

# JOURNAL OF ANIMAL SCIENCE

Curtiss M. Bailey, *Editor-in-Chief* (1987)

Denise L. York, *Assistant Editor*

## SECTION EDITORS

- Gary L. Cromwell, *Nonruminant Nutrition* (1989)  
H. Russell Cross, *Meat Science* (1989)  
Terry D. Etherton, *Growth and Developmental Biology* (1987)  
Rodger K. Johnson, *Breeding and Genetics* (1989)  
O. W. Robison, *Applied Animal Science* (1987)  
Theron S. Rumsey, *Ruminant Nutrition* (1987)  
G. Stanley Smith, *Pharmacology and Toxicology* (1989)  
W. Ray Stricklin, *Environment and Behavior* (1989)  
H. Allen Tucker, *Physiology and Endocrinology* (1989)

## EDITORIAL BOARD

- |                            |                              |                               |
|----------------------------|------------------------------|-------------------------------|
| Janice M. Bahr (1989)      | Fred R. Ehle (1987)          | Ronny L. Moser (1989)         |
| David B. Batson (1987)     | Eugene J. Eisen (1987)       | Russell B. Muntifering (1987) |
| David K. Beede (1989)      | Royce J. Emerick (1987)      | Terry M. Nett (1989)          |
| Donald H. Beermann (1989)  | Richard C. Ewan (1988)       | Merlyn K. Nielsen (1987)      |
| R. Dean Boyd (1988)        | Thomas R. Famula (1987)      | Richard F. Olsen (1987)       |
| James S. Brinks (1988)     | R. A. Field (1988)           | Donald L. Palmquist (1987)    |
| Jack H. Britt (1987)       | John C. Forrest (1987)       | Mark K. Petersen (1987)       |
| Robert A. Britton (1989)   | Donald E. Franke (1988)      | W. E. Pinchak (1988)          |
| Michael C. Brumm (1989)    | Rodney D. Geisert (1988)     | Donald A. Price (1989)        |
| Kenneth L. Bryant (1987)   | Harold Gonyou (1989)         | Terry J. Prince (1987)        |
| Leonard S. Bull (1987)     | Daniel R. Hagen (1987)       | Melvin Riley (1987)           |
| W. Ronald Butler (1987)    | Andrew C. Hammond (1988)     | D. C. Sharp III (1988)        |
| Corlette C. Calvert (1989) | Harold B. Hedrick (1987)     | Stephen B. Smith (1987)       |
| Dennis R. Campion (1989)   | Gary M. Hill (1989)          | Jerry W. Spears (1989)        |
| Howard H. Casper (1987)    | Katherine A. Houghton (1987) | Norman C. Steele (1988)       |
| Peter R. Cheeke (1988)     | Melvin C. Hunt (1989)        | James R. Stouffer (1987)      |
| N. Andy Cole (1988)        | James J. Ireland (1987)      | Fred A. Thrift (1989)         |
| Robert J. Collier (1989)   | George Jesse (1988)          | James L. Voss (1987)          |
| George E. Combs (1987)     | James E. Kinder (1987)       | John C. Waller (1987)         |
| Nancy M. Cox (1989)        | John Klindt (1987)           | Charles W. Weems (1989)       |
| Thomas D. Crenshaw (1988)  | Darrell Knabe (1987)         | James E. Williams (1987)      |
| Duane L. Davis (1989)      | Kreg A. Leymaster (1988)     | James W. Wilton (1989)        |
| Mark A. Diekman (1987)     | Charles V. Maxwell (1987)    | Richard A. Zinn (1987)        |
|                            | William M. Moseley (1988)    |                               |

Terms expire on August 31 of year indicated

## OFFICERS AND DIRECTORS OF THE AMERICAN SOCIETY OF ANIMAL SCIENCE

- |                                       |  |  |
|---------------------------------------|--|--|
| R. L. Preston, <i>President</i>       | H. D. Hafs, <i>Director-at-Large</i>       | L. L. Wilson, <i>Northeast Director</i>  |
| C. B. Theurer, <i>President-Elect</i> | A. P. Raun, <i>Director-at-Large</i>       | E. C. Prigge, <i>Northeast Director</i>  |
| E. R. Miller, <i>Secretary</i>        | R. E. Walton, <i>Director-at-Large</i>     | G. L. Cromwell, <i>Southern Director</i> |
| A. L. Neumann, <i>Treasurer</i>       | S. E. Curtis, <i>Midwestern Director</i>   | D. G. Spruill, <i>Southern Director</i>  |
| J. P. Fontenot, <i>Past-President</i> | R. G. Zimelman, <i>Midwestern Director</i> | R. C. Bull, <i>Western Director</i>      |
| C. M. Bailey, <i>Editor-in-Chief</i>  |  | D. M. Hallford, <i>Western Director</i>  |

*Manuscripts.* Address manuscripts and correspondence concerning them to the Editor-in-Chief, Dr. Curtiss M. Bailey, Animal Science Department, University of Nevada, Reno, NV 89557-0097. See "Information for Contributors" on the inside back cover.

*Membership.* Application is invited from persons with interest in animal science and livestock production. Annual dues in the Society, which includes the Journal of Animal Science, are \$50.00. Student Affiliate Membership to those who are certified by a Professional member as a regularly enrolled college student who does not hold a full-time position at the time of application for, or annual renewal of, affiliate membership, \$25.00 annually, which includes receipt of the Journal of Animal Science. Institutional members (including receipt of the Journal of Animal Science), \$95.00 per year. Airmail postage to members and subscribers in foreign countries is an additional \$90.00 annually. Applications for membership with remittance should be mailed to the ASAS Business Office.

*Address Change and Missing Copies.* Notice of change in address should be received by the ASAS Business Office 60 days in advance of change. Claims for missing copies should be received within 30 days (90 days foreign) of publication date to ensure replacement copies at no charge.

ASAS Business Office, 309 W. Clark Street, Champaign, IL 61820

---

Journal of Animal Science (ISSN 0021-8812) is published monthly by the American Society of Animal Science. Second-class postage paid at Champaign, IL 61820 and at additional mailing offices. Form 3579 to be returned to the ASAS Business Office. Copyright 1987 by American Society of Animal Science. Printed in USA. All rights reserved. Reproduction in part or whole prohibited. Boyd Printing Company, Inc., 49 Sheridan Avenue, Albany, NY 12210.