

# INSTRUCTIONS TO AUTHORS

## *Journal of Animal Science*

### (REVISED 2013)

The Instructions for Authors to the *Journal of Animal Science (JAS)* is divided into 2 sections:

- I. Manuscript Preparation, which gives the Style and Form to be used by authors in the preparation of manuscripts; and
- II. Policies and Procedures of JAS, which provides details concerning the mission of JAS, contact information, care and use of animals, the types of articles accepted by JAS, submitting manuscripts to JAS (including copyright policies), the review procedures and policies, and papers in press, author proofs, and publication charges.

#### I. MANUSCRIPT PREPARATION (STYLE AND FORM)

**The most important thing you can do as you prepare your manuscript** is to consult a recent issue of *JAS* in terms of the acceptable format for headings, title page, Abstract, Key words, Introduction, Materials and Methods, Results, Discussion (or combined Results and Discussion), Literature Cited, and tables and figures (including figure captions), which are described in more detail below. **Failure to adhere to the style and form will result in immediate rejection of the manuscript.**

**General.** Papers must be written in English and must use the American spelling and usage as well as standard scientific usage, as given in the following online resources:

- For general style and form, authors should follow that recommended in *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*. 7th ed. Council of Science Editors, Reston, VA.
- For American English spelling and usage: *Merriam-Webster Online* (<http://www.m-w.com/>).
- For numbers usage, consult the **Policies Regarding Number Usage** later in this document.
- For SI units, the following site (National Institute of Standards and Technology) provides a comprehensive guide: <http://physics.nist.gov/cuu/Units/index.html>
- For capitalization and spelling of plants, consult the USDA Plants website (<http://plants.usda.gov>).
- For anatomical nomenclature, consult the current *Nomina Anatomica Veterinaria* ([http://www.wava-amav.org/Downloads/nav\\_2005.pdf](http://www.wava-amav.org/Downloads/nav_2005.pdf)).

Manuscripts should be prepared double-spaced in Microsoft Word, with lines and pages numbered consecutively, using Times New Roman font at 12 points. Special characters (e.g., Greek and symbols) should be inserted using the symbols palette available in this font. Complex equations should be entered using Math-Type. Tables and figures should be placed in separate sections at the end of the manuscript (not placed in the text). Authors should prepare their manuscript in Microsoft Word and upload the manuscripts using the fewest files possible to facilitate the review and editing processes.

Manuscripts should contain the following sections (Appendices or Online-Only Data Supplements, described below, are optional), in this order:

**Title Page.** The title page includes a running head (the first word only and any proper nouns capitalized and no more than 45 characters plus spaces); the title (only the first word and any proper nouns capitalized, as brief as possible, and including the species involved); names of authors (e.g., T. E. Smith; no title, positions, or degrees) and institutions, including the department, city, state or country (all with first letters capitalized), and ZIP or postal code. Affiliations are footnoted using the symbols \*, †, ‡, §, #, ||, ¶ and are placed below the author names. Footnotes on the first page (present address, and e-mail address of the corresponding author) are referenced by superscript numbers. Acknowledgments, including acknowledgements of grants, experiment station, or journal series number, are given as a footnote to the title. Authors who hold patents related to the research presented in the manuscript should include a statement in a footnote.

**Abstract.** The abstract consists of no more than 2,500 keystrokes (characters plus spaces) in one paragraph and summarizes the pertinent results (with statistical evidence; i.e., *P*-values) in a brief but understandable form, beginning with a clear statement of the objective and ending with the conclusions, with no references cited. Abbreviations in the abstract that are not **Standard JAS abbreviations** must be defined at first use.

**Key Words.** List up to 6 key words or phrases including the species, variables tested, and the major response criteria. The first letter of each key word is lowercase (unless a proper noun); key words are separated by commas and presented in alphabetical order; and no abbreviations should be used. Because major words in the title are not used for the subject index, which is published in the last issue of each volume of *JAS*, appropriate words from the title (or synonyms) should be listed as key words.

**Introduction.** The Introduction must not exceed 2,000 keystrokes (characters plus spaces) and briefly justifies the research, specifies the hypotheses to be tested, and gives the objective(s). Extensive discussion of relevant literature should be included in the Discussion.

