

INSTRUCTIONS FOR AUTHORS (REVISED 2017)

Journal of Animal Science

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

I. Manuscript Preparation, which describes the Style and Form that authors must follow in the preparation of manuscripts; and

II. Policies and Procedures of *JAS*, which describes the mission of *JAS*, contact information, care and use of animals, protection of human subjects, conflict of interest, types of articles published in *JAS*, manuscript submission, copyright policies, review procedures and policies, papers in press, author proofs, and publication charges.

I. MANUSCRIPT PREPARATION (STYLE AND FORM)

The most important thing authors can do as they prepare their manuscripts is to consult a recent issue of *JAS* to see 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). Each of these topics is described in this document. The headings are shown in uppercase letters to illustrate how they should appear in manuscripts. A basic manuscript template in Microsoft Word is available at <http://www.animalsciencepublications.org/publications/jas/infora>. **Manuscripts that are not consistent with the Instructions for Authors will be immediately rejected.**

General. Manuscripts must be written in English and must use American spelling and usage, as well as standard scientific usage. The following online resources provide detailed information.

- 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, consult Merriam-Webster Online. <http://www.m-w.com/>
- For how to use numbers, refer to Policies Regarding Number Usage later in this document.
- For SI units, the 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*.

www.wava-amav.org/Downloads/nav_2012.pdf

- For bacterial nomenclature, consult Approved Lists of Bacterial Names. <http://www.bacterio.net/alintro.html>

Manuscripts should be prepared double-spaced in Microsoft Word, with lines and pages numbered consecutively, using Times New Roman font at 12 points and no less than 2.54-cm (1 inch) margins all around. 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 (<http://www.dessci.com/en/products/mathtype/>) or the Word Equation tool within your Word document. Do not insert equations as image files; image files will need to be re-keyed by hand by layout staff, which may introduce errors.

Tables and figures should be placed in separate sections at the end of the manuscript, and not placed in the text. Manuscripts should be uploaded to Thomson Reuters ScholarOne Manuscripts (formerly called Manuscript Central) using the fewest files possible to facilitate the review and editing processes.

Manuscripts should contain the following sections 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 keystrokes [i.e., characters and spaces; a space is counted as a keystroke]); 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. Author affiliations are footnoted using the symbols *, †, ‡, §, #, ||, and ¶ and are placed below the author names. If a consortium is listed in the byline, a footnoted reference to a website showing the names and affiliations of each member of the consortium should be included in acknowledgements; names and affiliations of each member of the consortium will not be listed on the title page. Superscript numbers are used to reference footnotes on the first page. Acknowledgments, including acknowledgements of consortia, grants, experiment station, or journal series number, are given as a footnote to the title. **Authors disclosing potential or actual conflicts of interest related to the research presented in the manuscript should describe this in a footnote with other acknowledgements (for details, see *Conflict of Interest*).**

Abstract. ABSTRACT consists of no more than 2,500 keystrokes (characters and spaces) in one paragraph and contains a summary of the pertinent results, with statistical evidence (i.e., *P*-values), in a brief but understandable form, beginning with a clear

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statement of the objective and ending with the conclusions, with no references cited. Abbreviations in the abstract that are not in **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 major response criteria. The first letter of each key word is lowercase, unless it is 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 should be listed as key words.

Introduction. INTRODUCTION must not exceed 2,000 keystrokes (characters and spaces) and must contain a brief justification for conducting the research, the hypotheses to be tested, and the objective(s). Extensive discussion of relevant literature should be included in DISCUSSION, not in INTRODUCTION.

Materials and Methods. MATERIALS AND METHODS is a required section and must contain a clear description or specific original reference 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. Manufacturer information must be provided at the first mention of each proprietary product used in the research (for details see, **Commercial Products**). Appropriate statistical methods should be used, although the biology should be emphasized. The threshold (e.g., $P < 0.05$) for significance should be stated. 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 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 methods 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., 10 μL of heparin).

