J. Dairy Sci. 104:Instructions 1–12

Journal of Dairy Science® Instructions to Authors: Style and Form[1]

Journal Policies and Procedures

The American Dairy Science Association® (ADSA®) invites scientists from the global community to submit papers for consideration to the *Journal of Dairy Science* (JDS). Authors need not be members of ADSA. These instructions detail editorial policies and style and form for publishing in JDS. We recommend that authors refer to these instructions, as well as the **Instructions to Authors: Policies**, during submission, peer review, acceptance, proof correction, and final publication phases.

Contact Information for Journal Staff

For information on the scientific content of the journal, contact the editor-in-chief, Dr. Paul J. Kononoff; phone: 402-472-6442; e-mail: pkononoff2@unl.edu.

For assistance with Scholar One (Manuscript Central) and Manuscript Submission/Copyright forms, contact Shauna Miller, editorial assistant, Headquarters Office, 1800 S. Oak St., Suite 100, Champaign, IL 61820; phone (217) 239-3339; fax (217) 378-4083; shaunam@assochq.org.

For questions about manuscript preparation, journal style and form, and proofs, contact Louise Adam, lead technical editor, at loua@assochq.org or journals@assochq.org.

For other information, contact Susan Pollock, managing editor, Headquarters Office, American Dairy Science Association, 1800 S. Oak St., Suite 100, Champaign, IL 61820; phone (217) 356-7641; susanp@assochq.org or journals@assochq.org.

Aims and Scope

The *Journal of Dairy Science* publishes original research, invited review articles, and other scholarly work that relates to the production and processing of milk or milk products intended for human consumption. The journal is broadly divided into dairy foods and dairy production sections. Please refer to the complete Aims and Scope online for more detailed information of suitable topics for the *Journal of Dairy Science*.

Dairy Foods Sections

- Bioactivity and Human Health
- Chemistry and Materials Science
- Dairy Product Microbiology and Safety
- Food Systems and Environment
- Processing and Engineering
- Sensory Analysis

Dairy Production Sections

- Animal Nutrition
- Farm Systems and Environment
- Genetics and Genomics
- Health, Behavior, and Well-being
- Physiology

In addition to the above sections, interpretive applied summaries and recommendations may be submitted to the Dairy Industry Today section. Syntheses and applications from technical reports that contribute to solutions to problems in the dairy industry are especially solicited. Authors of reports for extension education of the nonscientist are encouraged to share their contributions with colleagues and to achieve wider circulation of their conclusions and recommendations through this section. In addition, papers that report on advances in teaching and outreach techniques are suitable for this section.

Types of Articles

Full-Length Research Papers. The majority of papers published in JDS are full-length research articles, which includes systematic reviews and meta-analyses. The journal emphasizes the importance of high-quality scientific writing and clarity in presentation of the concepts and methods, and sufficient background information that would be required for thorough understanding by scientists in other disciplines. The results published must be replicated, either by replicating treatments within experiments or by repeating experiments. Studies using commercial products should address a hypothesis-based question relevant to the biology or mechanism of action of the product.

In addition to full-length research papers, the following types of articles appear in the journal:

Invited Reviews. The journal publishes invited reviews in all scientific sections of the journal. Authors

[1]Revised September 2020.

interested in writing a review should contact the Invited Reviews editor, Kerst Stelwagen (kerst.stelwagen@scilactis.co.nz) with justification for the review. Ultimately, the invitation for submissions and overseeing of the peer-review process are the responsibility of the Invited Reviews editor; authors should not submit an Invited Review without first receiving an invitation letter. The Invited Reviews editor may also solicit reviews on topics of interest. The first 10 printed pages of an invited review are published at no cost to the author. The journal does not publish unsolicited reviews.

Symposium Reviews. The editor-in-chief invites selected topics from the ADSA annual meeting program to be published in the journal. Symposium reviews must be prepared according to JDS Style and Form and submitted to the appropriate scientific section (not as invited reviews). These papers will undergo the same review and editing process as other papers submitted to the journal. The first 5 pages of a symposium review are published at no cost to the author.

Graduate Student Literature Reviews. Graduate students may submit their literature reviews (as Grad Student Lit Review) to be evaluated by the journal for publication as review papers. Papers must be prepared according to JDS Style and Form, contain no more than 30 double-spaced pages and 75 references, and be submitted to the appropriate scientific section of the journal (not as invited reviews). Students submitting papers should note in the cover letter that the paper is a graduate student literature review, that they are competing for the Graduate Student Literature Review Award and indicate the category in which they are competing (PhD Production Division, MS Production Division, PhD Dairy Foods Division, MS Dairy Foods Division). A full description of the award can be found on the ADSA website (https://www.adsa.org/Membership/ADSAAwards.aspx).

Letters to the Editor. Short (300 words) letters to the editor on topics of concern to readers, including comment on publications with rebuttals from authors if needed, may be submitted to the editor-in-chief or to any of the editors. Letters will be published at the discretion of the editor-in-chief. Authors of letters are subject to the same copyright release requirements as other authors. Letters are published at no charge to the author(s).

MANUSCRIPT PREPARATION

Reporting Guidelines

The *Journal of Dairy Science* requires the submission of an appropriate reporting guideline checklist with each paper. This is a widespread practice and common requirement in leading scientific and medical journals. Reporting guidelines help to ensure complete and accurate reporting of a study, which contributes to reproducibility and allows for critical appraisal of the work, as well as eventual inclusion of the study in systematic reviews and meta-analyses. Reporting guidelines do not prescribe study design or analysis but have been shown to improve the clarity and completeness of reporting. The requirement for the use of reporting guidelines begins January 1, 2021. More information on the policy and its implementation can be found here: https://www.journalofdairyscience.org/content/inst-auth.