**Materials and Methods.** A clear description or specific original reference is required for all biological, analytical, and statistical procedures. All modifications of procedures must be explained. Diets, dates of experimental activities if appropriate, animals [breed, sex, age, body weight, and weighing conditions (i.e., with or without restriction of feed and water)], surgical techniques, measurements, and statistical models should be described clearly and fully. Appropriate statistical methods should be used, although the biology should be emphasized. Statistical methods commonly used in the animal sciences need not be described in detail, but adequate references should be provided. The statistical model, classes, blocks, and experimental unit must be designated. Any restrictions used in estimating parameters should be defined. Reference to a statistical package without reporting the sources of variation (classes) and other salient features of the analysis, such as covariance or orthogonal contrasts, is not sufficient. Always reference SAS with the manufacturer information (SAS Inst. Inc., Cary, NC); do not call out as a reference in the Literature Cited. A statement of the results of the statistical analysis should justify the interpretations and conclusions. The experimental unit is the smallest unit to which an individual treatment is imposed. Measurements on the same experimental unit over time also are not independent and should not be considered as independent experimental units. Provide a validation for assays [e.g., mean and CV for repeated analysis of a sample (both between and within-assay if available) and the sensitivity (minimum amount or concentration detectable)]. Also, provide a publication reference for the methodology used in kits. Centrifugal force should be provided in  $\times g$ , not rpm, and duration and temperature of centrifugation must be included. Include volume of blood collected, container used, and amount of preservative or anticoagulant (e.g., heparin).

**Results.** The results are presented in the form of tables or figures when feasible. The text should explain or elaborate on the tabular data, but numbers should not be repeated within the text. Sufficient data, all with some index of variation attached (including significance level; i.e.,  $P$ -value), should be presented to allow the reader to interpret the results of the experiment. Reporting the actual  $P$ -value is preferred to the use of the terms *significant* and *highly significant*. Thus, the observed significance level (e.g.,  $P = 0.027$ ) should be presented, thereby allowing the reader to decide what to reject. Other probability ( $\alpha$ ) levels may be discussed if properly qualified so that the reader is not misled (e.g., trends in the data).

**Discussion.** The discussion should interpret the results clearly and concisely in terms of biological mechanisms and significance and also should integrate the research findings with the body of previ-

ously published literature to provide the reader with a broad base on which to accept or reject the hypotheses tested. A stand-alone Discussion section should not refer to any tables or figures, nor should it include  $P$ -values (unless citing a  $P$ -value from another work).

**Results and Discussion.** In *JAS*, authors have the option of combining the results and discussion into one section.

**Literature Cited.** To be listed in the Literature Cited section, papers must be published or accepted for publication ("in press"). Personal communications and unpublished data must not be included in the Literature Cited section. See the [Literature Cited Guidelines](#) later in this document.

**Tables and Figures.** Tables and figures must be prepared so they stand alone. Author-defined abbreviations must be defined (or redefined) in each table and figure. Manufacturer name and location should be provided for any proprietary product appearing in a table or figure.

Tables must be created using the table feature in MS Word (for instructions, see [Guidelines for Creating Tables in Microsoft Word](#) (<http://journalofanimalscience.org/site/misc/ifora.xhtml>)). Refer to a recent issue of *JAS* for examples of table construction. When possible, tables should be organized to fit across the page without running broadside. Each column must have a heading (e.g., Item, Ingredient, Trait, Fatty acid). Units should be separated from headings by a comma. Limit the data field to the minimum needed for meaningful comparison within the accuracy of the methods. In the body of the table, references to footnotes should be numerals. Each footnote should begin on a new line. To indicate significant differences among means within a row or column, superscript lowercase letters are used; the preferred statement in the footnotes is: "Within a row (or column), means without a common superscript differ ( $P < 0.05$ )."

Figures should be placed at the end of the manuscript and should follow the [Quality Guidelines for \*JAS\* Figures](#) (<http://journalofanimalscience.org/site/misc/ifora.xhtml>). Each figure should be placed on a separate page (separated by section breaks) and identified by the figure number. Figure captions should be typed double spaced on a separate page. The use of color in figures should be avoided unless it is essential to understanding the figure. There is an additional fee for color figures that are printed in the journal (see Manuscript Central for more information).

**Appendices.** To provide readers with numerical examples or give extensive detail of analytical procedures, an appendix or appendices can be included. However, if the supplemental material is of interest only to a limited number of *JAS* readers, it should not be included as an appendix. Instead, mention that supplemental information is available on request from the author; addresses for websites with appropriate supplemental information are acceptable. If extensive, the data may be included as an e-supplement to the manuscript (see Online-Only Data Supplements). Appendices should follow the Literature Cited section and be introduced by a major heading.

**Online-Only Data Supplements.** Authors can

present material online that cannot physically be displayed in the print journal (e.g., Excel files, video), that might be cost-prohibitive (e.g., color figures), or that provides data sets too detailed for publication in print. A note will appear in the print version that more material can be found online. Material posted online only must go through the review process, and consequently should be in a format easily accessible by most reviewers and readers.