Results. 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 readers to interpret the results of the experiment. Reporting the P -value is preferred to the use of the terms significant and highly significant, which are more editorial than quantitative descriptions. Thus,

the P -value (e.g., $P = 0.042$ or $P < 0.05$) should be presented, thereby allowing readers 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. DISCUSSION contains the author's, or authors', interpretations of the results of the study. The presentation should be clear and concise, address biological mechanisms and their significance, and integrate the research findings with the body of previously published literature to provide readers with a broad base on which to evaluate the author's, or authors', interpretations and assertions. Authors may speculate, but they should make it clear that their statements are speculative, rather than factual. A stand-alone DISCUSSION should not refer to any tables or figures, nor should it include P -values, unless citing a P -value from another work. The discussion must be consistent with the data from the research.

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

Literature Cited. To be listed in LITERATURE CITED, papers must be published or accepted for publication ("in press"). Personal communications and unpublished data must not be included in LITERATURE CITED. Guidelines and formats for references and citations are described in the Literature Cited Section of this document.

Tables and Figures. Tables and figures must be prepared so they meet the stand-alone criterion; that is, information in a table or figure can be understood without referring to information in the body of the manuscript. Tables and figures shall be placed at the end of the manuscript. Each table and each figure shall be placed on a separate page (separated with section breaks) and identified with table and figure numbers. Author-defined abbreviations must be defined (or redefined) in each table and figure. Manufacturer name and location must 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 Using Microsoft Word** (<http://www.animalsciencepublications.org/files/publications/jas/wordtableguidelines-jas.pdf>). Refer to a recent issue of *JAS* for examples of table construction. When possible, tables should be organized to fit across the page (i.e., portrait layout) without running broadside (i.e., landscape). Each column must have a heading (e.g., Item, Ingredient, Trait, Fatty acid). Units (e.g., kg) should be separated from headings by a comma, rather than being shown in parentheses. Limit the data field to the minimum needed for meaningful comparison within the accuracy of the methods. In the body of the table, numerals are used to reference footnotes. Each footnote should begin on a new line. Lowercase, superscript letters are used to indicate significant differences among means within a row or column and to reference footnotes explaining how to interpret the letters.

Figures should follow the **Quality Guidelines for *Journal of Animal Science* (JAS) Figures**

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(<http://www.animalsciencepublications.org/files/publications/jas/infora-guidelines-for-figures.pdf>). Figure captions should be typed double-spaced on a separate page. Now that *JAS* is a fully electronic publication, authors are encouraged to use color to enhance figures; there are no additional fees for color figures and images in issues of *JAS*.

Individuals may purchase print-on-demand copies of *JAS* issues from Sheridan Press. Print-on-demand copies will contain gray-scale, rather than color, figures and images. To purchase these, contact Sheridan at *Journal of Animal Science* or American Society of Animal Science, PO Box 465, Hanover, PA 17331 P: 717-632-3535, F: 717-633-8920, E: pubsvc.tsp@sheridan.com.

Appendices. An appendix or appendices are optional and used to provide numerical examples or give extensive detail of analytical procedures. 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, state that supplemental information is available on request from the corresponding 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 **E-Supplements**). Appendices should follow LITERATURE CITED and be introduced with a major heading (e.g., APPENDIX 1: TITLE).

E-Supplements. Authors may present material in an e-supplement (e.g., detailed data sets, Excel files, and video) that is more extensive or detailed than necessary for a *JAS* article. A note will appear in the *JAS* article that more material can be found online. Material in an e-supplement must undergo peer review and, thus, should be in a format that is easily accessible (i.e., does not require dedicated software or software that is not generally available) to most reviewers and readers.

Additional Usage Notes

Numbers. For details, see **Policies Regarding Number Usage for *Journal of Animal Science*** later in this document.

Abbreviations. Except to begin a sentence and when specifically contraindicated (e.g., units of time should only be abbreviated when used with a number), authors must use the abbreviations that are listed in this document under **STANDARD JAS ABBREVIATIONS**. Abbreviations in the text that are not listed in **STANDARD JAS ABBREVIATIONS** must be defined at first use, unless they are international abbreviations for elements, units of measure, amino acids, and chemicals, as examples. Abbreviations listed in **STANDARD JAS ABBREVIATIONS** or standard international abbreviations cannot be used to create author-defined abbreviations (e.g., t = metric ton and cannot be used as an abbreviation for time, temperature, or treatment; C = carbon and cannot be used for Control).

