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DESCRIPTION

First self-published in 1921, Poultry Science is an internationally renowned monthly journal, known as the authoritative source for a broad range of poultry information and high-caliber research. The journal plays a pivotal role in the dissemination of preeminent poultry-related knowledge across all disciplines. As of January 2020, Poultry Science is an Open Access journal with no subscription charges, meaning authors who publish here can make their research immediately, permanently, and freely accessible worldwide while retaining copyright to their work.

An international journal, Poultry Science publishes original papers, research notes, symposium papers, and reviews of basic science as applied to poultry. This authoritative source of poultry information is consistently ranked by Clarivate's Impact Factor as one of the top 10 agriculture, dairy and animal science journals to deliver high-caliber research. Currently it is the highest-ranked (by Impact Factor and Eigenfactor) journal dedicated to publishing poultry research. Subject areas include breeding, genetics, education, production, management, environment, health, behavior, welfare, immunology, molecular biology, metabolism, nutrition, physiology, reproduction, processing, and products.

IMPACT FACTOR

2019: 2.659 © Clarivate Analytics Journal Citation Reports 2020

ABSTRACTING AND INDEXING

Scopus
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GUIDE FOR AUTHORS

SCOPE AND GENERAL INFORMATION

AIMS AND SCOPE

Poultry Science® has moved to Gold Open Access (OA) per January 1st, 2020. Note that for manuscripts submitted after September 30th, 2019, an article processing charge (APC) is therefore payable after acceptance for publication. The APC for Poultry Science is $1500 for Poultry Science Association members, and $2000 for non-members per article. It will be requested after peer review and acceptance. For more information please also view the PSA press announcement and answers to frequently asked questions.

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An international journal, Poultry Science publishes original papers, research notes, symposium papers, and reviews of basic science as applied to poultry. This authoritative source of poultry information is consistently ranked by ISI Impact Factor as one of the top 10 agriculture, dairy and animal science journals to deliver high-caliber research. Currently it is the highest-ranked (by Impact Factor and Eigenfactor) journal dedicated to publishing poultry research. Subject areas include breeding, genetics, education, production, management, environment, health, behavior, welfare, immunology, molecular biology, metabolism, nutrition, physiology, reproduction, processing, and products.

SUBMISSION

All manuscripts are submitted and reviewed via the journal's Editorial Manager manuscripts submission site at https://www.editorialmanager.com/psj. New authors should create an account prior to submitting a manuscript for consideration.

The submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

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CONTACT INFORMATION

For information on the scientific content of the journal, contact the editor-in-chief, Dr. Robert L. Taylor, Jr., Professor of Animal & Nutritional Sciences, West Virginia University, 2108 Agricultural Science Building, P.O. Box 6108, Morgantown, WV 26506-6108; contact at PS-Editor@mail.wvu.edu.

For assistance with Editorial Manager manuscripts, manuscript submission, and manuscript status contact David Busboom at david.busboom@poultryscience.org.

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TYPES OF ARTICLES

Full-Length Articles

The journal emphasizes the importance of good scientific writing and clarity in presentation of the concepts, apparatus, and sufficient background information that would be required for thorough understanding by scientists in other disciplines. The results of experiments published in Poultry Science must be replicated, either by replicating treatments within experiments or by repeating experiments. Care should be taken to ensure that experiments are adequately replicated.

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Review papers are accepted only if they provide new knowledge or a high-caliber synthesis of important knowledge. Reviews are not exempt from Open Access charges. All Poultry Science guidelines for style and form apply.

Research Notes

Research Notes report the results of complete experiments but are less comprehensive than full-length articles. These short papers may convey preliminary or final data fulfilling one or more of the following criteria: a single experiment, low sample numbers, or limited replication. Manuscripts should be prepared according to the guidelines for full-length articles. The title of a Research Note must begin with the words "Research Note:". The running head shall be "RESEARCH NOTE." Results and Discussion should be a unified section with concise data interpretation. A conclusions heading is not permitted. Supplementary data are not permitted. These papers are limited to: 1) 3,000 words or approximately nine typed, double-spaced pages; 2) two tables or figures or one of each; and 3)
maximum ten (10) references. Authors must also indicate the section under which the manuscript is to be reviewed on the manuscript title page and on the Manuscript Submission Form. Editors may request that submitted full-length papers be revised for publication as Research Notes.

