an international forum for the exchange and dissemination of information including research, education and industry organisation. Each issue includes poultry industry-related news, regional reports on global developments in poultry, reports from specialist scientific working groups, book reviews, association news and a calendar of forthcoming events.

Coverage includes breeding, nutrition, welfare, husbandry, production systems, processing, product development, physiology, egg and meat quality, industry structure, economics and education.

The journal is of interest to academics, researchers, students, extension workers and commercial poultry producers.

Submit your research online
http://mc.manuscriptcentral.com/wpsj

World’s Poultry Science Journal is available online at:
http://journals.cambridge.org/wps

To subscribe contact
Customer Services
in Cambridge:
Phone +44 (0)1223 326070
Fax +44 (0)1223 325150
Email journals@cambridge.org

in New York:
Phone +1 (845) 353 7500
Fax +1 (845) 353 4141
Email subscriptions_newyork@cambridge.org

Free email alerts
Keep up-to-date with new content
http://journals.cambridge.org/wps-alerts

For free online content visit:
http://journals.cambridge.org/wpssample
The Journal of Agricultural Science

Senior Editors
Prof. R. E. L. Naylor, University of Aberdeen, Room 517 MacRobert Building, 581 King Street, Aberdeen AB24 3UA, UK
Prof. J. Wiseman, University of Nottingham, School of Biosciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK

Editorial Board
T. Aveling, University of Pretoria, South Africa
P. Bilborough, Newcastle University, UK
S. C. Bishop, Roslin Institute, Edinburgh, UK
M. D. Cast, US Dairy Forage Research Center, Madison, USA
S. Cecarelli, ICARDA, Syria
A. Cobb, Sedbergh, UK
B. R. Cullis, University of Wollongong, Australia
J. Dijkstra, Wageningen University, The Netherlands
R. N. Edmondson, Warwick HRI, Wellesbourne, UK
W. Erskine, CLIMA, University of Western Australia, Australia
J. France, University of Guelph, Canada
J. M. Hobbs, Cornell University, Ithaca, NY

G. Hooogenboom, Washington State University, USA
M. O. Humphreys, Institute of Grassland and Environmental Research, Aberystwyth, UK
R. Hunter, CSIRO, Livestock Industries, Division of Tropical Production, Queensland, Australia
P. S. Kettlewell, Harper Adams University College, UK
J. Laurens, Cornell University, Ithaca, NY USA
D. B. Lindsay, Cambridge, UK
S. J. Mooney, University of Nottingham, UK
C. K. Reynolds, University of Reading, UK
J. A. Rook, SAC, Edinburgh, UK
U. R. Sangakkara, University of Peradeniya, Sri Lanka
N. St. Pierre, Ohio State University, USA
C. Watson, Scottish Agricultural College, Aberdeen, UK

SUBMISSIONS
The Journal has moved to electronic submission. Manuscripts should be uploaded to http://mc.manuscriptcentral.com/jagricsci. Double-blind refereeing has also been adopted, therefore the authors’ names, addresses and emails should be removed from the main document and uploaded as a title page in a separate file, tagged ‘Not for Review’. Help is available on the website.

SUBSCRIPTIONS
The Journal of Agricultural Science (ISSN 0021-8596) is published six times a year in February, April, June, August, October and December. Six parts form a volume. The subscription price (excluding VAT) of Volume 149 (2011) (which includes delivery by air where appropriate, plus electronic access to institutional subscribers) is £717 net (US $1321.00 in the USA, Canada and Mexico). Single parts are £119 net (US $219 in the USA, Canada and Mexico). The electronic only price available to institutional subscribers is £595.00 ($1103.00 in USA, Canada and Mexico). Back issues are also available.

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, PO Box 55, Chitose, Tokyo 156, Japan.

CAMBRIDGE UNIVERSITY PRESS
The Edinburgh Building, Shaftesbury Road, Cambridge CB2 8RU, United Kingdom
32 Avenue of the Americas, New York, NY 10013–2473, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock House, The Waterfront, Cape Town 8001, South Africa

Printed in the United Kingdom by the University Press, Cambridge

COPYING
No contents may be reproduced by any means without the permission of Cambridge University Press. This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA (www.copyright.com). Organizations in the USA who are also registered with the CCC may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to CCC. This consent does not extend to multiple copying for promotional or commercial purposes. ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19106, 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 http://www.journals.cambridge.org For further information on other Press titles access www.cambridge.org

This journal issue has been printed on FSC-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world’s forests. Please see www.fsc.org for information.

© Cambridge University Press 2011

https://doi.org/10.1017/S0021859610001206
THE JOURNAL OF AGRICULTURAL SCIENCE

CONTENTS

CLIMATE CHANGE AND AGRICULTURE PAPERS
H. W. POLLEY, J. A. MORGAN and P. A. FAY Application of a conceptual framework to interpret variability in rangeland responses to atmospheric CO2 enrichment 1
P. CALANCA, D. BOLES, A. P. WEIGEL and M. A. LINIGER Application of long-range weather forecasts to agricultural decision problems in Europe 15
T. T. DERESSA, R. M. HASSAN and C. RINGLER Perception of and adaptation to climate change by farmers in the Nile basin of Ethiopia 23
K. KRISTENSEN, K. SCHELDE and J. E. OLESEN Winter wheat yield response to climate variability in Denmark 33
P. PELTONEN-SAINIO, L. JAASEN and K. HAKALA Crop responses to temperature and precipitation according to long-term multi-location trials at high-latitude conditions 49

CROPS AND SOILS PAPERS
M. P. W. SONNEVELD and J. J. H. VAN DEN AKKER Quantification of C and N stocks in grassland topsoils in a Dutch region dominated by dairy farming 63
J. KLEEN, F. TAUBE and M. GIERUS Agronomic performance and nutritive value of forage legumes in binary mixtures with perennial ryegrass under different defoliation systems 73
D. N. VLACHOSTERGIOS, A. S. LITHOURGIDIS and D. G. ROPAKIAS Adaptability to organic farming of lentil (Lens culinaris Medik.) varieties developed from conventional breeding programmes 85
P. BIHANI, B. CHAR and S. BHARGAVA Transgenic expression of sorghum DREB2 in rice improves tolerance and yield under water limitation 95

ANIMAL PAPERS
C. B. WASIKE, A. K. KARI and K. J. PETERS A participatory approach to the evaluation of the efficiency of animal recording practices based on institutional analysis and development framework 103
N. GHAVI HOSSEIN-ZADEH and M. ARDALAN Bayesian estimates of genetic parameters for cystic ovarian disease, displaced abomasum and foot and leg diseases in Iranian Holsteins via Gibbs sampling 119

BOOK REVIEW 125

FORTHCOMING EVENTS 127

Journal of Agricultural Science now accepts submissions via Manuscript Central. Go to http://mc.manuscriptcentral.com/jagricsci