Once defined, author-defined abbreviations should always be used, except to begin a sentence. Author-defined abbreviations must be defined in the abstract

and redefined at first use in the body of the manuscript, in each table, and in each figure. Authors should avoid excessive use of author-defined abbreviations.

Gene and Protein Names. Because there is no universally accepted style for gene and protein names that applies to all species, the *JAS* asks 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, and protein names are generally not italicized).

Quantitative Trait Loci and DNA Markers and Microarray Data. Authors of papers that contain original 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 on the JAS First Look website* (<http://www.animalsciencepublications.org/publications/jas/first-look>). The date on which the paper is posted to the *JAS-Papers in Press* website may represent the official public disclosure date for the contents of the article. 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://genomes.sapac.edu.au/bovineqtl/index.html>). Similarly, for microarray data we request that all authors using microarray data analysis in their research 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.

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 US; city, administrative region or district [e.g., province], and country if outside the US) or a website address must be given parenthetically at first mention in text, tables, and figures. The generic name should be used subsequently. No TM, ®, or © symbols should be used.

General Usage.

- Abbreviations are not used to begin sentences. Words must be spelled out.
- “Sex” should be used, rather than “gender.” Gender is more appropriate for describing a role in society than for describing biological sex.
- State total sample size (e.g., the study included a total of 600 animals), rather than using “N” to represent total sample size.
- The hierarchy for brackets and parentheses is [()]. For example, [(2 + 3) × (12 ÷ 2)] × 2 = 60.
- Meat shear force should be expressed in kilograms (kg), although newtons (N) may also be

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- acceptable.
- Report time using the 24-h system (e.g., 1410 h rather than 2:10 p.m.).
- Use italics to designate genus and species (e.g., *Bos taurus*) and botanical varieties (e.g., *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’).
- Names of muscles are not italicized.
- Specify the basis (i.e., 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).
- A diet is a feedstuff or a mixture of feedstuffs; a ration is the daily allotment of the diet.
- The word “Table” is capitalized and never abbreviated.
- Except to begin a sentence, the word “Figure” should be abbreviated to “Fig.”
- Except to begin a sentence, experiment and equation should be abbreviated to Exp. and Eq., respectively, when preceding a numeral (e.g., Exp. 1).
- 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 (e.g., Landrace and Hereford).
- Trademarked or registered names should be capitalized, but no TM or ® symbols should be used.

II. POLICIES AND PROCEDURES OF *JAS*

The mission of the American Society of Animal Science (ASAS) is to “**foster the discovery, sharing, and application of scientific knowledge concerning the responsible use of animals to enhance human life and well-being**” (<https://asas.org/about-asas/history-and-mission>). The *Journal of Animal Science*, which is published monthly by ASAS, accepts manuscripts presenting information for publication with this mission in mind.

The *JAS* is divided into the following Sections: Animal Genetics; Animal Nutrition: Nonruminant Nutrition; Animal Nutrition: Ruminant Nutrition; Animal Physiology; Animal Production; Animal Products; Special Topics; and Symposia, which contains invited manuscripts from symposia at ASAS meetings. Manuscripts that do not fit one of the *JAS* Sections will not be considered for publication.

The Editor-in-Chief, Associate Editor-in-Chief, Managing Editor, and Section Editors establish the

editorial policies of *JAS*, subject to review by the publications committee and ASAS Board of Directors. The views expressed in articles published in *JAS* represent the opinions of the author(s) and do not necessarily reflect the official policy of the institution with which an author is affiliated, the ASAS, or the *JAS* Editor-in-Chief. Authors are responsible for ensuring the accuracy of collection, analysis, and interpretation of data in manuscripts and ultimately for guaranteeing the veracity of the contents of articles published in *JAS*.