### **Additional Usage Notes**

**Numbers.** See **JAS Policies Regarding Number Usage** later in this document.

**Abbreviations.** Abbreviations in the text that are not standard *JAS* abbreviations must be defined at first use. Authors should not use standard *JAS* abbreviations (e.g., t = metric ton and cannot be used as an abbreviation for temperature). In addition, authors should not use abbreviations accepted by *JAS*, such as abbreviations for elements (e.g., S = sulfur and C = carbon and cannot be used as author-defined abbreviations). Once defined, author-identified abbreviations should always be used, except to begin a sentence. Author-identified abbreviations need to be redefined in the abstract, at first use in the body of the paper, in each table, and in each figure. Authors should avoid excessive use of author-defined abbreviations. See **Standard JAS abbreviations** later in this document, which includes standard abbreviations for physical units, units of time, statistical symbols and abbreviations, and others. Standard *JAS* abbreviations should always be used except to begin a sentence or unless otherwise contraindicated (e.g., units of time should only be abbreviated when used with a number).

**Gene and Protein Names.** Because there is no universally accepted style for gene and protein names that applies to all species, the *Journal of Animal Science* asks the authors to assume the responsibility of using the convention appropriate for the particular species. Some general guidelines can be found in the *CSE Manual for Authors, Editors, and Publishers* (7th ed., 2006). For example, the gene that codes for the protein p53 is *TP53* in humans and *Trp53* in mice (note that, by convention, gene names are italicized; also note that protein names are generally not italicized).

**Quantitative Trait Loci and DNA Markers and Microarray Data.** Papers that publish quantitative trait loci (QTL) or DNA marker association results for livestock are strongly encouraged to make their data available in an electronic form to one of the publicly available livestock QTL databases *after the manuscript appears in publication* [the date on which the paper is posted to the *JAS*-Papers in Press website (<http://journalofanimalscience.org/content/early/recent>) represents the official publication date]. Current QTL databases for livestock include, but may not be limited to, the Animal QTL database (<http://www.animalgenome.org/QTLdb>) and the Bovine QTL database (<http://bovineqtl.tamu.edu/>). Similarly, for microarray data we request that all authors using microarray data analysis in their re-

search submit a complete data set to 1 of 3 databases before submission of a manuscript: the NCBI Gene Expression Omnibus (GEO; <http://www.ncbi.nlm.nih.gov/projects/geo>), the EMBL-EBI ArrayExpress repository (<http://www.ebi.ac.uk/arrayexpress>), or the Center for Information Biology Gene Expression (CIBEX) database (<http://cibex.nig.ac.jp/index.jsp>).

**Commercial Products.** The use of names of commercial products should be minimized. When a commercial product is used as part of an experiment, the manufacturer name, and location (city and state if in the United States; city and country otherwise) or a website address should be given parenthetically at first mention in text, tables, and figures. The generic name should be used subsequently. No <sup>TM</sup> or <sup>®</sup> symbols should be used.

### **General Usage.**

- Note that “and/or” is allowed but not preferred; we ask that authors choose the more appropriate meaning or use “x or y or both” if possible.
- Report time using the 24-h system (e.g., 1410 h rather than 2:10 p.m.).
- Use italics to designate genus and species (*Bos taurus*) and botanical varieties (*Medicago sativa* var. Potomac). Designations for botanical cultivars should be preceded by “cv.” or enclosed in single quotes (e.g., *Festuca arundinacea* cv. Kentucky 31 or *Festuca arundinacea* ‘Kentucky 31’).
- Specify the basis (as-fed or dry matter) for dietary ingredient and chemical composition data listed in text or in tables. Similarly, specify the basis for tissue composition data (e.g., wet or dry basis).
- Calculations of efficiency should be expressed as output divided by input (i.e., gain:feed, not feed:gain). This avoids the spurious positive and negative infinity values when body weight gain is zero or negative. It also avoids the confusion associated with discussing an improvement as being a decrease.
- A diet is a feedstuff or a mixture of feedstuffs; a ration is the daily allotment of the diet.
- Restrict the use of “while” and “since” to meanings related to time. Appropriate substitutes include “and,” “but,” or “whereas” for “while” and “because” or “although” for “since.”
- The word “Table” is capitalized and never abbreviated. The word “Figure” should be abbreviated to “Fig.” when referred to in the text, unless it begins a sentence (then spell out as “Figure”). Experiment and equation should be abbreviated to Exp. and Eq., respectively, when preceding a numeral.
- Avoid jargon unfamiliar to scientists from other disciplines. Do not use the term “head” to refer to an animal or group of animals. Instead, use animal, sow, ewe, steer, heifer, cattle, etc.
- Avoid bi- as a prefix because of its ambiguity; biweekly means twice per week and once every 2 weeks.
- Breed and variety names should be capitalized (Landrace, Hereford). Trademarked or regis-

tered names should be capitalized, but no <sup>TM</sup> or ® symbols should be used.