Writing Style

Papers must be written in English. The text and supporting materials must use US spelling and usage as given in *Merriam-Webster's Collegiate Dictionary,* 11th ed., *Webster's Third International Dictionary,* or the *New Oxford American English Dictionary*, 3rd ed.

Today, most medical and scientific style manuals support the active over the passive voice. Use of the active voice results in lively, clear, and concise writing. Passive voice may still be appropriate in the Materials and Methods section, for example, where the actor is unimportant and the writer wishes to focus on the action or the recipient of the action. The active voice and first-person pronouns (I, we) should be used when appropriate in the Results, Discussion, and Conclusions sections.

For scientific conventions, authors should follow the style and form recommended in *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers,* 8th ed., published by the Council of Science Editors in cooperation with University of Chicago Press (www.scientificstyleandformat.org/).

Preparing the Manuscript File

To facilitate peer review, lines and pages should be numbered consecutively. Special characters (e.g., Greek, math, symbols) should be inserted using the symbols palette. Complex math should be entered using MathType from Design Science/Wiris (https://store.wiris.com/en). Equations and math must be editable. Tables and figures should be placed in separate sections at the end of the manuscript (not placed within the text). Failure to follow these instructions may result in immediate rejection of the manuscript.

Interpretive Summary

All authors of JDS papers should provide an interpretive summary of 100 words or less that summarizes the project's expected importance or its economic, environmental, and/or social impact. The summary should appear at the top of the first page of the manuscript. Interpretive summaries will be peer reviewed. The summaries are intended for an audience who may not be familiar with work in the authors' area of expertise and for government or media researchers, and they will provide JDS readers with a brief overview of the research presented in each issue.

Graphical Abstract and Highlights

The journal now accepts graphical abstracts for inclusion in the online version of the journal. Graphical abstracts are not required, but, if submitted, will undergo peer review. A graphical abstract is a single, concise visual summary of the main finding of the article. It should allow readers to quickly understand the main take-home message of the paper. The graphical abstract should include article highlights, which are 3 to 5 bullet points (maximum of 85 characters each, including spaces) aimed at a general audience. Highlights serve as a caption for the graphical abstract and should summarize the main findings of your research and capture the novelty of your results. Avoid technical jargon and abbreviations but use key words that will aid in the discoverability of your research. The graphical abstract and highlights should be placed into one document and uploaded as a separate file from the main text in ScholarOne.

Technical specifications and other guidance for preparing for graphical abstracts can be found here: https://www.elsevier.com/authors/journal-authors/graphical-abstract.

Headings

Major Headings. Major headings consist of Abstract, Introduction, Materials and Methods, Results, Discussion (or Results and Discussion), Conclusions (optional), Acknowledgments, Appendix (optional), and References.

Title Page

Across the top of the title page (first page), indicate a running head (abbreviated title) of no more than 45 characters.

A descriptive title—one that describes the subject of the article but does not reveal the main conclusions—should be used. The title should be short and informative and contain words or phrases used for indexing.

Under the title, names of authors should be given in mixed case (e.g., T. E. Smith or Tom E. Smith). Institutional addresses are displayed below the author names; footnotes referring from author names to displayed addresses should be numerals, in order from first to last author. The full name, mailing address, phone number, and e-mail address of the corresponding author should appear directly below the affiliation lines on the title page. The corresponding author will be identified by a footnote symbol and e-mail address below the accepted line on the first page of the published article (e.g., *Corresponding author: my.name@university.edu). Supplementary address information may be given in footnotes to the first page; use symbols for all title page footnotes. Acceptable format is shown below:

J. E. Smith,[1] R. A. Jones,[2] and A. T. Peters[1]
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Every author listed on the title page must have an account in ScholarOne that is linked to the manuscript submission.

ORCIDs. The corresponding (submitting) author of each manuscript is required to have an ORCID (https://orcid.org/) linked to their ScholarOne account. Co-authors *may* also have ORCIDs. ORCIDs that are present in the peer-review system when a manuscript is accepted for publication will be published on the manuscript. Late additions of ORCIDs cannot be published.

Abstract. The abstract should review important objectives, materials, results, conclusions, and applications as concisely as possible. Limit the use of abbreviations in the Abstract. Minimize the amount of data in the abstract and exclude statements of statistical probability (e.g., $P < 0.05$). Exclude references to other works.

Key Words. After the abstract, list 2 to 5 key words or phrases.

Abbreviations

Author-derived abbreviations should be defined at first use in the abstract and again in the body of the manuscript, and in each table and figure in which they are used. Author-derived abbreviations will be shown in bold type at first use in the body of the manuscript.

Refer to the "Miscellaneous Usage Notes" on page 9 for more information on abbreviations.

Body of the Paper

The body of the paper should contain an introduction to the problem (questions, objectives, reasons for research, and related literature); materials, methods, experimental design, and procedures; and results, discussion, conclusions, and applications.

The introduction should concisely describe the rationale for conducting the study, background, objectives, and hypotheses to be tested.

Results and Discussion may be combined into a single section. If not, the Results section should not contain discussion of previously published work. Results and references to tables and figures already described in the results section should not be repeated in the Discussion. The Discussion should begin with a brief summary of the paper. An optional separate conclusions section may follow the discussion. The conclusion section should consist of **one brief paragraph** that specifically states the main conclusions from the study. As such, it should not contain references to other works.

Appendix

A technical appendix may follow the References section. The appendix may contain explanations and elaborations that are not essential to other sections but are helpful to the reader. Novel computer programs or mathematical computations would be appropriate. The appendix is not be a repository for raw data.

