Tables & Figures
Abstracts

ANSC 5307

Components of Tables & Figures

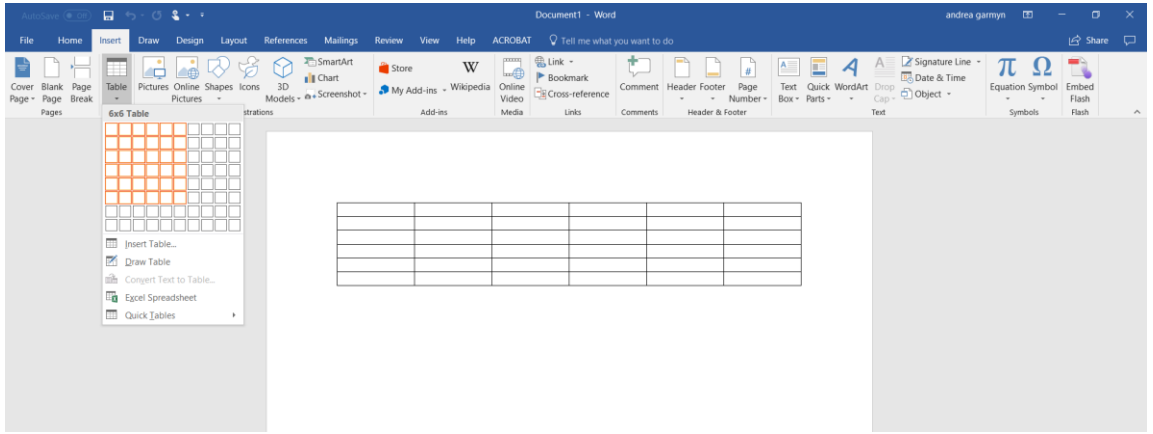
1. Stand alone
   - Should not need text to explain what's in the table
   - Should not repeat values from the tables or figures verbatim in the results
   - Author-defined abbreviations should be defined IN EACH TABLE
   - Manufacturer name and location should be provided for proprietary products
   - Each column head should be followed by the unit descriptor of that trait
2. Should reflect an "answer" to an objective
   - Exception – describing the design, diets, treatments, etc.
3. Provide some measure of variance
4. Regression – accuracy and precision