## II. POLICIES AND PROCEDURES OF *JAS* (return to **Style and Form**)

The mission of the American Society of Animal Science (ASAS) is to foster communication and collaboration among individuals and organizations associated with animal science research, education, industry, or administration “*To discover, disseminate, and apply knowledge for sustainable use of animals for food and other human needs.*” The *Journal of Animal Science* (*JAS*), which is published monthly by ASAS, accepts manuscripts presenting information for publication with this mission in mind. The editorial policies of *JAS* are established by the editor-in-chief, managing editor, division and associate editors, and editorial board, subject to review by the publications committee, board of directors, and the membership of ASAS. The views expressed in papers published in *JAS* represent the opinions of the author(s) and do not necessarily reflect the official policy of the institution with which the author is affiliated, the ASAS, or the editor-in-chief. It is the responsibility of the authors to ensure the accuracy of collection, analysis, and interpretation of data in manuscripts and ultimately to guarantee the veracity of the contents of articles published in *JAS*.

The *JAS* is one of the most frequently cited, peer-reviewed, agriculturally oriented research journals in the world, based on statistics published by ISI Inc. (Philadelphia, PA). Its high ranking in several ISI categories, including impact factor, attests to the quality standards maintained by the *JAS* editorial board, editors, and staff and by authors who submit manuscripts for publication.

### Contact Information

For information on the scientific content of the journal, contact the Editor-in-Chief, Dr. Gregory S. Lewis, American Society of Animal Science, P.O. Box 7410, Champaign, Illinois 61826-7410; e-mail: [glewis@asas.org](mailto:glewis@asas.org).

For questions on submitting a paper and Manuscript Central, contact Brett Holte, Submission Services Manager; e-mail: [bholte@sciencesocieties.org](mailto:bholte@sciencesocieties.org)

For assistance with author proofs, contact Emily Mueller, Managing Editor; e-mail: [emueller@science-societies.org](mailto:emueller@science-societies.org)

### Care and Use of Animals

All authors submitting to *JAS* must complete the Care and Use of Animals form certifying that any research that involves animals has followed established standards for the humane care and use of animals and must specify which standards were used. Only investigations that have followed high standards for the humane care and use of animals in research will be reported in *JAS*.

The manuscript must include a statement of insti-

tutional animal care and use committee (IACUC) (or equivalent) approval of all animal procedures. The IACUC statement should appear as the first item in the Materials and Methods. The manuscript should discuss anesthetics, analgesics, tranquilizers, and care taken to minimize pain and discomfort during preoperative, operative, and postoperative procedures. If research requires discomfort to the animals or stressful conditions, justification for these conditions must be evident in papers published in *JAS*.

### Types of Articles

Articles published in *JAS* encompass a broad range of research topics in animal production and fundamental aspects of genetics, nutrition, physiology, and preparation and utilization of animal products. Articles typically report research with beef cattle, companion animals, goats, horses, pigs, and sheep; however, studies involving other farm animals, aquatic and wildlife species, and laboratory animal species that address fundamental questions related to the biology of livestock, companion animals, and other managed animals will be considered for publication. Manuscripts that report research on production issues in animals other than those constituting the main focus of the journal should be submitted to other journals.

The preceding paragraph is not meant to exclude manuscripts but, rather, is a clarification of the focus of the journal. If there are any questions concerning the appropriateness of a manuscript for the journal, please contact the editor-in-chief.

**Research Articles.** Results of work contained in manuscripts submitted to *JAS* must not have been published or submitted previously in a refereed scientific journal. Previous presentation at a scientific meeting or the use of data in field day reports or similar documents, including press publications or postings to personal or departmental websites, does not preclude the publication of such data in *JAS*. Articles simultaneously posted to websites and submitted to *JAS* should carry a disclaimer on the website that this version of the paper has not undergone *JAS* peer-review and is not to be considered the final published form of the article. If the article is published in *JAS*, the author should post the PDF (reprint) version of the article to the website so proper credit can be given to *JAS* as the publisher of the article. Because *JAS* holds the copyright to articles it publishes, posting altered *JAS* articles that are represented as exact duplicates of the published version constitutes copyright violation.

**Review Articles.** The journal publishes board-invited review articles each year; these reviews are identified by the editor-in-chief in consultation with the editors. Occasionally proposals for review articles to be published in *JAS* may be solicited by division editors, after consultation with the editor-in-chief; the authors will be responsible for publication charges for these articles. Unsolicited review articles will not be considered.

**Special Topics.** Papers will be considered for publication in this division that present Biographical or Historical Sketches, or that present viewpoints dealing with Contemporary Issues or Teaching in the animal

sciences, or Perspectives that put a particular current topic into context in terms of its relationship or important to an entire area.