Supplemental Material

Large data sets and other materials or data supplements that are not central to the paper should be placed in a repository and cited in the references section. This allows authors to maintain control over those files and to retain copyright of their supplementary files. Most university libraries can host these deposits or authors may choose among general repositories available, such as

figshare: https://figshare.com/
Harvard Dataverse: https://dataverse.harvard.edu/
Open Science Framework: https://osf.io/
Mendeley Data: https://data.mendeley.com/
Zenodo: https://zenodo.org/

References

List only pertinent references. No more than 3 references should be needed to support a specific concept. Research papers and reviews should cite a reasonable number of references. Abstracts and articles from non-peer-reviewed magazines and proceedings should be cited sparingly.

Citations in Text. In the body of the manuscript, refer to authors as Smith and Jones (1992) or Smith and Jones (1990, 1992). Work that has not been accepted for publication should be listed in the text as follows: "J. E. Jones (institution, city, and state, personal communication)." Personal communications and unpublished data must not be included in the references section.

References Section. To be listed in the references section, papers must be published or accepted for publication. Manuscripts submitted for publication but not yet accepted can be cited as "unpublished data" in the text. Journals should be abbreviated according to the conventional ISO abbreviations used by PubMed (https://www.ncbi.nlm.nih.gov/nlmcatalog/journals).

For **journal** articles, include all authors (do not use "et al."), year, article title, abbreviated journal name, volume, page range, and digital object identifier (DOI). Inclusive page numbers (or article identifiers) must be provided and the DOI included if available.

Hyde, M. L., M. R. Wilkens, and D. R. Fraser. 2019. In vivo measurement of strontium absorption from the rumen of dairy cows as an index of calcium absorption capacity. J. Dairy Sci. 102:5699–5705. https://doi.org/10.3168/jds.2018-16052.

For **book** references, include authors, year, chapter or section title, page range, book title, edition, book editors (if applicable), and publisher name and location.

Huber, J. T. 1996. Amelioration of heat stress in dairy cattle. Pages 211–243 in Progress in Dairy Science. C. J. C. Philips, ed. CAB International, Wallingford, UK.

For **conference proceedings**, include authors, year, abstract title, page number or abstract number, proceedings title, location of meeting, and name and location of proceedings publisher.

Van Amburgh, M. E., T. R. Overton, L. E. Chase, D. A. Ross and E. B. Recktenwald. 2009. The Cornell net carbohydrate and protein system: Current and future approaches for balancing of amino acids. Pages 28–37 in Cornell Nutr. Conf. Feed Manuf. Cornell Univ., Ithaca, NY.

For **abstracts presented at ADSA or joint annual meetings**, cite as a journal article but include the journal supplement number and the page of the supplement on which the abstract appeared. Include "(Abstr.)" at the end of the citation.

Vieira-Neto, A., I. M. R. Leao, J. G. Prim, R. Zimpel, K. V. de Almeida, M. M. Nehme, J. Bollatti, A. C. M. Silva, A. Revilla-Ruiz, C. D. Nelson, and J. E. P. Santos. 2019. Effect

of duration of exposure to diets differing in DCAD on calcium metabolism after a parathyroid hormone challenge in dairy cows. J. Dairy Sci. 102(Suppl. 1):15. (Abstr.)

For **patents**, provide names of inventors, year, title, name of assignee, and US or other patent number.

Biernoth, G., and W. Merk, inventors. 1985. Fractionation of milk fat using a liquified gas or a gas in the supercritical state. Unilever NV-PLC, assignee. US Pat. No. 4,504,503.

For **theses**, provide author, year, title, thesis type (PhD, MS, DVM), department name, and university name and location.

Kelly, M. G. 1977. Genetic parameters of growth in purebred and crossbred dairy cattle. MS Thesis. Department of Animal Science, North Carolina State Univ., Raleigh.

For **websites**, provide authors (or organization name), year, page title, date accessed (in month, day, year format), and URL.

USDA. 2018. Milk Cost-of-Production Estimates-2016 Base. Accessed Feb. 10, 2018. https://www.ers.usda.gov/data-products/milk-cost-of-production-estimates/milk-cost-of-production-estimates/#MilkCost-of-Production Estimates-2016 Base.

Tables

Tables should be self-explanatory and understandable without excessive reference to the text. The table shown below may be used as an example.

Tables must be prepared using the table feature in Microsoft Word. When possible, tables should be organized to fit across the page without running landscape. Be aware of the dimensions of the standard page size (8.5 × 11 in) when planning tables (use of more than 15 columns may create layout problems).

The table title should describe concisely the data shown; it does not require an ending period. Do not use vertical rules and use few horizontal rules. **Bold and italic typefaces should not be used in tables.** Limit the data field to the minimum needed for meaningful comparison within the accuracy of the methods.

Abbreviations should conform to journal style and be consistent with those used in the text.

For differences among means within a row or column, superscript letters should be used as appropriate sequentially (e.g., a, ab, b, c, cd) consistently from largest to smallest means and defined in the footnote. Informational footnotes should be numbered and each footnote should begin a new line (see sample table).