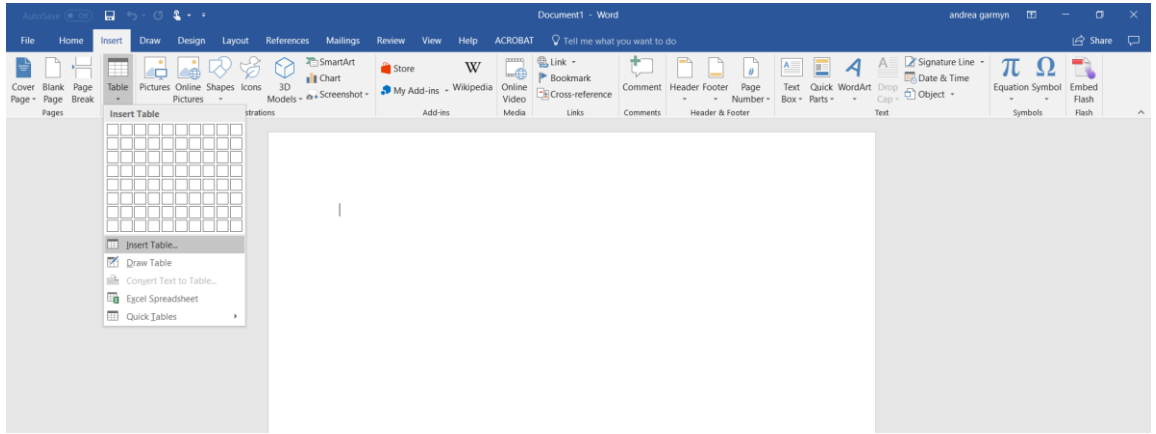
Components of Tables & Figures

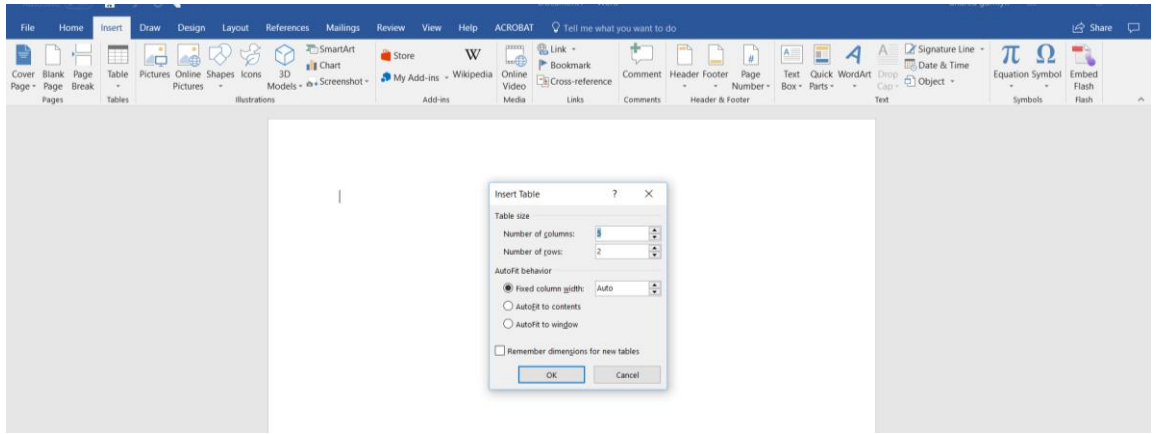
5. Titles should fit and explain the content of the tables/figure
6. Footnotes should be concise and appropriate
   - Check the journal where you're submitting, but in general:
     - Use letter superscripts and symbols for statistical significance
     - Use numbered footnotes for informational or explanatory footnote
   - Footnotes can be used to denote statistical significance, define abbreviations, or clarify data in a row or column
7. Means should be footnoted (with superscripts) in order
   - **Largest to smallest**
   - Smallest to largest
   - Possible to use multiple sets of superscripts in 1 table or figure to indicate significance for multiple main effects or interactions
     - $^{a–d}$ Within a row, least squares means without a common superscript differ ($P < 0.05$) due chill × time interaction
     - $^{v–z}$ Within a row, least square means without a common superscript differ ($P < 0.05$) due to muscle.
8. Provide N or n

Creating a Table using Microsoft Word

1. Determine the number of columns and rows required
2. Insert Table
    1. Go to Insert Tab (along the top)
    2. Click Table
    3. Pick number of rows and cells OR
    4. Click ‘Insert Table” to designate the number of row/columns and how to fit data







Editing tables in Microsoft Word

- Merging cells
  - Title
  - Footnotes
  - Spanner head
- Add/delete rows or columns
  - Right click
  - Go to Layout tab (along the top)
  - Depending on the version of Word, you might be able to add columns or rows by scrolling over them and clicking “+” when it appears
- Align decimals
- Border removal
  - No vertical lines allowed, very few horizontal lines required
  - Wait to remove lines

Additional **Journal of Animal Science** Recommendations for Tables

- When possible, tables should be organized to fit across the page without running broadside
  - More than 15 columns creates layout issues when it goes to print
- Footnotes
  - Should read from left to right and top to bottom
  - Each should begin a new line
  - Probability can be indicated as follows with symbols
    - †$P < 0.10$ * $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$
- Standard errors
  - Homogeneous variance: use pooled SE
  - Heterogeneous variance : SE can be attached to each mean by ± signs
    - Unequal numbers of observations in treatment means
    - Unbalanced experiments

Other Journal Table Recommendations

- ***animal***
  - Treatment means are reported with meaningful decimals. For guidance, the last digit corresponds to 1/10 of standard error (e.g., for a standard error of 1.2, the mean values should be reported as 15)
  - Separate columns for basic statistical results:
    - Error terms (preferably residual error terms)
    - Probabilities
      - P values (e.g. $P = 0.07$) are reported or indicated by *, ** and *** for $P < 0.05$, $P < 0.01$ and $P < 0.001$, respectively
  - Differences between treatments (or comparison of mean values) are indicated using superscript letters with the following conventional standard:
    - a, b for $P < 0.05$
    - A, B for $P < 0.01$