**Symposium Papers**

Symposium chair must decide whether or not the symposium is to be published and will inform the editor-in-chief of this decision at the January meeting. If the decision is not to publish the symposium, the individual authors retain the right to submit their papers for consideration for the journal as ordinary manuscripts. If publication is decided upon, all manuscript style and form guidelines of the journal shall be followed. If you are interested in publishing a symposium in *Poultry Science*, please contact the editor-in-chief for full guidelines.

**Invited Papers**

Invited papers are subject to review, and all manuscript style and form guidelines of the journal shall be followed. Invited papers are exempt from open access fee.

**Invited Reviews**

Invited Reviews will be approximately 10 published pages and in review format. Nominations or suggestions for potential timely reviews are welcomed and should be sent directly to the editor-in-chief.

**Contemporary Issues**

Contemporary Issues will address critical issues facing poultry scientists and the poultry industry. As such, submissions to this section should be of interest to any poultry scientist, to the industry, to instructors and faculty teaching contemporary issues classes, and to undergraduate and graduate students. The section will consist of short papers (approximately 2 published pages) written in essay format and will include an abstract, appropriate subheadings, and references.

**Book Reviews**

A limited number of book reviews will publish in *Poultry Science*. Book reviews shall be prepared in accordance to the style and form requirements of the journal, and they are subject to editorial revision. No fees will be assessed.

**Letters to the Editor**

The purpose of letters will be to discuss, critique, or expand on scientific points made in articles recently published in *Poultry Science*. Introduction of unpublished data will not be allowed, nor will material based on conjecture or speculation. Letters must be received within 6 months of an article’s publication. Letters will be limited to 400 words and 5 references. The author(s) of the original paper(s) will be provided a copy of the letter and offered the opportunity to submit for consideration a reply within 30 days. Replies will have the same page restrictions and format as letters, and the titles shall end with "-Reply." Letters and replies will be published together. Letters and replies shall follow appropriate *Poultry Science* formatting and may be edited by the editor-in-chief and a technical editor. If multiple letters on the same topic are received, a representative letter concerning a specific article may be published. Letters and replies will be published as space permits.

**JOURNAL POLICIES**

**PEER REVIEW PROCESS**

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Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

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**PREPARATION OF MANUSCRIPT**

**MANUSCRIPT FORMATTING**

**General**


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It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor’s options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns.
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**Major headings**

Major headings are centered (except ABSTRACT), all capitals, boldface, and consist of ABSTRACT, INTRODUCTION, MATERIALS AND METHODS, RESULTS, DISCUSSION (or RESULTS AND DISCUSSION), ACKNOWLEDGMENTS (optional), APPENDIX (optional), and REFERENCES.

**First subheadings**

First subheadings are placed on a separate line, begin at the left margin, the first letter of all important words is capitalized, and the headings are boldface and italic. Text that follows a first subheading should be in a new paragraph.

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Second subheadings begin the first line of a paragraph. They are indented, boldface, italic, and followed by a period. The first letter of each important word should be capitalized. The text follows immediately after the final period of the subheading.

**TITLE PAGE**

The title page shall begin with a running head (short title) of not more than 45 characters. The running head is centered, is in all capital letters, and shall appear on the top of the title page. No abbreviations should be used.

The title of the paper must be in boldface; the first letter of the article title and proper names are capitalized, and the remainder of the title is lowercase. The title must not have abbreviations.

Under the title, names of authors should be typed (first name or initial, middle initial, last name). Affiliations will be footnoted using the following symbols: *, #, †, §, ‡, ||, and be placed below the author names. Do not give authors' titles, positions, or degrees. Numbered footnotes may be used to provide supplementary information, such as present address, acknowledgment of grants, and experiment station or journal series number. The corresponding author should be indicated with a numbered footnote (e.g., Corresponding author: name@university.edu).

Note that there is no period after the corresponding author's e-mail address. The title page shall include the name and full address of the corresponding author. Telephone numbers and e-mail address must also be provided. The title page must indicate the appropriate scientific section for the paper (i.e., Animal Well-Being and Behavior; Genetics and Genomics; Immunology, Health and Disease; Metabolism and Nutrition; Molecular and Cellular Biology; Physiology and Reproduction; Processing and Products; Microbiology and Food Safety; Management and Production).

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Author-derived abbreviations should be defined at first use in the abstract and again in the body of the manuscript. The abbreviation will be shown in bold type at first use in the body of the manuscript. Refer to the Miscellaneous Usage Notes for more information on abbreviations.