Contact Information

For information on the scientific content of the journal, contact the Editor-in-Chief, Dr. James Sartin, American Society of Animal Science, P.O. Box 7410, Champaign, Illinois 61826-7410; e-mail: jsartin@asas.org.

For questions about submitting a manuscript and ScholarOne Manuscripts, contact Lauren Van Driel, Submission Services Manager; e-mail: lvandriel@sciencesocieties.org.

For assistance with author proofs, contact Ms. Emily Mueller, Managing Editor; e-mail: emueller@sciencesocieties.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*.

Also, the manuscript must include a statement of institutional animal care and use committee (IACUC), or equivalent, approval of all animal procedures. The IACUC statement should appear as the first item in MATERIALS AND METHODS and should specify which publically available animal care and use standards were followed (e.g., ADSA-ASAS-PSA Guide for Care and Use of Agricultural Animals in Research and Teaching; Primary Industries Ministerial Council, Model code of practice for the welfare of animals: the sheep). The manuscript should describe 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*.

Protection of Human Subjects

In the United States, federally funded or regulated research involving human subjects must comply with Code of Federal Regulations (CFR), Title 45 Public Welfare, Part 46 Protection of Human Subjects. However, CFR 45 Part 46.101(b) exempts some research from these regulations. For all exempted research and other details, see <http://www.hhs.gov/ohrp/human-subjects/guidance/45cfr46.html>. Exempted research

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includes that in which the only involvement of human subjects is for “taste and food quality evaluation and consumer acceptance if 1) wholesome foods without additives are consumed or 2) a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.” If human subjects were used in exempted research and the research was in compliance with CFR 45 Part 46, or equivalent regulations where the research was conducted, authors must state in **MATERIALS AND METHODS** or acknowledgements that they were in full compliance. If human subjects were used in research that was not exempted in CFR 45 Part 46, or equivalent regulations where the research was conducted, authors must certify that the research received a priori approval from an appropriate Institutional Review Board.

Conflict of Interest

All *JAS* editors, ASAS staff, ASAS Board of Directors, and submitting authors must disclose any actual or potential conflicts of interest that may affect their ability to objectively present or review research or data. This generally includes any relevant professional, personal, political, intellectual, religious, or financial interest in, or relationship with, an individual or business that could have an actual or perceived influence, positive or negative, on the conduct and publication of the research or data. Financial relationships generally refer to financial benefits accrued to authors through avenues such as salary, consulting fees, honoraria (including paid holidays, use of vacation property, country club privileges, and other nonmonetary rewards for service), intellectual property rights, royalties, business ownership, and investments, other than diversified mutual funds or the equivalent.

Disclosures for *JAS* authors are to be provided as an acknowledgement on the title page of a manuscript (for instructions, see **Title Page**). The *JAS* may use such information as a basis for editorial and publication decisions, and may publish such disclosures if that is deemed relevant and sufficient. The *JAS* editors, ASAS staff, and ASAS Board of Directors with actual or potential conflicts of interest that may affect their ability to objectively evaluate or manage a manuscript will be prevented from gaining access to the manuscript and associated documents, unless they are an author or coauthor, in which case ScholarOne Manuscripts will limit their access to the Corresponding Author Center. When the current Editor-in-Chief, for example, has an actual or potential conflict of interest with a manuscript, a former Editor-in-Chief will assume the responsibilities of the Editor-in-Chief for that manuscript.

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. Many articles are multidisciplinary and cannot be conveniently categorized. Articles typically report research with cattle, goats, pigs, and sheep. However, studies involving other farm animals (e.g., poultry and meat and working horses) and companion animals, including performance and recreational horses, aquatic, and wildlife species will be considered for publication. Studies with laboratory animal species that address fundamental questions related to the biology of livestock, companion animals, and other managed animals may be considered.

The preceding paragraph is not meant to exclude manuscripts but, rather, is a clarification of the focus of *JAS*. Authors may contact the Editor-in-Chief or Associate Editor-in-Chief if there are questions about whether the topic of a manuscript is appropriate for *JAS*.