Examples

TABLE 5. EFFECTS OF QUALITY GRADE CATEGORY ON WARNER–BRATZLER SHEAR FORCE (WBSF) AND TRAINED SENSORY PANEL SCORES FOR USDA SELECT, USDA CHOICE AND CERTIFIED ANGUS BEEF (CAB) STRIP LOIN STEAKS

Trait	Select	Choice	CAB	SEM*
WBSF, kg	3.16[a]	3.02[b]	2.68[c]	0.08
Initial juiciness†	5.78[b]	5.71[b]	6.27[a]	0.11
Sustained juiciness†	5.74[b]	5.70[b]	6.27[a]	0.10
Initial tenderness‡	5.96[b]	6.04[b]	6.63[a]	0.14
Sustained tenderness‡	5.98[b]	6.05[b]	6.58[a]	0.14
Flavor intensity§	5.88[b]	6.05[a]	6.25[a]	0.07
Beef flavor¶	5.95[b]	6.12[b]	6.44[a]	0.07
Overall mouthfeel**	5.85[b]	5.95[b]	6.48[a]	0.11

* Pooled standard error of means (Select, $n = 89$; Choice, $n = 39$; CAB, $n = 25$).

† 1 = extremely dry and 8 = extremely juicy.

‡ 1 = extremely tough and 8 = extremely tender.

§ 1 = extremely bland and 8 = extremely intense.

¶ 1 = extremely uncharacteristic beef flavor and 8 = extremely characteristic beef flavor.

** 1 = extremely non-beef-like mouthfeel and 8 = extremely beef-like mouthfeel.

[abc] Within a row, means without a common superscript differ ($P < 0.05$).

Examples

Table 2. Marbling score and proximate analysis for steaks from U.S. and Canada quality grades

	USDA grade		Canadian grade			
Trait	Choice ($n = 83$)	Select ($n = 96$)	AAA ($n = 77$)	AA ($n = 82$)	P-value	SEM[1]
Marbling score[2]	511[a]	443[ab]	488[a]	393[b]	0.02	34.3
Moisture, %	70.65[a]	71.69[ab]	70.91[a]	72.78[b]	0.01	0.40
Fat, %	5.79[a]	4.72[ab]	5.08[a]	3.43[b]	0.02	0.48
Protein, %	22.49	22.50	22.79	22.71	0.82	0.27

[a,b]Within a row, means without a common superscript differ ($P < 0.05$).

[1]Pooled (largest) SE of least squares means. Samples numbers: USDA Choice = 83; USDA Select = 96; Canadian AAA = 77; Canadian AA = 82.

[2]USDA marbling scores: 300 to 399 = slight; 400 to 499 = small; 500 to 599 = modest.

Examples

Table 2. The effects of chilling regime and muscle on the physicochemical traits of New Zealand beef (sarcomere length and proximate composition)[1]

	CB						HB							*P*-value[3]		
Trait	LT	LL	GM (heart)	GM (eye)	PM	SM	LT	LL	GM (heart)	GM (eye)	PM	SM	SEM[2]	Chill	Muscle	C×M
Sarcomere length, µm	1.79^{bc}	1.80^{b}	1.53^{fg}	1.47^{g}	3.07^{a}	1.54^{fg}	1.67^{de}	1.71^{cd}	1.61^{ef}	1.68^{de}	1.81^{b}	1.69^{de}	0.03	< 0.01	< 0.01	< 0.01
Fat, %	3.28^{x}	3.96^{x}	2.50^{y}	2.79^{y}	4.44^{w}	1.96^{z}	3.34^{x}	3.76^{x}	2.6^{y}	2.79^{y}	4.58^{w}	1.99^{z}	0.27	0.80	< 0.01	0.82
Moisture, %	73.23^{y}	72.22^{z}	73.35^{y}	73.16^{y}	72.94^{yz}	73.86^{x}	72.70^{y}	72.59^{z}	73.04^{y}	72.68^{y}	72.58^{yz}	73.51^{x}	0.25	0.05	< 0.01	0.46
Protein, %	22.56^{wx}	22.59^{w}	22.24^{y}	22.47^{xy}	21.49^{z}	22.91^{v}	22.24^{wx}	22.49^{w}	22.14^{y}	22.10^{xy}	21.65^{z}	22.62^{v}	0.10	< 0.01	< 0.01	0.08

[a–g]Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle × chilling interaction.