Table 4. Effects of dietary protein supplement sources and forage source ratio on nutrient digestibility and N excretion of lactating dairy cows

	Diet[1,2]									
	HAS		MAS		LAS			Probability[3]		
Item	SBM	CM	SBM	CM	SBM	CM	SEM	PS	FS	PS × FS
N intake, g/d	604	601	605	611	581	600	11.5	0.39	0.27	0.58
Urine volume, L/d	40.7	42.9	41.6	39.3	35.3	34.5	2.2	0.80	<0.01	0.43
Urinary excretion										
Total N, g/d	245	242	259	244	254	236	7.6	0.05	0.30	0.65
Total N, % of N intake	40.9	39.7	43.1	40.1	44.0	39.8	1.5	0.05	0.30	0.65
Urea N, g/d	198	194	199	188	195	179	6.0	<0.01	0.24	0.56
Urea N, % of total urinary N	82.3	83.1	78.6	76.6	78.0	77.2	2.0	0.24	0.08	0.79
Urea N, % of N intake	32.9	31.9	33.3	30.8	33.9	30.4	1.1	<0.01	0.98	0.33
Fecal N excretion										
N, g/d	182	197	189	185	179	171	5.5	0.72	0.02	0.08
N, % of N intake	30.1	32.8	31.1	29.9	31.1	28.7	0.6	0.59	0.04	<0.01
Apparent digestibility, %										
DM	71.0[a]	68.3[c]	69.6[b]	69.8[b]	70.1[ab]	71.3[a]	0.44	0.23	0.04	<0.01
OM	70.4[a]	67.2[c]	68.7[b]	68.9[b]	69.4[ab]	70.1[a]	0.46	0.06	0.09	<0.01
CP	69.9[ab]	67.2[c]	68.9[b]	70.1[ab]	68.9[b]	71.3[a]	0.64	0.59	0.04	<0.01
NDF	51.9[a]	45.3[c]	48.5[b]	47.2[b]	51.1[a]	51.2[a]	0.74	<0.01	<0.01	<0.01

[a–c]Mean values in the same row with different superscripts differ ($P < 0.01$) for the interaction between forage source and protein supplement.

[1]Forage sources in different proportions: HAS = high alfalfa silage, 50% alfalfa silage and 10% corn silage; MAS = medium alfalfa silage, 30% alfalfa silage and 30% corn silage; LAS = low alfalfa silage, 10% alfalfa silage and 50% corn silage.

[2]Protein supplement: SBM = soybean meal, CM = canola meal.

[3]Probability of treatment effects: PS = effects of protein supplement, SBM vs. CM diets; FS = effect of forage sources in different proportions; PS × FS = interaction between protein and forage source.

Figures

To facilitate review, figures should be placed at the end of the manuscript, with each caption appearing on the same page as the corresponding figure.

• ***Figure size.*** Prepare figures at final size for publication. Figures should be prepared to fit one column (8.9 cm wide), 2 columns (14 cm wide), or full-page width (19 cm wide).

• ***Font size.*** Ensure that all type within the figure and axis labels is readable at final publication size. A minimum type size of 8 points (after reduction to publication size) should be used. The font size should be proportional to the overall size of the figure (within a range of 8 to 12 points at final publication size).

• ***Fonts.*** For best readability, use Helvetica, Times New Roman, Arial, and the symbols palette within those fonts to annotate and label figures (for data points, axis descriptors, units, legends).

• ***Line weight.*** For line graphs, use a minimum stroke weight of 1 point for all lines. Use solid, long-dash, short-dash, and dotted lines to distinguish line types. Avoid the use of gray lines, as these will not reproduce well. Lines with different symbols for the data points may also be used to distinguish curves. Axes and ticks should be in black (not gray) with a thickness of at least 1 point.

• ***Axis labels.*** Each axis should have a descriptor and a unit. Units may be separated from the descriptor by a comma or parentheses.

• ***Shading and fill patterns.*** With the elimination of print in 2019, full color can be used in all figures at no additional charge. Complex patterns and 3-dimensional effects reproduce poorly and should not be used. Unnecessary backgrounds and grid lines should be removed from graphs.

• ***Symbols.*** Identify curves and data points using the following symbols only: □, ■, ○, ●, ▲, ▼, +, or ×. Symbols should be defined in the figure caption or in a key on the figure (but not both).

• ***File formats.*** Figures can be submitted in PDF, EPS, TIFF, and JPEG formats or pasted into Microsoft Word. Note that pasting into Word often reduces figure quality. Authors may upload high-resolution figures (preferably as TIFFs) in addition to the figures pasted into Word for review.

• ***Color and grayscale figures.*** Color figures should be prepared and submitted in RGB (not CMYK). Figures that are to be published in grayscale (black and white) should be submitted in grayscale because color may mask contrast problems that are apparent only when the figure is reproduced in grayscale.

• ***Resolution.*** **Minimum resolution is 600 dpi for grayscale and color figures, and 1,200 dpi for line art.** Submitting figures that do not meet these requirements may delay publication of your article.

• ***Photomicrographs.*** Photomicrographs must have their unmagnified size designated with a scale bar on the figure. Reduction for publication can make a magnification power designation (e.g., 100×) inappropriate.

• ***Captions.*** The caption should provide sufficient information that the figure can be understood without excessive reference to the text. All author-derived abbreviations and symbols used in the figure should be defined in the caption.

• ***General tips.*** Do not use three-dimensional bar charts unless essential to the presentation of the data. Use color or the simplest grayscale shading scheme possible to present the data clearly. Ensure that data, symbols, axis labels, lines, and key are clear and easily readable at final publication size.

Color charges. There is no charge for color figures.

Statistical Analysis

Biology should be emphasized, but the use of incorrect or inadequate statistical methods to analyze and interpret biological data is not acceptable. Consultation with a statistician is recommended. 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. A statement of the results of statistical analysis should justify the interpretations and conclusions. When possible, results of similar experiments should be pooled statistically. Do not report a number of similar experiments separately.

