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

Figures

To facilitate review, figures should be placed at the end of the manuscript (separated by section breaks). Each figure should be placed on a separate page, and identified by the manuscript number and figure number. Figure captions should be typed (double spaced) on a separate page.

- **Figure size.** Prepare figures at final size for publication. For more detail, see page 2. 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 are readable at final publication size. A minimum type size of 8 points (after reduction) should be used.

- **Fonts.** Use Helvetica and Times New Roman fonts only; use the symbol palette in Times to add symbols to figures and captions.

- **Line weight.** For line graphs, use a minimum stroke weight of 1 point for all lines. If multiple lines are to be distinguished, use solid, long-dash, short-dash, and dotted lines. Avoid the use of gray or shaded lines, as these will not reproduce well. Lines with different symbols for the data points may also be used to distinguish curves. Remove unnecessary backgrounds and grid lines from graphs.

- **Axis labels.** Each axis should have a description and a unit. Units should be separated from the descriptor by a comma.

- **Shading and fill patterns.** For bar charts, use different fill patterns if needed, e.g., black, white, gray, diagonal stripes. Avoid the use of multiple shades of gray, as they will not be easily distinguishable in print.

- **Symbols.** Identify curves and data points using the following symbols only: □, ■, ○, ■, ▲, △, ◇, ♦, +, and ×. 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 Word, PDF, EPS, TIFF, and JPEG.

- **Grayscale figures.** If figures are to be reproduced in grayscale (black and white), submit in grayscale. Often color will mask contrast problems that are apparent only when the figure is reproduced in grayscale.

- **Color figures.** If figures are to appear in color in the print journal, files must be submitted in CMYK color (not RGB).

- **Resolution.** Minimum resolution is 300 dpi for color and grayscale figures, and 600 dpi for line art.

- **Photomicrographs.** Photomicrographs must have their unmagnified size designated, either in the caption or 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-defined abbreviations and symbols used in the figure should be defined in the caption. Manufacturer name and location should be provided for any proprietary product appearing in the figure or figure caption. Make sure all symbols and letters (e.g., *, †, a, b) are defined.

- **General tips.** Avoid the use of 3-dimensional bar charts, unless essential to the presentation of the data. Use the simplest 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. Remove boxes around figures.

All figures submitted with the final, revised version of the manuscript should be original laser printouts or professionally prepared glossy figures or photographs. Photocopies are often distorted, speckled, faint, or fuzzy and lead to poor reproductions of the illustrations.

All *JAS* figures are printed at one of three final widths: 8.9 cm (3 1/2 inches, single column), 14 cm (5 1/2 inches, centered on the page), or approximately 19 cm (7 1/2 inches, spanning two columns). Any original figures narrower than 8.9 cm are printed at the same size as the original. To preserve quality, figures are never enlarged for printing, only reduced.

Whenever possible, illustrations that are roughly square or are taller than they are wide, and consist of a single panel or multiple panels in vertical alignment, are sized to fit the 8.9-cm column. Because they take up less space than wider figures, these 1-column illustrations save the author money on page charges. A single-column format will certainly not suit all figures, but authors with simple, single-panel figures should strive to create them so that they can be printed at a width of 8.9 cm.

Many times, figures that could otherwise be printed at 8.9 cm wide cannot be reduced to this width because of problems of scale. This also applies to figures that must be printed at 19 cm wide rather than 14 cm. Make sure all symbols, lettering, tick marks, axis lines and keys are as large as they can be without distorting the data or becoming unsightly. Often, although symbols would be readable in a 1-column figure, characters along the axes or within a graph would not be legible if the figure were reduced to 8.9 cm wide.

Another deterrent to reducing simple figures to a single column is the positioning of keys to the symbols outside the graph itself. Without the key the graph would be printable at 8.9 cm, but reducing the figure to this width would render the type in the key unreadable. A simple solution is to position the key in white space within the graph, or above/below the graph.

One simple test to determine whether a figure will be clear at one of the three widths used by JAS is to reduce the figure on a photocopy machine to the appropriate width and ask someone unfamiliar with the figure to evaluate it for readability.

Choice of patterns to differentiate bars in a bar graph can also be problematic. Using patterns within bars is always preferable to using various shades of gray, because the sometimes subtle differences between gray levels can be lost in printing. Desktop publishing applications and laser printers have helped make attractive, high-quality graphics possible and have broadened the author's choices considerably, but the multiple levels of gray often found in bar graphs present a problem when those figures are scanned and transmitted electronically to the printer.

Line patterns are preferable in bar graphs, but here, too, authors should be careful to choose patterns that are very distinct from one another, with ample space between lines in the pattern. Thin black lines too close together can cause the same problem with reproduction as solid gray areas, and two patterns of such lines, even if they run diagonally in opposite directions, can both appear as gray in the final printed figure.

Words should never be printed within shaded areas in illustrations, and shading itself should be avoided unless it is necessary to illustrate a concept or add dimension to a drawing.

Even though a figure is scaled appropriately, the author should remain aware of *JAS* style and format guidelines regarding the notation of units of measure. In *JAS* figures, it is required that units that follow some variable be preceded by a comma. Also, be conscious of proper notation of units; the abbreviation for liter is L, not l, for example, and *M* for molar is italicized. The *Journal* adheres to the Système international d'unités (SI) guidelines for abbreviations of units; many of these can be found in our guide for authors, *Journal of Animal Science* Instructions to Authors, which is available at http://jas.fass.org/misc/ifora.shtml

In short, paying attention to the relative scale of elements within the figure and to JAS style conventions can improve the appearance of submitted figures and can save space within the article because properly proportioned figures are more easily reduced to the smallest possible width.