Research Articles. Results of research contained in manuscripts submitted to *JAS* must not have been published in or submitted previously to a peer-reviewed 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, do not preclude the publication of such data in *JAS*. However, abstracts, proceedings papers, field-day reports, or similar presentations that are expanded to produce full-length manuscripts should be referenced and cited in *JAS* manuscripts. 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 has been published in *JAS*, the author should include the complete *JAS* citation so that 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 invited review articles. The Editor-in-Chief, in consultation with the Associate Editor-in-Chief, Section Editors, and the ASAS Board of Directors, identifies invited reviews. Section Editors may solicit proposals for review articles to be published in *JAS*, after consultation with and approval by the Editor-in-Chief; the authors may be responsible for a portion of the publication charges for invited reviews. Unsolicited review articles will not be considered.

Special Topics. This Section includes Biographical or Historical Sketches and Contemporary Issues in the animal sciences. Even though Biographical or Historical Sketches are part of the Special Topics Section, they will be published on the ASAS website and in the Association News section of *JAS*. The frequency of publication depends on the availability of the prepared sketches. For more information, see <http://www.animalsciencepublications.org/publications/jas/infora..>

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Contemporary Issues include topics such as environmental concerns, legislative proposals, systems analysis, and various “newsworthy” scientific issues. Even though Contemporary Issues manuscripts do not have to include original data, authors’ assertions should be substantiated with references to established information from credible published sources.

Special Topics papers will be subject to peer review in a manner similar to other *JAS* submissions. Because of the nature of these manuscripts, their format may vary from that of standard scientific articles, although ABSTRACT and INTRODUCTION must be consistent with keystroke (characters and spaces) limitations defined earlier in this document.

Teaching articles should be submitted to *Natural Sciences Education*, which is a joint venture of several professional societies, including the ASAS. Articles in *Natural Sciences Education* are “written by and for educators in extension, universities, industry, administration, and grades K–12” and highlight teaching techniques, concepts, ideas, and other teaching-related issues. The goal is build a portfolio of teaching-related articles that can be accessed at a single location. For detailed information about *Natural Sciences Education*, see <https://www.agronomy.org/publications/nse>.

Rapid Communications. *JAS* is now considering rapid publication of short communications that are considered novel and highly significant to animal science. Submitted papers should follow *JAS* guidelines, but are restricted to 2 figures or tables or a combination of 1 figure/1 table. The words “Rapid Communication:” should begin the title. When preparing the file, please include the following at the top of the first page, in bolded text: **NOTE: THIS IS A RAPID COMMUNICATION SUBMISSION**. This note will ensure that the submission is processed immediately.

The final published paper will be no more than 5 printed pages (approximately 15 Word file pages). A *JAS* Section Editor handles the review and outcome is to accept or reject the paper. The reviews will generally be complete by 2 weeks and if accepted, added to the First Look page within 2 days and placed in the next available journal issue. If significant revisions are needed, the Section Editor will reject the manuscript and require a new submission. Generally there will not be a revision. All papers are subject to the \$100 submission fee (applied towards publication if accepted). The manuscript will be published **Open Access** and the fee for publication of this rapid format will be \$1,000 (members) and \$2,000 (nonmembers).

Technical Notes. A technical note is used 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 for publication, a technical note shall not exceed 10 pages (approximately 18 Microsoft Word document pages), including tables and

figures. “Technical note:” shall be the first portion of the title of such manuscripts. The review process for a technical note will be the same as that for other manuscripts. Information that is more extensive or detailed than necessary for a Technical note may be presented in an e-supplement (see ***E-Supplements***). Short communications, brief communications, and similar types of articles will not be considered for publication in *JAS*.

Letters to the Editor. A letter 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 articles published in *JAS*. To be acceptable for publication, a letter must adhere to the following guidelines. 1) Only a letter that addresses matters of science and relates to information published in *JAS* will be considered. In general, a letter should not exceed 5,000 keystrokes and should contain no more than 5 citations. 2) A letter should provide supporting evidence based on published data for the points made or must develop logical scientific hypotheses. A letter based on conjecture or unsubstantiated claims will not normally be published. No new data may be presented in a letter. 3) The Editor-in-Chief will evaluate each letter and determine whether a letter is appropriate for publication. If a letter is considered appropriate, the author(s) of original *JAS* article(s) will be invited to write a letter of response. Normally both letters will be published together. 4) All letters will be subject to acceptance and editing by the Editor-in-Chief and editing by a technical editor.