Experimental Unit. The experimental unit is the smallest unit to which an individual treatment is imposed. For group-fed animals, the group of animals in the pen or the paddock is the experimental unit; therefore, groups must be replicated. Repeated chemical analyses of the same sample usually do not constitute independent experimental units. Measurements on the same experimental unit over time also are not independent and must not be considered as independent experimental units. For analysis of time effects, use time-sequence analysis.

Usual assumptions are that errors in the statistical models are normally and independently distributed

with constant variance. Most standard methods are robust to deviations from these assumptions, but occasionally data transformations or other techniques are helpful. Most statistical procedures are based on the assumption that experimental units have been assigned to treatments at random. If animals are stratified by ancestry or weight or if some other initial measurement should be accounted for, the model should include a blocking factor, or the initial measurement should be included as a covariate.

A parameter [mean (μ), variance (σ^2)], which defines or describes a population, is estimated by a statistic (mean, s^2). The term *parameter* is not appropriate to describe a variable, observation, trait, characteristic, or measurement taken in an experiment.

Experimental Design. Standard designs are adequately described by name and size (e.g., "a randomized complete block design with 6 treatments in 5 blocks"). For a factorial set of treatments, an adequate description might be as follows: "Tryptophan at 0.05 or 0.10% of the diet and niacin at 5, 10, or 20 mg/kg of diet were used in a 2 × 3 factorial arrangement in 5 randomized complete blocks, each block consisting of littermates." Note that a factorial arrangement is not a design; the term "design" refers to the method of grouping experimental units into homogeneous groups or blocks (i.e., the way in which the randomization is restricted).

Variability. Standard deviation refers to the variability in a sample or a population. The standard error (calculated from error variance) is the estimated sampling error of a statistic such as the sample mean. When a standard deviation or standard error is given, the number of degrees of freedom on which it rests should be specified. When any statistical value (as mean or difference of 2 means) is mentioned, its standard error or confidence limit should be given. The fact that differences are not "statistically significant" is no reason for omitting standard errors. They are of value when results from several experiments are combined in the future. They are also useful to the reader as measures of efficiency of experimental techniques. **A value attached by "±" to a number implies that the second value is its standard error (not its standard deviation) unless otherwise specified.** Adequate reporting may require only (1) the number of observations, (2) arithmetic treatment means, and (3) an estimate of experimental error. The pooled standard error of the mean is the preferred estimate of experimental error. Standard errors need not be presented separately for each mean unless the means are based on different numbers of observations or the heterogeneity of the error variance is to be emphasized. Presenting individual standard errors clutters the presentation and can mislead readers.

For more complex experiments, tables of subclass means and tables of analyses of variance or covariance may be included. When the analysis of variance contains several error terms, such as in split-plot and repeated-measures designs, the text should indicate clearly which mean square was used for the denominator of each F statistic. Unbalanced factorial data can present special problems. Accordingly, it is appropriate to state how the computing was done and how the parameters were estimated. Approximations should be accompanied by cautions concerning possible biases.

Contrasts (preferably orthogonal) are used to answer specific questions for which the experiment was designed; they should form the basis for comparing treatment means. Nonorthogonal contrasts may be evaluated by Bonferroni t statistics. The exact contrasts tested should be described for the reader. Multiple-range tests are not appropriate when treatments are orthogonally arranged. Fixed-range, pairwise, multiple comparison tests should be used only to compare means of treatments that are unstructured or not related. In factorial treatment arrangements, means for main effects should be presented when important interactions are not present. Means for individual treatment combinations also should be provided in table or text so that future researchers may combine data from several experiments to detect important interactions. An interaction may not be detected in a given experiment because of a limitation in the number of observations.

Significance. The observed significance level (e.g., $P = 0.03$) should be presented rather than merely $P < 0.05$ or $P < 0.01$, thereby allowing the reader to decide what to reject. The terms *significant* and *highly significant* have traditionally been reserved for $P < 0.05$ and $P < 0.01$, respectively; however, reporting the exact P-value is preferred to the use of these terms. For example, use "... we observed a difference ($P = 0.03$) between control and treated samples" rather than "...we observed a significant ($P < 0.05$) difference between control and treated samples." Other probability (alpha) levels may be discussed if properly qualified so that the reader is not misled. Do not report P-values to more than 2 or 3 places after the decimal (2 significant digits are usually sufficient). Regardless of the probability level used, failure to reject a hypothesis should be based on the relative consequences of Type I and II errors. A "nonsignificant" relationship should not be interpreted to suggest the absence of a relationship. An inadequate number of experimental units or insufficient control of variation limits the power to detect relationships. Avoid the ambiguous use of $P > 0.05$ to declare nonsignificance, such as indicating that a difference is not significant at

$P > 0.05$ and subsequently declaring another difference significant (or a tendency) at $P < 0.09$. In addition, readers may incorrectly interpret the use of $P > 0.05$ as the probability of a beta error, not an alpha error.

Present only meaningful digits. A practical rule is to round values so that the change caused by rounding is less than one-tenth of the standard error. Such rounding increases the variance of the reported value by less than 1%, so <1% of the relevant information contained in the data is sacrificed. In most cases, 2 or 3 significant digits (not decimal places) are sufficient.

Nomenclature: Genes and Proteins

The journal recommends using internationally accepted symbols for genes and proteins; such symbols may be used without definition. Symbols for specific genes and proteins can be obtained by querying the gene database of PubMed (https://www.ncbi.nlm.nih.gov/gene/) or the Gene Cards database (www.genecards.org) Nomenclature rules for humans, nonhuman primates, and livestock are available at https://www.genenames.org, and rules for mice and rats are at http://www.informatics.jax.org/mgihome//nomen/strains.shtml. Gene symbols should be shown in italics (e.g., *SERPINA14*) and proteins in roman text (e.g., SERPINA14). Gene symbols are generally shown in all uppercase letters (e.g., *LHB*), except in mice and rats, where only the first letter is capitalized (e.g., *Lhb*).

