The Journal of Agricultural Science

SENIOR EDITORS
Dr P. Bilalbore
University of Newcastle, School of Agriculture, Food & Rural Development, Newcastle upon Tyne NE1 7RU, UK
Prof. J. Wiseman
University of Nottingham, School of Biosciences, Sutton Bonington Campus, Loughborough, Leicestershire LE12 5RD, UK

EDITORIAL BOARD
M. Adali, College of Public Health, Medical and Veterinary Sciences, James Cook University, Australia
T. Aveling, University of Pretoria, South Africa
B. Barkla, Southern Cross University, Australia
R. Bhatta, National Institute of Animal Nutrition and Physiology, India
S. Bitinman, Agroscope Research Centre, Switzerland
G. Cantalapiedra, INRA – Voisins, Senlis, France
M. D. Coen, US Dairy Forage Research Center, Madison, USA
S. Crecarelli, ICARDI, France
E. Charmley, CSIRO, Australia
B. R. Chalmers, University of Queensland, Australia
B. R. Collins, University of Wollongong, Australia
W. Dannenfjy, University of Prenensive, Sri Lanka
J. Dijkstra, Wageningen University, The Netherlands
R. Dinkins, USDA-ARS, USA

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 ten times a year in January, March, April, May, July, August, September, October, November and December. Ten parts form a volume. The subscription price (excluding VAT) of Volume 155 (2017) (which includes delivery by air where appropriate, plus electronic access to institutional subscribers) is £1377 net (US $2626) in the USA, Canada and Mexico. Single parts are £181 net (US $362) in the USA for educational institutions. The subscription price (inclusive of delivery) of Volume 155 (2017) is £1577 net (US $3154) in the USA, Canada and Mexico to: The Journal of Agricultural Science, Cambridge University Press, Journals Fulfillment Department, Cambridge University Press, 1 Liberty Plaza, Floor 20, New York, NY 10006, USA. Claims for missing issues should be made immediately on receipt of the subsequent issue.

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 Tee 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 the Cambridge or the American Branch of Cambridge University Press.

INTERNET ACCESS
This journal can be found online at Cambridge Core cambridge.org/core

In this issue, we feature a paper on the role of FSC-certified paper and cover boards in promoting sustainable forestry practices. The journal is open access and free to read online. To find out more, visit cambridge.org/core

Printed in the UK by Bell & Bain Ltd., Glasgow.
Modelling Animal Systems papers in this issue

CROP RESEARCH PAPERS

The relationship among flowering tolerance, vernalization requirement, Ppd alleles and winter hardness in European wheat cultivars
A. GORASH, R. ARMONIENE·, Ž. LIATUKAS AND G. BRAZAUSKAS 1353

Validation of analytical method and evaluation of clothianidin residues in rice in a typical Chinese field ecosystem
J. Y. LI, Y. ZHENG, A. CHEN, X. L. WANG AND J. L. ZHU 1371

Nineteen different traits show the management of perennial ryegrass-lawn for growing cattle
J. M. MCDONNELL, T. J. GILLIAM, M. MURPHY, L. DELBRY AND M. O’CONNOR 1381

Effects of precision planting patterns and am management on winter wheat yields and water productivity
X. M. MAO, W. W. ZHONG, X. Y. WANG AND Q. ZHOU 1394

Nitrogen-use efficiency in spring wheat: genotypic variation and grain yield response under sandy soil conditions

Corrigendum
Impact of dynamics of faecal concentrations of plant and synthetic n-alkanes on their suitability for the estimation of dry matter intake and apparent digestibility in horses
M. BACHMANN, M. WENSCH-DORENDORF, M. BULANG AND A. ZEYNER 1475

ANIMAL RESEARCH PAPERS

Effects of different dietary protein levels and rumen-protected folic acid on ruminal fermentation, degradability, bacterial populations and urinary excretion of purine derivatives in beef steers

Chronic heat stress and feed restriction affects carcass composition and the expression of genes involved in the control of fat deposition in broilers

Submit your paper online
mc.manuscriptcentral.com/jagricsci

Register to receive the latest news and content from the journal
https://www.cambridge.org/core/journals/journal-of-agricultural-science

ISSN: 0021-8596
VOLUME 155 ISSUE 9 NOVEMBER 2017
THE JOURNAL OF AGRICULTURAL SCIENCE