[v–z]Within a row, least square means without a common superscript differ ($P < 0.05$) due to muscle.

[1]LT- *longissimus thoracis*; LL- *longissimus lumborum*; GM- *gluteus medius*; PM- *psoas major*; SM- *semimembranosus*.

[2]Pooled (largest) SE of least squares means.

[3]Observed significance levels for main effects of chilling, muscle, and the chilling x muscle interaction.

Examples

Table 5
The effects of muscle and quality grade[1] on the least square means for consumer ($n = 120$) sensory scores[1] for palatability traits.

Trait	Gluteus medius ($n = 36$)		Longissimus lumborum ($n = 12$)		Semimembranosus ($n = 18$)		Serratus ventralis ($n = 40$)		SEM[2]	*P*-value[3]		
	Select	Top Choice	Select	Top Choice	Select	Top Choice	Select	Top Choice		Muscle	QG	M × QG
Tenderness	62.01^{xy}	71.17^{xy}	60.36^{x}	75.77^{x}	31.83^{z}	37.60^{z}	56.45^{y}	70.60^{y}	2.15	<0.01	<0.01	0.07
Juiciness	57.57^{d}	67.02^{c}	58.45^{d}	70.51^{bc}	48.96^{e}	48.99^{e}	73.21^{b}	82.24^{a}	1.99	<0.01	<0.01	<0.01
Flavor	59.22^{c}	68.78^{ab}	57.17^{cd}	72.07^{a}	50.00^{e}	52.46^{de}	60.22^{c}	66.78^{b}	2.03	<0.01	<0.01	<0.01
Overall liking	59.28^{c}	68.67^{ab}	54.53^{c}	73.95^{a}	42.50^{d}	46.61^{d}	58.05^{c}	68.10^{b}	2.38	<0.01	<0.01	<0.01

[1]Quality grade: Select (marbling score: slight[00] to slight[100]) or Top Choice (marbling score: modest[50] to moderate[50]).
[2]Pooled (largest) SE of LS means.
[3]Observed significance levels for main effects of muscle (M), quality grade (QG), and the muscle × quality grade interaction.
[a–e]Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle × quality grade interaction.
[xyz]Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle.

Examples

Table 7. Regression equations developed to predict marbling score based on estimations of live traits for British (n = 109), Continental (n = 114), British × Continental (n = 93), and dairy (n = 108) biological types[1]

Equation	Item[2]	Estimate[3]	SEM	R^2	C(p)[4]
British					
1	Intercept	214.77	68.40	0.15	18.40
	Brisket	0.92	0.22		
2	Intercept	91.77	73.72	0.24	7.38
	Fat thickness	−401.37	113.53		
	Brisket	1.94	0.35		
3	Intercept	82.86	71.78	0.28	2.42
	Fat thickness	−457.30	112.40		
	Frame size	18.37	6.91		
	Brisket	1.84	0.35		
4	Intercept	118.41	71.93	0.32	−0.73
	Fat thickness	−488.96	110.92		
	Frame size	16.23	6.83		
	Brisket	2.04	0.35		
	Disposition	−13.73	5.88		
5	Intercept	67.17	75.09	0.35	−2.61
	QG	1.45	0.70		
	Fat thickness	−590.32	119.85		
	Frame size	13.55	6.85		
	Brisket	0.97	0.63		
	Disposition	−15.65	5.86		
6	Intercept	81.97	74.97	0.33	−2.43
	QG	2.36	0.39		
	Fat thickness	−582.17	120.52		
	Frame size	12.67	6.87		
	Disposition	−15.64	5.90		
7	Intercept	81.20	75.82	0.31	−1.28
	QG	2.51	0.38		
	Fat thickness	−566.92	121.60		
	Disposition	−17.39	5.89		
Continental					
1	Intercept	229.22	42.01	0.21	7.39
	Tail pones	0.82	0.15		
2	Intercept	328.47	55.58	0.25	2.45
	Neck length	−26.40	10.00		
	Tail pones	0.90	0.51		
British × Continental					
1	Intercept	231.21	93.72	0.06	15.24
	Brisket	0.74	0.31		
2	Intercept	352.48	103.28	0.12	10.49
	Neck length	−36.02	14.43		
	Brisket	0.89	0.31		
Dairy					
1	Intercept	109.41	74.84	0.17	−1.25
	QG	1.15	0.25		

[1]A minimum significance level of 0.05 was required to enter and remain in the model.
[2]Variables were based on average live estimates of the 3 USDA graders.
[3]β_0 for intercept and β_1 for the remaining items.
[4]C(p) = Mallow's statistic.