Nomenclature: Single Nucleotide Polymorphisms

The increasing number of SNP association studies and the improvements in bovine genome annotation require a standardized SNP nomenclature for unequivocal and correct SNP identification. Additionally, information regarding the SNP investigated should be easily accessible in a publicly available database. Therefore, all relevant SNP included in a study should be listed with their unique RefSNP (rs) as indicated in the public domain NCBI dbSNP database (https://www.ncbi.nlm.nih.gov/snp). If the SNP investigated do not yet have an entry in the NCBI dbSNP database, the authors of the manuscript are responsible for submitting all the required information to NCBI (see https://www.ncbi.nlm.nih.gov/projects/SNP/) for depositing the SNP into the database and obtaining a unique ss number for the SNP. In the text of the manuscript, use the rs/ss number of the SNP or an alternative standardized nomenclature.

Nomenclature: Microorganisms

All microorganisms must be named by genus and species. The name of the genus must appear in full the first time that the microorganism is cited in the abstract, in the body of the paper, and in each table and figure legend. Thereafter, the genus can be abbreviated by its first initial unless it will be confused with other microorganisms cited in the paper, in which case each genus should be abbreviated to use enough letters to avoid confusion (e.g., *Strep.* vs. *Staph.*). The formal, binomial names of all microorganisms should be in italics. Specific strain designations and numbers should be used when appropriate.

For microorganisms that are genetic variants of a parent strain, the genotypic and phenotypic properties should be cited according to the procedures described by Demerec et al. (1966) in *Genetics* 54:61–76 (www.genetics.org/content/54/1/61.long). Phenotypes should be identified by 3 letters; the first is capitalized. Genotypes should be identified by 3 lowercase italic letters. Superscript plus (+) signs are used to refer to a wild-type. The serial isolation number is placed after the locus symbol for mutations. The delta symbol is used to indicate deletions.

Nomenclature: Enzymes

First mention of an enzyme within a manuscript should include the Enzyme Commission (EC) number (https://enzyme.expasy.org/).

In Vitro Antimicrobial Susceptibility Tests

Authors should avoid the use of the term "antibiotic" when referring to a specific agent unless that agent is naturally occurring and unmodified (e.g., penicillin). The broader term "antimicrobial agent" is preferred because it includes naturally produced agents, semisynthetic agents, and totally synthetic agents. The term "susceptibility" should be used instead of "sensitivity." Authors unfamiliar with antimicrobial susceptibility testing should obtain CLSI (formerly NCCLS) document M31 (Clinical Laboratory Standards Institute, 940 W. Valley Rd., Suite 1400, Wayne, PA 19087-1898) for specific information regarding antimicrobial susceptibility testing of veterinary pathogens. CLSI or equivalent methods for antimicrobial susceptibility testing available outside the US are also acceptable.

Two methods are generally used to generate antimicrobial susceptibility data: the agar disk diffusion (ADD) method and the minimum inhibitory concentration (MIC) method. The use of the term "Kirby-Bauer" to refer to the ADD method is incorrect and should be avoided. The correct citation for this method is the "disk

diffusion method of Bauer et al." The ADD method is a qualitative method and results should be reported as susceptible, intermediate, or resistant (SIR). If zone of inhibition diameters are reported, these should be reported in millimeters.

The MIC method is quantitative and results should be reported in micrograms per milliliter (μg/mL). The minimum summary statistics for reporting MIC results from multiple strains of an organism are the MIC_{50}, the MIC_{90}, and the range. The MIC_{50} and MIC_{90} represent the concentrations required to inhibit 50 and 90% of the strains, respectively. The MIC_{50} and MIC_{90} reported should be the actual concentrations tested, not values calculated from the actual data obtained. When <10 isolates of a species are tested, tabulate only the MIC range of each antimicrobial agent tested. If more than a single drug is studied, insert a column labeled "test agent" between the columns listing the organisms and the columns containing the numerical data, and record data for each agent in the same isolate order. In addition, the percentage of strains categorized as susceptible, intermediate, or resistant may be reported. If only one of these categories is to be reported, the percent susceptible value is preferred. If the percentage of resistant isolates is to be reported for an agent, it should include isolates categorized as intermediate.

The percentage of strains susceptible or resistant to an antibiotic at its breakpoint concentration may be given only if an appropriate breakpoint has been approved, as by CLSI. Given the paucity of approved breakpoints for mastitis pathogens, authors may use breakpoints from other species (e.g., human breakpoints for ampicillin or canine breakpoints for enrofloxacin). However, authors must clearly state that the breakpoints are not approved for mastitis pathogens. Moreover, authors cannot assign breakpoints or use breakpoints from related antibiotics (except for class testing purposes) or breakpoints developed for other methods.

Authors must indicate that the appropriate quality control tests were performed. Information regarding the frequency of testing and the specific strains tested should be provided. The frequency of quality control testing and organisms tested should conform to the recommendations in the CLSI standard (document M31) or equivalent. A single statement in the manuscript indicating that the results obtained for the quality control documents were within published ranges is acceptable. However, authors may be asked for the quality control information during the manuscript review cycle.

Sensory Data

Sensory data should comply with "*Invited Review:* Sensory Analysis of Dairy Foods," J. Dairy Sci. 90:4925–4937 (https://doi.org/10.3168/jds.2007-0332).