SUBMISSION OF MANUSCRIPTS

Manuscripts should be submitted electronically through ScholarOne Manuscripts at <http://mc.manuscriptcentral.com/jas>. Authors with questions about using the electronic manuscript submission system or, for technological reasons, are unable to submit manuscripts electronically may contact Lauren Van Driel (lvandriel@sciencesocieties.org).

Please note: in 2016, *JAS* instituted a submission fee equivalent to the page charges for one page at the membership rate. The submission fee must be paid at the time of submission, but will be credited towards total page charge fee if the article is published. **Please note:** the submission fee is not refundable if the article is rejected.

Section titles

Each author will be prompted to choose a section for grouping articles within the table of contents.

1. Animal Behavior and Cognition
2. Animal Genetics and Genomics
3. Animal Health and Well Being
4. Animal Models
5. Arid Land Animal Production
6. Cell and Molecular Biology

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7. Companion Animal Biology
8. Companion Animal Nutrition
9. Dairy Products
10. Environmental Animal Science
11. Exercise Physiology
12. Feeds
13. Fetal Programming
14. Forage Based Livestock Systems
15. Gastrointestinal Biology
16. Growth Biology
17. Housing and Management
18. Immunology
19. Integrated Animal Science
20. Lactation and Mammary Gland Biology
21. Meat Science
22. Metabolism and Metabolomics
23. Microbiology
24. Microbiome
25. Molecular Nutrition
26. Muscle Biology
27. Neuroendocrinology
28. Non ruminant nutrition
29. Pasture and Grazing Lands
30. Proteomics
31. Reproduction
32. Ruminant Nutrition
33. Special Topics
34. Sustainable Animal Science and Practices
35. Symposia
36. Technology in Animal Science
37. Toxicology
38. Wildlife Management
39. Zoo and Exotic Animal Management and Nutrition
40. Board Invited Reviews

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Physical units

Item	Unit
Bq	becquerel
°C	degree Celsius
cal	calorie

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Ci	curie
cM	centimorgan (spell out morgan if used without a prefix)
Da	dalton
Eq	equivalent (only can be used with a prefix; e.g., mEq)
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
N	newton (N not italicized)
<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
min	minute
h	hour
d	day
wk	week
mo	month
yr	year

Statistical symbols and abbreviations

Item	Term
ANOVA	analysis of variance
CI	confidence interval
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> ²	simple coefficient of determination
<i>R</i>	multiple correlation coefficient
<i>R</i> ²	multiple coefficient of determination
<i>s</i> ²	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</i>	<i>t</i> -(or Student) distribution
α	probability of Type I error
β	probability of Type II error
μ	mean (population)
σ	standard deviation (population)
σ^2	variance (population)
χ^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