Biographies and Histories are part of the Special Topics Division but will be published on the ASAS website (<http://journalofanimalscience.org/site/misc/ifora.xhtml>) as well as in the Association News section of the journal. The frequency of publication depends on the availability of the prepared sketches. See <http://journalofanimalscience.org/site/misc/ifora.xhtml> for more information.

Contemporary Issues include topics such as environmental concerns, legislative proposals, systems analysis, and others. Teaching papers may discuss innovative pedagogical methods, philosophy of education, or solutions to teaching problems in animal science. Although Contemporary Issues or Teaching papers do not have to include original data, whenever appropriate the stated assertions should be substantiated by references to established information from credible published sources.

Special Topics papers will be subject to peer review in a manner similar to other submissions. Because of the nature of these papers, their format may vary from that of standard scientific articles.

**Technical Notes.** A technical note is a vehicle to report a new method, technique, or procedure of interest to *JAS* readers. When possible, a technical note should include a comparison of results from the new method with those from previous methods, using appropriate statistical tests. The advantages and disadvantages of the new procedure should be discussed. When typeset, a technical note shall not exceed 6 pages (9 typed manuscript pages), including tables and figures. The words "Technical note" shall be the first words of the title of such manuscripts. The review process for a technical note will be the same as that for other manuscripts.

**Letters to the Editor.** Letters judged suitable for publication will be printed in a "Letters to the Editor" section of *JAS*. The purpose of this section is to provide a forum for scientific exchange relating to matters published in *JAS*. To be acceptable for publication, letters must adhere to the following guidelines: 1) Only letters that address matters of science and relate to information published in *JAS* will be considered. In general, letters should not exceed 5,000 characters plus spaces and should contain no more than 5 citations; 2) Letters should provide supporting evidence based on published data for the points made or must develop logical scientific hypotheses; letters based on conjecture or on unsubstantiated claims will not normally be published. No new data may be presented in the letters; 3) Letters will be considered by the editor-in-chief and if deemed appropriate for publication, the author(s) of original paper(s) will be invited to write a letter of response. Normally both letters will be published together; and 4) All letters will be subject to acceptance and editing by the editor-in-chief and editing by the technical editor.

## SUBMISSION OF MANUSCRIPTS

Manuscripts should be submitted electronically at

<http://mc.manuscriptcentral.com/jas>. Authors who have questions about using the electronic manuscript submission system should contact Brett Holte, Submission Services Manager at [bholte@sciencesocieties.org](mailto:bholte@sciencesocieties.org). Authors who are unable to submit electronically should contact Brett Holte ([bholte@sciencesocieties.org](mailto:bholte@sciencesocieties.org)) for assistance; include your manuscript as an attachment (saved as a Microsoft Word file). Staff at ASAS headquarters will post manuscripts by proxy, but authors should be aware that delays might occur in the review process.

## Copyright Agreement

Authors shall complete the Manuscript Submission and Copyright Release form for each new manuscript submission. The form is completed during the submission process through Manuscript Central. Persons unable complete copyright agreements, such as federal employees, must indicate the reason for exemption on the form. The copyright to material published in *JAS* is held by ASAS. Persons who wish to reproduce material in *JAS* must request written permission to reprint copyrighted information from the managing editor. Likewise, authors of *JAS* manuscripts who include material (usually tables or figures) taken from other copyrighted sources must secure permission from the copyright holders and provide evidence of this permission at the time the manuscript is submitted to *JAS* for review. Tables or figures reproduced from the work of others must include an acknowledgment of the original source in a footnote or legend.

## REVIEW OF MANUSCRIPTS

**General Procedures.** The suitability of all manuscripts for publication in *JAS* is judged by the reviewers and associate editors, division editors, and the editor-in-chief. All communications regarding a submitted manuscript should maintain confidentiality. Associate editors handle correspondence with the author and promptly advise the division editor whether a manuscript should be rejected or accepted. The division editor's decision to reject or accept is based on the associate editor's recommendation and his or her own review of the manuscript. The division editor forwards document files for accepted manuscripts to the editor-in-chief for further review and editing, after which the editor-in-chief forwards the document file(s) to the technical editors. Note that most manuscripts that are eventually published are first returned by the associate editor to the author for revision, and in addition, the division editor may ask for changes before acceptance. The editor-in-chief is the final arbiter regarding acceptance or rejection of manuscripts submitted for publication.

**Rejections.** There are 3 main grounds for rejection of manuscripts. First, manuscripts that are not written clearly, concisely, and coherently or that do not conform to *JAS* style and form guidelines will be rejected without review. Authors whose first language is not English are urged to have their paper reviewed by an editing service. Second, the substance of the

manuscript may not meet *JAS* standards: the work may be incomplete, the evidence may not support the conclusions, the experimental approach may be poorly conceived, or the work may repeat established fact or represent no advance of existing knowledge. Third, although the work may be sound and the results valid, the paper may be better suited for publication elsewhere.