**ABSTRACT**

The Abstract disseminates scientific information through abstracting journals and through convenience for the readers. The Abstract, consisting of not more than 325 words, appears at the beginning of the manuscript with the word ABSTRACT without a following period. It must summarize the major objectives, methods, results, conclusions, and practical applications of the research. The Abstract must consist of complete sentences and use of abbreviations should be limited. References to other work and footnotes are not permitted. The Abstract and Key Words must be on a separate sheet of paper.

**KEY WORDS**

The Abstract shall be followed by a maximum of five key words or phrases to be used for subject indexing. These should include important words from the title and the running head and should be singular, not plural, terms (e.g., broiler, not broilers). Key words should be formatted as follows: Key words: . . .

**ARTICLE STRUCTURE**

**Introduction**

The Introduction, while brief, should provide the reader with information necessary for understanding research presented in the paper. Previous work on the topic should be summarized, and the objectives of the current research must be clearly stated.

**Materials and methods**

All sources of products, equipment, and chemicals used in the experiments must be specified parenthetically at first mention in text, tables, and figures [i.e., (model 123, ABC Corp., Provo, UT)]. Model and catalog numbers should be included. Information shall include the full corporate name (including division, branch, or other subordinate part of the corporation, if applicable), city, and state (country if outside the United States), or Web address. Street addresses need not be given unless the reader would not be able to determine the full address for mailing purposes easily by consulting standard references.

Age, sex, breed, and strain or genetic stock of animals used in the experiments shall be specified. Animal care guidelines should be referenced if appropriate.

Papers must contain analyzed values for those dietary ingredients that are crucial to the experiment. Papers dealing with the effects of feed additives or graded levels of a specific nutrient must give analyzed values for the relevant additive or nutrient in the diet(s). If products were used that contain different potentially active compounds, then analyzed values for these compounds must be given for the diet(s). Exceptions can only be made if appropriate methods are not available. In other papers, authors should state whether experimental diets meet or exceed the National Research Council (1994) requirements as appropriate. If not, crude protein and metabolizable energy levels should be stated. For layer diets, calcium and phosphorus contents should also be specified.

When describing the composition of diets and vitamin premixes, the concentration of vitamins A and E should be expressed as IU/kg on the basis of the following equivalents:

**Vitamin A**

1 IU = 0.3 μg of all-trans retinol 1 IU = 0.344 μg of retinyl acetate

1 IU = 0.552 μg of retinyl palmitate
1 IU = 0.60 μg of β-carotene

**Vitamin E**

1 IU = 1 mg of dl-α-tocopheryl acetate  
1 IU = 0.91 mg of dl-α-tocopherol  
1 IU = 0.67 mg of d-α-tocopherol

In the instance of vitamin D3, cholecalciferol is the acceptable term on the basis that 1 IU of vitamin D3 = 0.025 μg of cholecalciferol.

The sources of vitamins A and E must be specified in parentheses immediately following the stated concentrations.

- **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.

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 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. For example, it is recommended that percentage data between 0 and 20 and between 80 and 100 be subjected to arc sin transformation prior to analysis. 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, they should include a blocking factor, or the initial measurement should be included as a covariate.

- A parameter [mean (μ), variance (σ²)], which defines or describes a population, is estimated by a statistic (x, s²). The term parameter is not appropriate to describe a variable, observation, trait, characteristic, or measurement taken in an experiment.

- 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: "Total sulfur amino acids at 0.70 or 0.80% of the diet and Lys at 1.10, 1.20, or 1.30% of the diet were used in a 2 x 3 factorial arrangement in 5 randomized complete blocks consisting of initial BW." 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).

- 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 also are 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). 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 well 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. Least squares means are the correct means to use for all data, but arithmetic means are identical to least squares means unless the design is unbalanced or contains missing values or an adjustment is being made for a covariate. In factorial treatment arrangements, means for main effects should be presented when important interactions are not present. However, 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.

- The terms significant and highly significant traditionally have been reserved for \( P < 0.05 \) and \( P < 0.01 \), respectively; however, reporting the P-value is preferred to the use of these terms. For example, use "... there was a difference (\( P < 0.05 \)) between control and treated samples" rather than "... there was a significant (\( P < 0.05 \)) difference between control and treated samples." When available, the observed significance level (e.g., \( P = 0.027 \)) should be presented rather than merely \( P < 0.05 \) or \( P < 0.01 \), thereby allowing the reader to decide what to reject. Other probability (\( \alpha \)) levels may be discussed if properly qualified so that the reader is not misled. Do not report P-values to more than 3 places after the decimal. Regardless of the probability level used, failure to reject a hypothesis should be based on the relative con- sequences 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 that less than 1% of the relevant information contained in the data is sacrificed. Significant digits in data reported should be restricted to 3 beyond the decimal point, unless warranted by the use of specific methods.