Two examples of figures with correct scaling:

All type on the figures is legible, and the symbols are large enough to be distinguishable at a final width of 8.9 cm (3 1/2 inches). The key to symbols in the line graph appears within the space of the graph itself, so no unnecessary space is taken up by a key positioned at the side of the graph. In the bar chart, patterns within the bars are clearly distinguishable from one another, and no shades of gray have been used to differentiate values. Both the x- and y-axis have overall labels and units.
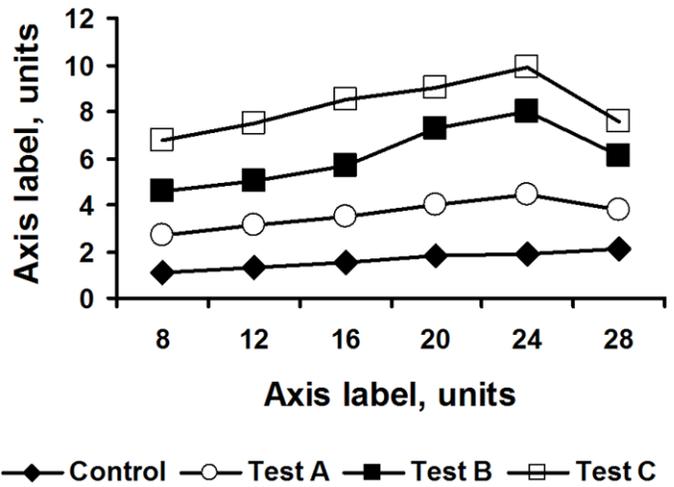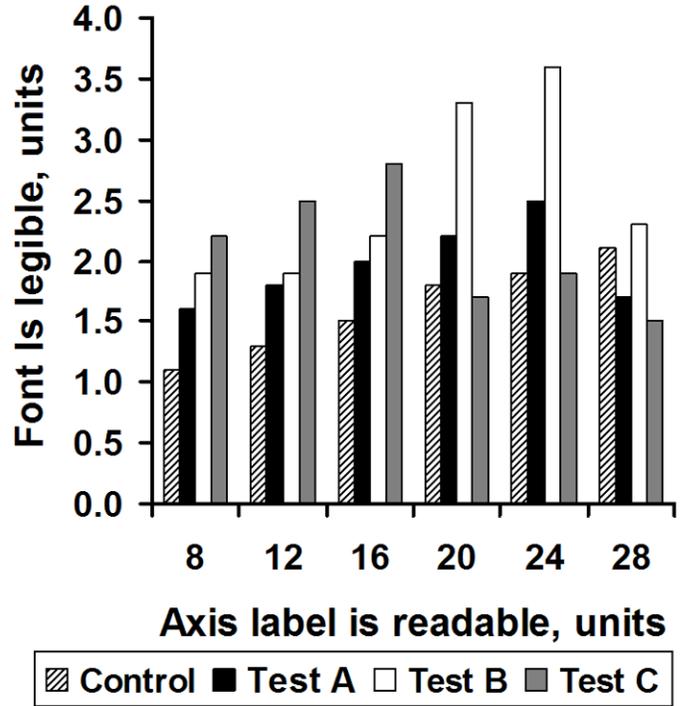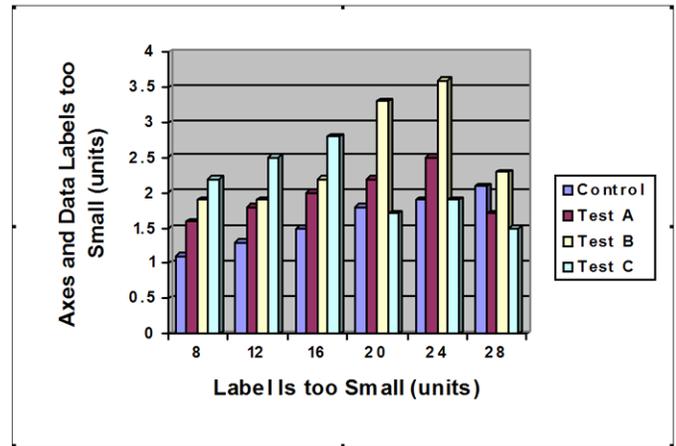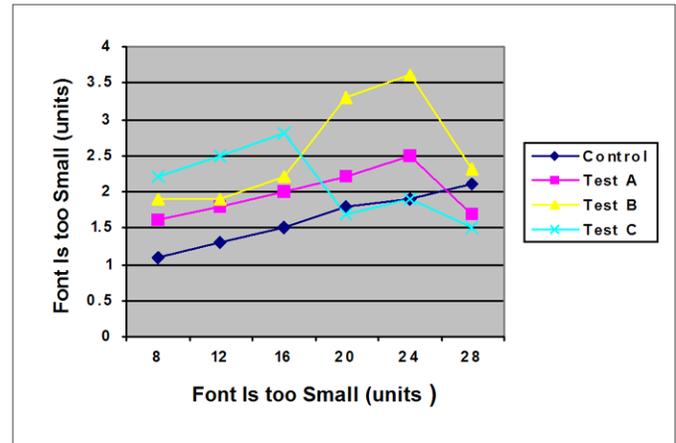
Examples of figures that could be improved:

Improvements to be made to these figures:

- Convert to black and white

- Remove background grid

- Remove gray background

- Enlarge letters and numbers on axis labels

- Units should be separated from axis labels by a comma, not placed in parentheses

- Enlarge figure key

- Use consistent number of decimal places (panels A and B)

- Remove third dimension from graph (all of panel C; bars in panel A)

- Graph and axis labels should be 3.5 inches (9 cm) wide

- Axis labels should be in upper and lower case letters (e.g., Serum zinc, not SERUM ZINC)

A.

B.

C.