Miscellaneous Usage Notes

Abbreviations. Abbreviations should not be used in the title, key words, or to begin sentences, except when they are widely known throughout science (e.g., DNA, RNA) or are terms better known by their abbreviation. Appendices 1 and 2 of this document list abbreviations that can be used without definition. The suitability of abbreviations will be evaluated by the reviewers and editors during the review process and by the technical editor during editing. Terms used fewer than 3 times after first use must be spelled out in full rather than abbreviated. Do not use capitalized whole words (e.g., CORN) as treatment abbreviations, or single-letter abbreviations that could be confused with chemical elements (e.g., P, C, S). All terms are to be spelled out in full with the abbreviation following in bold type in parentheses the first time they are mentioned in the main body of the text. Abbreviations shall be used consistently thereafter.

The abstract, text, each table, and each figure must be understood independently of each other. Therefore, abbreviations shall be defined within each of these units of the manuscript.

Foreign and Latin Words and Phrases. Non-English words in common usage (i.e., given in recent editions of standard dictionaries) will not appear in italics (e.g., in vitro, in vivo, ad libitum, in situ, a priori). However, genus and species of plants, animals, or bacteria and viruses should be italicized; in addition, all taxa of bacteria should be italicized.

Capitalization. Breed and variety names are to be capitalized (e.g., Holstein, Danish Red). Trademarked or registered names should be capitalized, but no ™ or ® symbols should be used. Proper nouns should be capitalized.

Numbers and Units. The *Journal of Dairy Science* uses the Council of Science Editors' number style given in the eighth edition of *Scientific Style and Format* (numerals used for all numbers).

Measures must be in the metric (SI) system; however, US equivalents may be given in parentheses. Measures of variation must be defined in the Abstract and in the body of the paper at first use.

Monetary values should be presented in US dollars or euros. If other currencies are used, a conversion to US dollars should be given at first use.

SI Units. Units of measure should be abbreviated according to standard SI usage and do not need to be

defined. See "Appendix 2: Selected Units and Terms" on page 12 for a list of commonly used terms. The following site (National Institute of Standards and Technology) provides a comprehensive guide to SI units and usage: https://physics.nist.gov/cuu/Units/index.html.

General Usage. Note that "and/or" is not permitted; choose the more appropriate meaning or use "x or y or both."

Use the slant line only when it means "per" with numbered units of measure or "divided by" in equations. Use only one slant line in a given expression: e.g., g/cow per day. The slant line may not be used to indicate ratios or mixtures.

Commercial Products. The use of names of commercial products should be minimized. When a commercial product is being tested as part of the experiment, the manufacturer and location should be given parenthetically at first mention in text, tables, and figures, but, when possible, the generic name should be used thereafter. Only generic names should be used in article titles. Trademark symbols and registration marks should not be used and will be removed.

Studies using commercial products should address a hypothesis-based question relevant to the biology or mechanism of action of the product. When possible, cite easily accessible references to describe a method being used instead of describing a method as "per manufacturer's instructions."

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Appendix 1*:* Abbreviations

Revised March 2020

The following abbreviations may be used without definition in the *Journal of Dairy Science*. In addition, abbreviations of all chemical elements, common combinations of chemical elements, SI units of measure used with a value, and common amino acids (3-letter and 1-letter abbreviations) should be used without definition. Abbreviations are generally not permitted in the title, running head, and key words. Plural abbreviations do not require "s".

Unrestricted Use

AA = amino acid
ACTH = adrenocorticotropin
AMP, ADP, ATP = adenosine mono-, di-, or triphosphate
ANOVA = analysis of variance
ATPase = adenosine triphosphatase
BLUP = best linear unbiased predictor
BSA = bovine serum albumin
cDNA = complementary deoxyribonucleic acid
DNA = deoxyribonucleic acid
DNase = deoxyribonuclease
dNTP = deoxynucleotide triphosphates
EDTA = ethylenediaminotetraacetate
EGTA = ethylene glycol tetraacetate
ELISA = enzyme-linked immunosorbent assay
FSH = follicle-stimulating hormone
GAPDH = glyceraldehyde 3-phosphate dehydrogenase
GnRH = gonadotropin-releasing hormone
GWAS = genome-wide association study
HEPES = *N*-2-hydroxyethyl piperazine-N′-ethanesulfonic acid
HPLC = high-performance (pressure) liquid chromatography
IFN = interferon
Ig = immunoglobulin
IL = interleukin
LH = luteinizing hormone
mAb = monoclonal antibody
MALDI-TOF = matrix-assisted laser desorption/ionization time-of-flight
mRNA = messenger ribonucleic acid
NAD^+/NADH = nicotinamide adenine dinucleotide (oxidized/reduced)
NADP = nicotinamide adenine dinucleotide phosphate
$NADPH_2$ = reduced nicotinamide adenine dinucleotide phosphate
PAGE = polyacrylamide gel electrophoresis
PCR = polymerase chain reaction
$PGF_{2\alpha}$ = prostaglandin $F_{2\alpha}$
REML = restricted maximum likelihood
RFLP = restriction fragment length polymorphism
RIA = radioimmunoassay
RNA = ribonucleic acid
RNase = ribonuclease
rRNA = ribosomal ribonucleic acid
SNP = single nucleotide polymorphism
Tris = tris(hydroxymethyl)aminomethane
UHT = ultra-high temperature
USDA = United States Department of Agriculture
UV = ultraviolet