**Appeals.** If a manuscript is rejected, as a first course of action the author may discuss the matter with the associate editor or division editor responsible for the manuscript. Decisions must be appealed to the editor-in-chief if the author(s) believe(s) that the judgment was erroneous or unfair. A letter presenting the reasons for the appeal should be sent to the editor-in-chief. The editor-in-chief will review the author's reasons, as well as all materials related to the manuscript and, after consulting with the editors who reviewed the manuscript, will render a decision whether to accept or deny the appeal. A rejected manuscript may be resubmitted for publication in another division of *JAS* only if this course of action has been specifically recommended by the associate editor or division editor originally assigned to the manuscript and the transfer has been approved by the editor-in-chief.

**Revisions.** Most manuscripts that are eventually published are returned to the author(s) for revision. Normally, the revised manuscript must be returned to the associate editor via *JAS* Manuscript Central within 6 weeks from the date of receipt by the author or the manuscript will be withdrawn. Extenuating circumstances must be communicated to the technical editing staff, who will consult with the editor-in-chief before granting an extension. A Revision Checklist (<http://journalofanimalscience.org/site/misc/ifora.xhtml>) is sent with requests for revision to assist the authors.

## PAPERS IN PRESS, AUTHOR PROOFS, AND PUBLICATION CHARGES

**Papers in Press.** To facilitate earlier dissemination, accepted manuscripts will be assigned a digital object identifier (DOI) and posted to the *JAS* Papers in Press site (<http://journalofanimalscience.org/content/early/recent>) in the form in which they are accepted; because this does not represent the final, published form of the manuscript, the authors bear the primary responsibility for the content of manuscripts posted to the publish-ahead-of-print site.

**Author Proofs.** Accepted manuscripts are forwarded by the editor-in-chief to the editorial office for technical editing and typesetting. At this point, the technical editor may contact the authors for missing information or figure revisions. The manuscript is then typeset, figures reproduced, and author proofs prepared. Correspondence concerning the accepted manuscript should be directed to the technical editor.

Proofs of all manuscripts will be provided to the corresponding author and should be read carefully and checked against the typed manuscript; accuracy of the galley proof is the author's responsibility. Corrections

may be returned by fax, mail, or e-mail. For faxed or mailed corrections, changes to the proof should be made neatly and clearly in the margins of the proof. If extensive correction is required, changes should be provided on a separate sheet of paper with a symbol indicating location on the proof. Changes sent by e-mail to the technical editor must indicate page, column, and line numbers for each correction to be made on the proof. Editor queries should be answered on the galley proofs; failure to do so may delay publication. Excessive author changes made at the proof stage may result in a \$250 surcharge.

**Publication Charges and Reprints.** The journal has 2 options available for publication: open access (OA) and conventional page charges. For the OA option, authors will pay the OA fee when proofs are returned to the editorial office so that their paper will become freely available upon publication in an online issue. Charges for OA publication are \$2,500 per article, if at least one author is a current professional member of ASAS; the charge is \$3,250 when no author is an ASAS member. For conventional publication, the charge is \$85 per printed page in *JAS* if at least one author is an ASAS member; the page charge is \$170 when no author is a member of ASAS. Reprints may be ordered at an additional charge. When the galley proof is sent, the author is asked to complete a reprint order form requesting the number of reprints desired and the name of the institution, agency, or individual responsible for publication charges. Authors who submit articles containing color illustrations are responsible for paying the additional charge for color printing, including the printing of any reprints they order.

## STANDARD JAS ABBREVIATIONS (return to **Style and Form**)

The following abbreviations should be used without definition in *JAS*; plural abbreviations do not require a final "s". Use of 3-letter abbreviations for amino acids (e.g., Ala) and use of standard abbreviations for elements (e.g., S) are acceptable in *JAS*. For chemical units and abbreviations, refer to the *ACS Style Guide* (published by the American Chemical Society, Washington, DC).

### Physical units

Item	Unit
Bq	becquerel
°C	degree Celsius
cal	calorie
Ci	curie
cM	centimorgan (spell out morgan if used without a prefix)
Da	dalton
Eq	equivalent (only can be used with a prefix)
g	gram
ha	hectare

Hz	hertz
IU	international unit
J	joule
L	liter
lx	lux
m	meter
<i>M</i>	molar (concentration; preferred over mol/L)
mol	mole
<i>N</i>	normal (concentration)
Pa	pascal
rpm	revolutions/minute (not to be used to indicate centrifugal force)
t	metric ton (1,000 kg)
V	volt
W	watt

**Units of time**

Item	Unit
s	second(s)
min	minute(s)
h	hour(s)
d	day(s)
wk	week(s)
mo	month(s)
yr	year(s)