**Results and discussion**

Results and Discussion sections may be combined, or they may appear in separate sections. If separate, the Results section shall contain only the results and summary of the author's experiments; there should be no literature comparisons. Those comparisons should appear in the Discussion section. Manuscripts reporting sequence data must have GenBank accession numbers prior to submitting. One of the hallmarks for experimental evidence is repeatability. Care should be taken to ensure that experiments are adequately replicated. The results of experiments must be replicated, either by replicating treatments within experiments or by repeating experiments.
Acknowledgements

An Acknowledgments section, if desired, shall follow the Discussion section. Acknowledgments of individuals should include affiliations but not titles, such as Dr., Mr., or Ms. Affiliations shall include institution, city, and state.

Appendix

A technical Appendix, if desired, shall follow the Discussion section or Acknowledgments, if present. The Appendix may contain supplementary material, explanations, and elaborations that are not essential to other major sections but are helpful to the reader. Novel computer programs or mathematical computations would be appropriate. The Appendix will not be a repository for raw data.

REFERENCES

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Tables must be created using the MS Word table feature and inserted in the manuscript after the references section. When possible, tables should be organized to fit across the page without running broadside. Be aware of the dimensions of the printed page when planning tables (use of more than 15 columns will create layout problems). Place the table number and title on the same line above the table. The table title does not require a period. Do not use vertical lines and use few horizontal lines. Use of bold and italic typefaces in the table should be done sparingly; you must define such use in a footnote. Each table must be on a separate page. To facilitate placement of all tables into the manuscript file (just after the references) authors should use "section breaks" rather than "page breaks" at the end of the manuscript (before the tables) and between tables.

Units of measure for each variable must be indicated. Papers with several tables must use consistent format. All columns must have appropriate headings. Abbreviations not found on the inside front cover of the journal must be defined in each table and must match those used in the text. Footnotes to tables should be marked by superscript numbers. Each footnote should begin a new line. Superscript letters shall be used for the separation of means in the body of the table and explanatory footnotes must be provided [i.e., "Means within a row lacking a common superscript differ (P < 0.05)."]; other significant P-values may be specified. Comparison of means within rows and columns should be indicated by different series of superscripts (e.g., a,b,... in rows; x-z ... in columns) The first alphabetical letter in the series (e.g., a or A) shall be used to indicate the largest mean. Lowercase super- scripts indicate P ≤ 0.05. Uppercase letters indicate P ≤ 0.01 or less.

Probability values may be indicated as follows: *P ≤ 0.05, **P ≤ 0.01, ***P ≤ 0.001, and #P ≤ 0.10. Consult a recent issue of Poultry Science for examples of tables.
Generally, results should be presented to the significant figure of the instrument used to collect the data. For example, results should not be presented to 5 digits when the instrument used only reads to 2 digits.

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- Abbreviations shall 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 abbreviation (e.g., IgG, CD). A helpful criterion for use of abbreviation is whether it has been accepted into thesauri and indexes widely used for searching major bibliographic databases in the scientific field. Abbreviations may be used in heads within the paper, if they have been first defined within the text. The inside back cover of every issue of the journal lists abbreviations that can be used without definition. The list is subject to revision at any time, so authors should always consult the most recent issue of the journal for relevant information. Abbreviations are allowed when they help the flow of the manuscript; however, excessive use of abbreviations can confuse the reader. The suitability of abbreviations will be evaluated by the reviewers and editors during the review process and by the technical editor during editing. As a rule, author-derived abbreviations should be in all capital letters. Terms used less than three times must be spelled out in full rather than abbreviated. 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, rather than the full term.