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CIE	International Commission on Illumination (Commission Internationale d'Eclairage)	Ig	immunoglobulin (when used to identify a specific immunoglobulin)
CLA	conjugated linoleic acid	IGF	insulin-like growth factor
CoA	coenzyme A	IGFBP	insulin-like growth factor-binding protein(s)
Co-EDTA	cobalt ethylenediaminetetraacetate	IL	interleukin
CP	crude protein ($N \times 6.25$)	IVDMD	in vitro dry matter disappearance
D	dextro-	kb	kilobase(s)
diam.	diameter	KPH	kidney, pelvic, heart fat
DE	digestible energy	L	levo-
DEAE	(dimethylamino)ethyl (as in DEAE-cellulose)	LD ₅₀	lethal dose 50%
DFD	dark, firm, and dry (meat)	LH	luteinizing hormone
DM	dry matter	LHRH	luteinizing hormone-releasing hormone
DMI	dry matter intake	LM	longissimus muscle
DNA	deoxyribonucleic acid	ME	metabolizable energy
EBV	estimated breeding value(s)	MP	metabolizable protein
eCG	equine chorionic gonadotropin	mRNA	messenger ribonucleic acid
EDTA	ethylenediaminetetraacetic acid	MUFA	monounsaturated fatty acid
EFA	essential fatty acid	NAD	nicotinamide adenine dinucleotide
EIA	enzymeimmunoassay	NADH	reduced form of NAD
ELISA	enzyme-linked immunosorbent assay	NDF	neutral detergent fiber
EPD	expected progeny difference(s)	NDIN	neutral detergent insoluble nitrogen
Eq.	Equation(s)	NE	net energy
Exp.	experiment (always followed by a numeral)	NE _g	net energy for gain
FFA	free fatty acid(s)	NE _l	net energy for lactation
FSH	follicle-stimulating hormone	NE _m	net energy for maintenance
GE	gross energy	NEFA	nonesterified fatty acid
G:F	gain-to-feed ratio	No.	number (use only in tables, not in the text)
GLC	gas-liquid chromatography	NPN	nonprotein nitrogen
GLM	general linear model	NRC	National Research Council
GnRH	gonadotropin-releasing hormone	o.d.	outside diameter
GH	growth hormone	OIE	World Organisation for Animal Health (Office International des Epizooties)
GHRH	growth hormone-releasing hormone	OM	organic matter
h ²	heritability	PAGE	polyacrylamide gel electrophoresis
i.m.	intramuscular	PBS	phosphate-buffered saline
i.p.	intraperitoneal	PCR	polymerase chain reaction
i.v.	intravenous	PG	prostaglandin
hCG	human chorionic gonadotropin	PGF _{2α}	prostaglandin F _{2α}
HCW	hot carcass weight	PMSG	pregnant mare's serum gonadotropin
HEPES	<i>N</i> -(2-hydroxyethyl)piperazine- <i>N'</i> -2-ethanesulfonic acid	PPAR	peroxisome proliferator-activated receptor
HPLC	high-performance (pressure) liquid chromatography	PSE	pale, soft, and exudative (meat)
i.d.	inside diameter	PUFA	polyunsaturated fatty acid(s)
		QTL	quantitative trait locus (loci)
		RDP	ruminally degradable protein

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REML	restricted maximum likelihood
RFLP	restriction fragment length polymorphism
RIA	radioimmunoassay
RNA	ribonucleic acid
RQ	respiratory quotient
RUP	ruminally undegradable protein
rRNA	ribosomal ribonucleic acid
SAS	SAS Institute Inc. (no longer stands for Statistical Analysis System)
s.c.	subcutaneous
SDS	sodium dodecyl sulfate
SFA	saturated fatty acid
SNP	single nucleotide polymorphism
spp.	species
ssp.	subspecies
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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- AOAC. 1990. Official methods of analysis. 15th ed. Assoc. Off. Anal. Chem., Arlington, VA.
NRC. 2000. Nutrient requirements of beef cattle. 7th rev. ed. Natl. Acad. Press, Washington, DC.
Robinson, P. H., E. K. Okine, and J. J. Kennelly. 1992. Measurement of protein digestion in ruminants. In: S. Nissen, editor, Modern methods in protein nutrition and metabolism. Academic Press, San Diego, CA. p. 121–127.

2. Handbooks, technical bulletins, theses, and dissertations

- Goering, H. K., and P. J. Van Soest. 1970. Forage fiber analyses (apparatus, reagents, procedures, and