Define in Abstract; Unrestricted Use Elsewhere

ADF = acid detergent fiber
ADG = average daily gain
ADL = acid detergent lignin
ADIN = acid detergent insoluble nitrogen
AI = artificial insemination
BCS = body condition score
BHB = β-hydroxybutyrate
bST = bovine somatotropin
BTA = *Bos taurus* autosome
BUN = blood urea nitrogen
BW = body weight
CI = confidence interval*
CLA = conjugated linoleic acid
CN = casein
CNS = coagulase-negative staphylococci (see NAS)
CoA = coenzyme A
CP = crude protein
CV = coefficient(s) of variation*
DCAD = dietary cation-anion difference
df = degrees of freedom*
DHI(A) = Dairy Herd Improvement/Information (Association)
DIM = days in milk
DM = dry matter
DMI = dry matter intake
EAA = essential amino acid
EBV = estimated breeding value
ECM = energy-corrected milk
ETA = estimated transmitting ability
FAME = fatty acid methyl esters
FCM = fat-corrected milk
GC = gas chromatography
GLC = gas-liquid chromatography
h^2 = heritability*
HTST = high temperature, short time
IGF = insulin-like growth factor
IMI = intramammary infection
α-LA = α-lactalbumin
β-LG = β-lactoglobulin
LPS = lipopolysaccharide
LSD = least significant difference*
LSM = least squares means*
ME = metabolizable energy
MIC = minimum inhibitory concentration
MP = metabolizable protein
MS = mass spectrometry
MUFA = monounsaturated fatty acids
MUN = milk urea nitrogen
n = number of samples*
NAN = nonammonia nitrogen
NAS = non-*aureus* staphylococci
NDF = neutral detergent fiber
NDIN = neutral detergent insoluble N
NDM = nonfat dry milk
NEAA = nonessential amino acid
NE_G = net energy for gain
NE_L = net energy for lactation
NE_M = net energy for maintenance
NFC = nonfiber carbohydrates
NPN = nonprotein nitrogen
NRC = National Research Council
NS = nonsignificant*
NSC = nonstructural carbohydrates
OM = organic matter
PBS = phosphate-buffered saline
PMN = polymorphonuclear leukocyte
PTA = predicted transmitting ability
PUFA = polyunsaturated fatty acids
r = correlation coefficient*
R^2 = coefficient of determination*
QTL = quantitative trait loci
RDP = rumen-degradable protein
RUP = rumen-undegradable protein
SARA = subacute ruminal acidosis
SCC = somatic cell count
SCS = somatic cell score
SD = standard deviation*
SDS = sodium dodecyl sulfate
SE = standard error*
SEM = standard error of the mean*
SFA = saturated fatty acids
SNF = solids-not-fat
SPC = standard plate count
TDN = total digestible nutrients
TMR = total mixed ration
TS = total solids
UF = ultrafiltration, ultrafiltered
UFA = unsaturated fatty acids
VFA = volatile fatty acids

*Unrestricted use in tables and parenthetical expressions; spell out/define at first use in running text.

Appendix 2*:* Selected Units and Terms

The following units and terms can be used without definition in the *Journal of Dairy Science*.

atomic mass unit	amu
atmosphere	atm
base pair	bp
calorie (gram)	cal
celsius (with number)	°C
centimeter	cm
centimeter, square	cm^2
circa	ca.
centimorgan	cM
centipoise	cP
central processing unit	CPU
colony-forming unit	cfu
counts per minute	cpm
counts per second	cps
crossed with, times	×
cubic	cu
cubic centimeter	cc, cm^3
cubic millimeter	mm^3
curie	Ci
cycles per second (hertz)	Hz
day(s)	d
dalton	Da
deci	d (prefix)
deciliter	dL
electron volt	eV
equivalents	Eq
foot-candle	use lx
gram	g
gravity	*g*
hectare	ha
hour(s)	h
inside diameter	i.d.
international unit	IU
intramuscularly	i.m.
intraperitoneally	i.p.
intravenously	i.v.
joule	J
kilo	k (prefix)
kilobase	kb
kilobyte	KB
kilocalorie	kcal
kilogram	kg
kilopascal	kPa
liter	L
logarithm (natural)	ln
logarithm (base 10)	$\log_{10}$
lux	lx
mega	M (prefix)
meter	m
metric tonne	tonne or t
micro	µ (prefix)
microcurie	µCi
microfarad	µF
microgram	µg
microliter	µL
milli	m (prefix)
milliliter	mL
millimeters of mercury	mm Hg
millimolar (concentration)	m*M* (= mmol/L)
millimole (mass)	mmol
minute(s)	min
molar (concentration)	*M*
molar (mass)	mol
mole (number, mass)	mol
month(s)	mo
morning/afternoon	a.m./p.m.
nano	n (prefix)
newton	N
normal (concentration)	*N*
nanogram	ng
osmolality	use mmol/kg
outside diameter	o.d.
parts per billion	ppb (use µg/kg or equivalent)
parts per million	ppm (use mg/kg or equivalent)
pascal	Pa
pico	p (prefix)
picogram	pg
plaque-forming unit	pfu
probability	*P*
revolutions per minute	rpm
second(s)	s
siemens	S
species	spp.
subcutaneous	s.c.
subspecies	ssp.
thousands (approximation)	K (e.g., 50K SNPs)
unit	U
volt	V
volume	vol
volume/volume	vol/vol (use parenthetically)
watt	W
week(s)	wk
weight/volume	wt/vol (use parenthetically)
year(s)	yr

Amino Acids

alanine	Ala
arginine	Arg
asparagine	Asn
aspartic acid	Asp
citrulline	Cit
cysteine	Cys
glutamic acid	Glu
glutamine	Gln
glycine	Gly
histidine	His
isoleucine	Ile
leucine	Leu
lysine	Lys
methionine	Met
ornithine	Orn
phenylalanine	Phe
proline	Pro
serine	Ser
threonine	Thr
tryptophan	Trp
tyrosine	Tyr
valine	Val