Example in SAS – 5307 factorial for tables example

```
data mary;
input ID Muscle$ QG$ Avg_WBSF
        Pre_temp Pre_wt post_temp
        post_wt Cookloss
        pH_avg Collagen fat
        moisture protein;
cards;
```

```
proc glimmix data=work.mary;
  class muscle QG;
  model cookloss = muscle|QG post_temp;
  lsmeans muscle|QG / lines pdiff;
run;

proc glimmix data=work.mary;
  class muscle QG;
  model ph_avg = muscle|QG ;
  lsmeans muscle|QG / lines pdiff;
run;
```

Table 3
The effects of muscle and quality grade[1] on the least square means for percentage chemical intramuscular fat (IMF), protein, moisture, collagen and pH of raw samples ($n = 106$).

Trait	Gluteus medius ($n = 36$)		Longissimus lumborum ($n = 12$)		Semimembranosus ($n = 18$)		Serratus ventralis ($n = 40$)		SEM[2]	*P*-value[3]		
	Select	Top Choice	Select	Top Choice	Select	Top Choice	Select	Top Choice		Muscle	QG	M × QG
IMF, %	3.82^{y}	6.35^{y}	2.95^{y}	6.85^{y}	1.61^{z}	3.41^{z}	7.48^{x}	11.90^{x}	0.88	<0.01	<0.01	0.11
Protein, %	22.93^{b}	22.56^{b}	23.36^{ab}	22.81^{a,b}	23.41^{a}	22.97^{a}	20.76^{c}	19.92^{c}	0.19	<0.01	<0.01	0.47
Moisture, %	70.92^{b}	68.82^{d}	71.94^{ab}	68.55^{d}	72.46^{a}	70.96^{b}	69.92^{c}	66.26^{e}	0.63	<0.01	<0.01	0.04
Collagen, %	1.85^{z}	2.11^{z}	1.90^{z}	1.98^{z}	1.71^{z}	1.82^{z}	2.15^{y}	2.44^{y}	0.09	<0.01	<0.01	0.40
pH	5.50^{z}	5.47^{z}	5.61^{y}	5.55^{y}	5.62^{y}	5.55^{y}	5.78^{x}	5.78^{x}	0.03	<0.01	0.09	0.72

[1]Quality grade: Select (marbling score: slight^{00} to slight^{100}) or Top Choice (marbling score: modest^{50} to moderate^{50}).
[2]Pooled (largest) SE of LS means.
[3]Observed significance levels for main effects of muscle (M), quality grade (QG), and the muscle × quality grade interaction.
$^{a–d}$Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle × quality grade interaction.
^{xyz}Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle.

Table 4
The effects of muscle and quality grade[1] on the least square means for Warner–Bratzler shear force (WBSF) and cooking loss ($n = 106$).

Trait	Gluteus medius ($n = 36$)		Longissimus lumborum ($n = 12$)		Semimembranosus ($n = 18$)		Serratus ventralis ($n = 40$)		SEM[2]	*P*-value[3]		
	Select	Top Choice	Select	Top Choice	Select	Top Choice	Select	Top Choice		Muscle	QG	M × QG
WBSF, *N*	31.48^{xy}	30.79^{xy}	32.07^{yz}	24.42^{yz}	34.23^{x}	33.15^{x}	27.85^{z}	22.56^{z}	1.77	<0.01	<0.01	0.11
Cooking loss, %	25.50	22.74	22.62	22.37	22.78	21.44	23.12	23.54	1.42	0.51	0.36	0.56

[1]Quality grade: Select (marbling score: slight^{00} to slight^{100}) or Top Choice (marbling score: modest^{50} to moderate^{50}).
[2]Pooled (largest) SE of LS means.
[3]Observed significance levels for main effects of muscle (M), quality grade (QG), and the muscle × quality grade interaction.
^{xyz}Within a row, least squares means without a common superscript differ ($P < 0.05$) due to muscle.

