

SPANISH JOURNAL OF AGRICULTURAL RESEARCH

Formerly known as “Investigación Agraria” the SJAR merged in 2003 from two series: “Producción y Protección Vegetales” and “Producción y Sanidad Animales” founded in 1985, the predecessor of which was “Anales del Instituto Nacional de Investigaciones Agronómicas”, first published in 1952

EDITORIAL BOARD

Chief Scientific Editors

PLANT SCIENCE. **Fernando Ponz Ascaso.** INIA, Madrid (Spain). fponz@inia.es

ANIMAL SCIENCE. **Antonio Lopez Sebastian.** INIA, Madrid (Spain). alopez@inia.es

AGRICULTURAL ECONOMICS AND ENGINEERING. **Carmen de Blas Beorlegui.** INIA, Madrid (Spain). cblas@inia.es

Managing Editors

Victoria Baonza Merino. INIA, Madrid (Spain). baonza@inia.es

Carmen de Blas Beorlegui. INIA, Madrid (Spain). cblas@inia.es

Technical Editor

Gemma Perez Rivera. INIA, Madrid (Spain). publinia@inia.es

AGRICULTURAL ECONOMICS

SECTION EDITOR: **Fernando Vidal** (UMH, Orihuela, Alicante, Spain). fvidal@umh.es

ASSOCIATE EDITORS: **Jesus Barreiro** (FAO, Roma, Italy). **Julio Berbel** (UCO, Cordoba, Spain). **Margarita Brugarolas** (UMH, Orihuela, Alicante, Spain). **Carlos Romero** (UPM, Madrid, Spain). **Baldomero Segura** (UPV, Valencia, Spain).

AGRICULTURAL ENGINEERING

SECTION EDITOR: **Francisco Rovira** (UPV, Valencia, Spain). frrovira@dmta.upv.es

ASSOCIATE EDITORS: **Carlos J. Alvarez** (USC, Santiago de Compostela, La Coruña, Spain). **Fatima Baptista** (Univ Evora, ICAAM, Evora, Portugal). **Emilio Gil** (UPC, Castelldefels, Barcelona, Spain). **Elisa Gorbe** (Wageningen Univ, Wageningen, Netherlands). **Jose M. Peña-Barragan** (CSIC, Cordoba, Spain). **M. Carmen Rocamora** (UMH, Orihuela, Alicante, Spain). **Victor Sanchez-Giron** (UPM, Madrid, Spain).

AGRICULTURAL ENVIRONMENT AND ECOLOGY

SECTION EDITOR: **Robert Save** (IRTA, Caldes de Montbui, Barcelona, Spain). robert.save@irta.es

ASSOCIATE EDITORS: **Alvaro Alonso-Fernandez** (UAH, Alcala de Henares, Madrid, Spain). **Carmen Biel** (IRTA, Caldes de Montbui, Barcelona, Spain). **Josep M. Espelta** (CREAF-UAB, Barcelona, Spain). **M. Rosa Mosquera** (USC, Lugo, Spain). **Sebastian Sanchez-Fotus** (UPM, Madrid, Spain). **M. Brigida Fernandez de Simon** (INIA, Madrid, Spain). **Eustaquio Gil-Pelegrin** (CITA, Zaragoza, Spain).

ANIMAL BREEDING, GENETICS AND REPRODUCTION

SECTION EDITOR: **Luis Varona** (UNIZAR, Zaragoza, Spain). lvarona@unizar.es

ASSOCIATE EDITORS: **Isabel Cervantes** (UCM, Madrid, Spain). **Jose M. Folch** (CRAG, UAB, Barcelona, Spain). **Eva Moce** (IVIA, Valencia, Spain). **Julian Santiago-Moreno** (INIA, Madrid, Spain).

ANIMAL HEALTH AND WELFARE

SECTION EDITOR: **Lorenzo Gonzalez** (AHVLA-Lasswade, Penicuik, Scotland, UK). lorenzo.gonzalez@ahvla.gsi.gov.uk

ASSOCIATE EDITORS: **Jose M. Blasco** (SIA, Zaragoza, Spain). **Mercedes Gomez** (UCM, Madrid, Spain). **Ramon A. Juste** (NEIKER, Derio, Vizcaya, Spain). **Colin McInnes** (Moreton Research Institute, Scotland, UK).

ANIMAL PRODUCTION

SECTION EDITOR: **Clemente Lopez-Bote** (UCM, Madrid, Spain). clemente@vet.ucm.es

ASSOCIATE EDITORS: **M. Dolores Carro** (UPM, Madrid, Spain). **Argimiro Daza** (UPM, Madrid, Fuensanta Hernandez-Ruiperez) (UM, Murcia, Spain). **Gonzalo Hervas** (IGM-CSIC-ULE, Leon, Spain). **M. Angeles Latorre** (UNIZAR, Zaragoza, Spain). **Rosa M. Nieto** (EEZ, CSIC, Granada, Spain). **J. Francisco Perez-Hernandez** (UAB, Barcelona, Spain). **Alfredo Teixeira** (Inst Politec Bragança, Bragança, Portugal).

Journal Editorial Office

Servicio de Publicaciones-INIA. Autopista A-6, km 7.5. E-mail: sjar@inia.es. Phone: +34 91 347 39 45. Fax: +34 91 357 22 93

AIM AND SCOPE

The *Spanish Journal of Agricultural Research* (SJAR) accepts research articles, reviews and short communications of content related to agriculture. Research articles and short communications must report original work not previously published in any language, nor under consideration for publication elsewhere.

SJAR is an international peer-reviewed journal. The main aim of SJAR is to publish papers that report research findings on the following topics: agricultural economics; agricultural engineering; agricultural environment and ecology; animal breeding, genetics and reproduction; animal health and welfare; animal production; plant breeding, genetics and genetic resources; plant physiology; plant production (field and horticultural crops); plant protection; soil science; and water management.

SJAR is indexed in **Science Citation Index** and **Scopus**. Additionally, in **Agricola**, **Agris**, **Biosis**, **CAB Abstracts**, **CABI full text databases**, **Current Contents Connect** (Agriculture/Agronomy), **Dialnet**, **DOAJ** (Directory of Open Access Journals), **FSTA** (Food Science and Technology Abstracts), **Georef**, **Global Health**, **ICyT**, **Pascal**. It is also included in the following automated directories: **Jake**, **Latindex Catalogue**, **Redalyc**, **Ulrich's Periodicals Directory**.

SJAR is published quarterly (March, June, September and December) by the *Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria* [Spanish National Institute for Agricultural and Food Research and Technology] (INIA), Autopista A-6, km 7.5, Madrid, Spain.

ALERT SERVICE

Register as Reader with this journal, at www.inia.es/sjar. You will be notified by email on publication of new issues of SJAR.

OPEN ACCESS JOURNAL

Full contents available online at www.inia.es/sjar