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- some applications). Agric. Handbook No. 379. ARS-USDA, Washington, DC.
- Shreck, A. L., C. D. Buckner, G. E. Erickson, and T. J. Klopfenstein. 2011. Digestibility of crop residues after chemical treatment and anaerobic storage. In: 2011 Nebraska Beef Cattle Report. Rep. No. MP94. Univ. of Nebraska, Lincoln. p. 35–36.
- Sigma. 1984. Total hemoglobin: Quantitative, colorimetric determination in whole blood at 530–550 nm. Tech. Bull. No. 525. rev. ed. Sigma Chemical, St. Louis, MO.
- Ward, J. D. 1995. Effects of copper deficiency on performance and immune function of cattle. PhD Diss. North Carolina State Univ., Raleigh.
- ### 3. Journal articles and abstracts
- Centon, J. R., G. E. Erickson, T. J. Klopfenstein, K. J. Vander Pol, and M. A. Greenquist. 2007. Effects of roughage source and level in finishing diets containing wet distillers grains on feedlot performance. *J. Anim. Sci.* 85(Suppl. 2):76. (Abstr.) doi:10.2527/jas.2006-354 (NOTE: The doi is now considered part of a citation.)
- Cleale, R. M., IV, R. A. Britton, T. J. Klopfenstein, M. L. Bauer, D. L. Harmon, and L. D. Satterlee. 1987a. Induced non-enzymatic browning of soybean meal. II. Ruminant escape and net portal absorption of soybean protein treated with xylose. *J. Anim. Sci.* 65:1319–1326. (NOTE: Articles published before circa 2005 may not have a doi.)
- Perez, V. G., A. M. Waguespark, T. D. Bidner, L. L. Southern, T. M. Fakler, T. L. Ward, M. Steidinger, and J. E. Pettigrew. 2011. Additivity of effects from dietary copper and zinc on growth performance and fecal microbiota of pigs after weaning. *J. Anim. Sci.* 89:414–425. doi:10.2527/jas.2010-2839
- Revidatti, M. A., J. V. Delgado Bermejo, L. T. Gama, V. Landi Perati, C. Ginja, L. A. Alvarez, J. L. Vega-Pla, A. M. Martínez, and BioPig Consortium. 2014. Genetic characterization of local Criollo pig breeds from the Americas using microsatellite markers. *J. Anim. Sci.* 92:4823-4832. doi: 10.2527/jas.2014-7848
- The Bovine Hap Map Consortium. 2009. Genome-wide survey of SNP variation uncovers the genetic structure of cattle breeds. *Science.* 324:528-532. doi 10.1126/science.1167936
- ### 4. Conference proceedings
- Bailey, E. A., J. R. Jaeger, J. W. Waggoner, G. W. Preedy, L. A. Pacheco, and K. C. Olson. 2012. Effect of weaning method on welfare and performance of beef calves during receiving. *Proc. West. Sec. Amer. Soc. Anim. Sci.* 63:25-29.
- NMC. 1995. Summary of peer-reviewed publications on efficacy of premilking and postmilking teat disinfections published since 1980. In: *Natl. Mastitis Counc. Reg. Meet. Proc.*, Harrisburg, PA. *Natl. Mastitis Counc.*, Arlington, VA. p. 82–92.
- Talmant, A., X. Fernandez, P. Sellier, and G. Monin. 1989. Glycolytic potential in longissimus dorsi muscle of Large White pigs as measured after in vivo sampling. In: *Proc. 35th Int. Congr. Meat Sci. Technol.*, Copenhagen, Denmark. p. 1129.
- Van der Werf, J. H. J. 1990. A note on the use of conditional models to estimate additive genetic variance in selected populations. *Proc. 4th World Congr. Genet. Appl. Livest. Prod.*, Edinburgh, Scotland XIII:476–479.
- ### 5. Electronic Publications
- FDA. 2014. Approved animal drug products online (Green Book). <http://www.fda.gov/AnimalVeterinary/Products/ApprovedAnimalDrugProducts/default.htm> (Accessed 26 December 2014.)
- Galyean, M. L. and P. J. Defoor. 2003. Effects of roughage source and level on intake by feedlot cattle. *J. Anim. Sci.* 81(E. Suppl. 2):E8–E16.
- Heaton, M. P., T. S. Kalbfleisch, D. T. Petrik, B. Simpson, J. W. Kijas, M. L. Clawson, C. G. Chitko-McKown, G. P. Harhay, K. A. Leymaster, and the International Sheep Genomics Consortium. 2013. Genetic testing for TMEM154 mutations associated with lentivirus susceptibility in sheep. *PLoS ONE* 8(2): e55490. doi:10.1371/journal.pone.0055490
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