**Statistical symbols and abbreviations**

Item	Term
ANOVA	analysis of variance
CV	coefficient of variation
df	degree(s) of freedom (spell out if used without units)
<i>F</i>	<i>F</i> -distribution (variance ratio)
LSD	least significant difference
<i>n</i>	sample size (used parenthetically or in footnotes; note italics)
<i>P</i>	probability
<i>r</i>	simple correlation coefficient
<i>r</i> <sup>2</sup>	simple coefficient of determination
<i>R</i>	multiple correlation coefficient
<i>R</i> <sup>2</sup>	multiple coefficient of determination
<i>s</i> <sup>2</sup>	variance (sample)
SD	standard deviation (sample)
SE	standard error
SED	standard error of the differences of means
SEM	standard error of the mean

<i>t t</i> -	(or Student) distribution
$\alpha$	probability of Type I error
$\beta$	probability of Type II error
$\mu$	mean (population)
$\sigma$	standard deviation (population)
$\sigma^2$	variance (population)
$\chi^2$	chi-squared distribution

**Others**

Item	Term
AA	amino acid(s)
ACTH	adrenocorticotropic hormone
ADF	acid detergent fiber (assumed sequential unless designated otherwise)
ADFI	average daily feed intake (not to be confused with DMI)
ADG	average daily gain
ADIN	acid detergent insoluble nitrogen
ADL	acid detergent lignin
ADP	adenosine diphosphate
AI	artificial insemination
AIA	acid insoluble ash
ARS	Agricultural Research Service
ATP	adenosine triphosphate
avg	average (use only in tables, not in the text)
BCS	body condition score
BLUE	best linear unbiased estimate
BLUP	best linear unbiased prediction
bp	base pair
BSA	bovine serum albumin
BTA	<i>Bos taurus</i> chromosome
BW	body weight (used for live weight)
cDNA	complementary deoxyribonucleic acid
C/EBP	CAAT-enhancer binding protein
cfu	colony-forming unit
CIE	International Commission on Illumination (Commission Internationale d'Eclairage)
CLA	conjugated linoleic acid
CoA	coenzyme A
Co-EDTA	cobalt ethylenediaminetetraacetate
CP	crude protein (N $\times$ 6.25)
D	dextro-
diam.	diameter
DE	digestible energy
DEAE	(dimethylamino)ethyl (as in DEAE-cellulose)

DFD	dark, firm, and dry (meat)	MP	metabolizable protein
DM	dry matter	mRNA	messenger ribonucleic acid
DMI	dry matter intake	MUFA	monounsaturated fatty acid
DNA	deoxyribonucleic acid	NAD	nicotinamide adenine dinucleotide
EBV	estimated breeding value(s)	NADH	reduced form of NAD
eCG	equine chorionic gonadotropin	NDF	neutral detergent fiber
EDTA	ethylenediaminetetraacetic acid	NDIN	neutral detergent insoluble nitrogen
EFA	essential fatty acid	NE	net energy
EIA	enzymeimmunoassay	NEg	net energy for gain
ELISA	enzyme-linked immunosorbent assay	NEl	net energy for lactation
EPD	expected progeny difference(s)	NEm	net energy for maintenance
Eq.	Equation(s)	NEFA	nonesterified fatty acid
Exp.	experiment (always followed by a numeral)	No.	number (use only in tables, not in the text)
FFA	free fatty acid(s)	NPN	nonprotein nitrogen
FSH	follicle-stimulating hormone	NRC	National Research Council
<i>g</i>	gravity	o.d.	outside diameter
GE	gross energy	OM	organic matter
G:F	gain-to-feed ratio	PAGE	polyacrylamide gel electrophoresis
GLC	gas-liquid chromatography	PBS	phosphate-buffered saline
GLM	general linear model	PCR	polymerase chain reaction
GnRH	gonadotropin-releasing hormone	PG	prostaglandin
GH	growth hormone	PGF <sub>2<math>\alpha</math></sub>	prostaglandin F <sub>2<math>\alpha</math></sub>
GHRH	growth hormone-releasing hormone	PMSG	pregnant mare's serum gonadotropin
h <sup>2</sup>	heritability	PPAR	peroxisome proliferator-activated receptor
hCG	human chorionic gonadotropin	PSE	pale, soft, and exudative (meat)
HCW	hot carcass weight	PUFA	polyunsaturated fatty acid(s)
HEPES	<i>N</i> -(2-hydroxyethyl)piperazine- <i>N'</i> -2-ethanesulfonic acid	QTL	quantitative trait locus (loci)
HPLC	high-performance (pressure) liquid chromatography	RDP	ruminally degradable protein
i.d.	inside diameter	REML	restricted maximum likelihood
Ig	immunoglobulin (when used to identify a specific immunoglobulin)	RFLP	restriction fragment length polymorphism
IGF	insulin-like growth factor	RIA	radioimmunoassay
IGFBP	insulin-like growth factor-binding protein(s)	RNA	ribonucleic acid
IL	interleukin	RQ	respiratory quotient
IVDMD	in vitro dry matter disappearance	RUP	ruminally undegradable protein
kb	kilobase(s)	rRNA	ribosomal ribonucleic acid
KPH	kidney, pelvic, heart fat	SAS	Statistical Analysis System
l	levo-	SDS	sodium dodecyl sulfate
LD50	lethal dose 50%	SFA	saturated fatty acid
LH	luteinizing hormone	SNP	single nucleotide polymorphism
LHRH	luteinizing hormone-releasing hormone	spp.	species
LM	longissimus muscle	ssp.	subspecies
ME	metabolizable energy	SSC	<i>Sus scrofa</i> chromosome
		ST	somatotropin
		TDN	total digestible nutrients