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- The following abbreviations may be used without definition in *Poultry Science*:

  A adenine  
  ADG average daily gain  
  ADFI average daily feed intake  
  AME apparent metabolizable energy  
  AMEn nitrogen-corrected apparent metabolizable energy  
  ANOVA analysis of variance  
  B cell bursal-derived, bursal-equivalent derived cell bp base pairs  
  BSA bovine serum albumin  
  BW body weight  
  C cytosine  
  cDNA complementary DNA  
  cfu colony-forming units  
  CI confidence interval  
  CP crude protein  
  cpm counts per minute  
  CV coefficient of variation d day  
  df degrees of freedom  
  DM dry matter  
  DNA deoxyribonucleic acid  
  EDTA ethylenediaminetetraacetate  
  ELISA enzyme-linked immunosorbent antibody assay  
  EST expressed sequence tag  
  g gram g gravity  
  G guanine  
  GAT glutamic acid-alanine-tyrosine  
  G:F gain-to-feed ratio  
  GLM general linear model  
  h hour  
  HEPES N-2-hydroxyethyl piperazine-N’-ethane-sulfonic acid  
  HPLC high-performance (high-pressure) liquid chromatography
ICU international chick units
Ig immunoglobulin  IL interleukin
IU international units  kb kilobase pairs  kDa kilodalton
L liter*
L:D hours light:hours darkness in a photoperiod (e.g., 23L:1D)
m meter
μ micro M molar
MAS marker-assisted selection
ME metabolizable energy
MEn nitrogen-corrected metabolizable energy
MHC major histocompatibility complex
mRNA messenger ribonucleic acid min minute
mo month
MS mean square
n number of observations
N normal
NAD nicotinamide adenine dinucleotide
NADH reduced nicotinamide adenine dinucleotide
NRC National Research Council
NS not significant
PAGE polyacrylamide gel electrophoresis
PBS phosphate-buffered saline
PCR polymerase chain reaction pfu plaque-forming units
QTL quantitative trait loci  r correlation coefficient
r² coefficient of determination, simple
R² coefficient of determination, multiple
RH relative humidity
RIA radioimmunoassay
rpm revolutions per minute
s second
SD standard deviation
SDS sodium dodecyl sulphate
SE standard error
SEM standard error of the mean
SRBC sheep red blood cells
SNP single nucleotide polymorphism
T thymine
TBA thiobarbituric acid
T cell thymic-derived cell
TME true metabolizable energy
TMEn nitrogen-corrected true metabolizable energy
Tris tris(hydroxymethyl)aminomethane
TSAA total sulfur amino acids U uridine
USDA United States Department of Agriculture
UV ultraviolet
vol/vol volume to volume
vs. versus
wt/vol weight to volume
wt/wt weight to weight
wk week
yr year*

*Also capitalized with any combination, e.g., mL.

**International words and phrases**

Non-English words in common usage (defined in recent editions of standard dictionaries) will not appear in italics (e.g., in vitro, in vivo, in situ, a priori). However, genus and species of plants, animals, or bacteria and viruses should be italicized. Authors must indicate accent marks and other diacritics on international names and institutions. German nouns shall begin with capital letters.
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Numbers less than 1 shall be written with preceding zeros (e.g., 0.75). All numbers shall be written as digits. Measures must be in the metric system; however, US equivalents may be given in parentheses. *Poultry Science* requires that measures of energy be given in calories rather than joules, but the equivalent in joules may be shown in parentheses or in a footnote to tables. Units of measure not preceded by numbers must be written out rather than abbreviated (e.g., lysine content was measured in milligrams per kilogram of diet) unless used parenthetically. Measures of variation must be defined in the Abstract and in the body of the paper at first use. Units of measure for feed conversion or feed efficiency shall be provided (i.e., g:g).

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Nucleotide sequence data must relate to poultry or poultry pathogens and must complement biological data published in the same or a companion paper. If sequences are excessively long, it is suggested that the most relevant sections of the data be published in *Poultry Science* and the remaining sequences be submitted to one of the sequence databases. Acceptance for publication is contingent on the submission of sequence data to one of the databases. The following statement should appear as a footnote to the title on the title page of the manuscript. "The nucleotide sequence data reported in this paper have been submitted to Embank Submission (Mail Stop K710, Los Alamos National Laboratories, Los Alamos, NM 87545) nucleotide sequence database and have been assigned the accession number XNNNNN." Publication of the description of molecular clones is assumed by the editors to place them in the public sector. Therefore, they shall be made available to other scientists for research purposes.

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Authors are required to use only approved gene and protein names and symbols. For poultry, full gene names should not be italicized. Gene symbols should be in uppercase letters and should be in italics. A protein symbol should be in the same format as its gene except the protein symbol should not be in italics.

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- Appropriate substitutes include "and," "but," or "whereas" for "while" and "because" or "although" for "since."
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