TLC	thin layer chromatography
Tris	tris(hydroxymethyl)aminomethane
tRNA	transfer ribonucleic acid
TSAA	total sulfur amino acids
USDA	US Department of Agriculture
UV	ultraviolet
VFA	volatile fatty acid(s)
vol	volume
vol/vol	volume/volume (used only in parentheses)
vs.	versus
wt	weight (use only in tables, not in the text)
wt/vol	weight/volume (used only in parentheses)
wt/wt	weight/weight (used only in parentheses)

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sive page numbers must be provided.

Sample references are as follows:

- Books and articles within edited books:
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Le Neindre, P., C. Terlouw, X. Boivin, A. Boissy, and J. Lensink. 2001. Behavioral research and its application to livestock transport and policy: A European perspective. *J. Anim. Sci.* 79(E-Suppl.). <http://www.asas.org/jas/jas0905.pdf>. (Accessed 7 October 2001.)

#### POLICIES REGARDING NUMBER USAGE FOR JOURNAL OF ANIMAL SCIENCE

In 2006, *JAS* adopted the proposed changes for number style by the Council of Science Editors for the seventh edition of their *Scientific Style and Format*. The greatest change is more widespread use of numerals for single-digit numbers. A full description of the new number style is available in *Scientific Style and Format*.

A summary of the CSE number style policies is as follows:

- All cardinal numbers are written as numerals except when they begin a sentence or appear in a title, when 2 numerals are adjacent in a sentence (spell out the number most easily expressed in words; e.g., two 10-kg samples), or when a number is used as a figure of speech.
- Numbers less than 1 are written with a preceding (leading) zero (e.g., 0.75).
- A comma separator is used in numbers greater than 999.
- Numerals should be used to designate ratios and multiplication factors (e.g., 2:1, 3-fold increase).
- If a number is spelled out at the beginning of a sentence, its associated unit is also spelled out (e.g., Ten milliliters of fluid . . ., not Ten mL of fluid . . .).
- Units of measurement not associated with a

number should be spelled out rather than abbreviated (e.g., lysine content was measured in milligrams per kilogram of diet) unless used parenthetically.

- Single-digit ordinals are spelled out (i.e., first through ninth); larger ordinals are expressed in numeric form. Single-digit ordinals may be expressed numerically when they form part of a series (e.g., 1st, 3rd, 10th, 20th, not first, third, 10th, 20th).

General number usage policies of *JAS* are as follows:

- Measures must be presented in the metric system (SI or *Système International d'Unités*; see: <http://physics.nist.gov/cuu/Units/introduction.html>, or <http://physics.nist.gov/Pubs/SP330/sp330.pdf>).
- When a term must be expressed in nonmetric units for clarity (e.g., bushel weight), give such values in parentheses after the metric value.
- Use “to” instead of a hyphen to indicate a numerical range in text.
- Avoid the use of multiplying factors (e.g.,  $\times 10^6$ ) in table columns or rows, or in figure axis labels because of the uncertainty whether the data are to be, or already have been, converted by the factor.
- Avoid ambiguity by stating units (e.g., numbers of spermatozoa, millions/mL).
- Do not use more than one slant line (for “per”) in a single expression (e.g., use 5 mg/(g·d) or 5 mg·g<sup>-1</sup>·d<sup>-1</sup> instead of 5 mg/g/d). Mathematically, “per” implies division; when 2 “per” occur consecutively, it is unclear precisely what is being divided by what.
- Dietary energy may be expressed in calories or in joules; the standard SI unit for energy is the joule.
- Hyphenate units of measure used as preceding adjectives (e.g., 5-kg sample). Hyphens are not used with percent or degree signs.
- Insert spaces around all signs (except slant lines) of operation (=, −, +, ×, >, or <, etc.) when these signs occur between 2 values.
- Convert “mg %” to other units, such as mg/L or mg/mL; use “mol/100 mol” rather than “molar percent.”