Figures (JAS)

- Font size – minimum 8 point
- Fonts – Helvetica, Times New Roman, Symbol fonts
- Line weight – minimum 1
  - Solid, long-dash, short-dash, dotted
- Axis Labels – descriptor and unit (separated by comma)
- Shading and Fill Patterns
  - Black, white, gray, diagonal stripes (avoid multiple shades of gray)
- Symbols – define in figure caption
  - Possible symbols: □■○●△▲▽▼♢♦+×★☆
- Caption – sufficient information for figure to stand alone

Examples

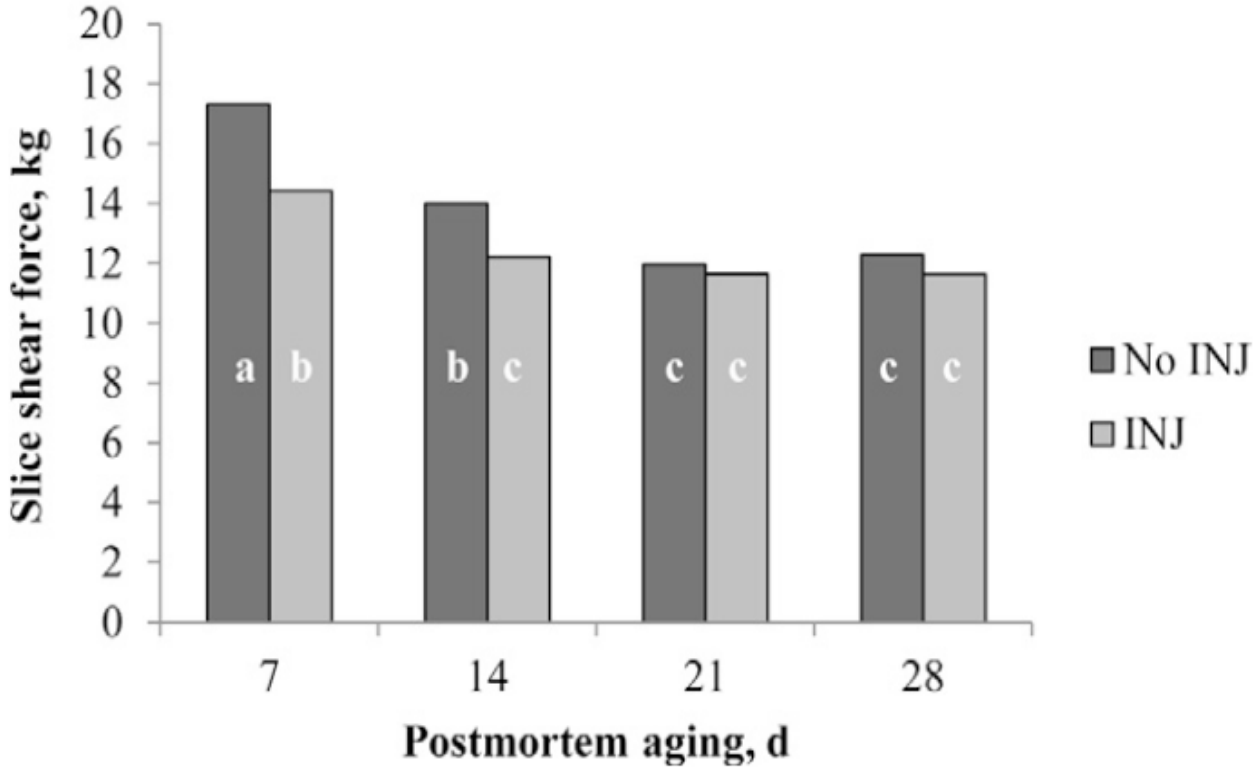


Figure 2. Effects of postmortem $CaCl_2$ injection [INJ; 200 m*M* at 5% (wt/wt) at 72 h postmortem] and postmortem aging period (7, 14, 21, and 28 d) on slice shear force values. Sample numbers/day: No ZH (zilpaterol hydrochloride; Merck Animal Health, De Soto, KS) = 38; ZH = 40; No INJ = 39; INJ = 39. SEM = 1.28; *P*-value: Aging × INJ = 0.05. Least squares means lacking a common letter differ ($P < 0.05$).

Examples

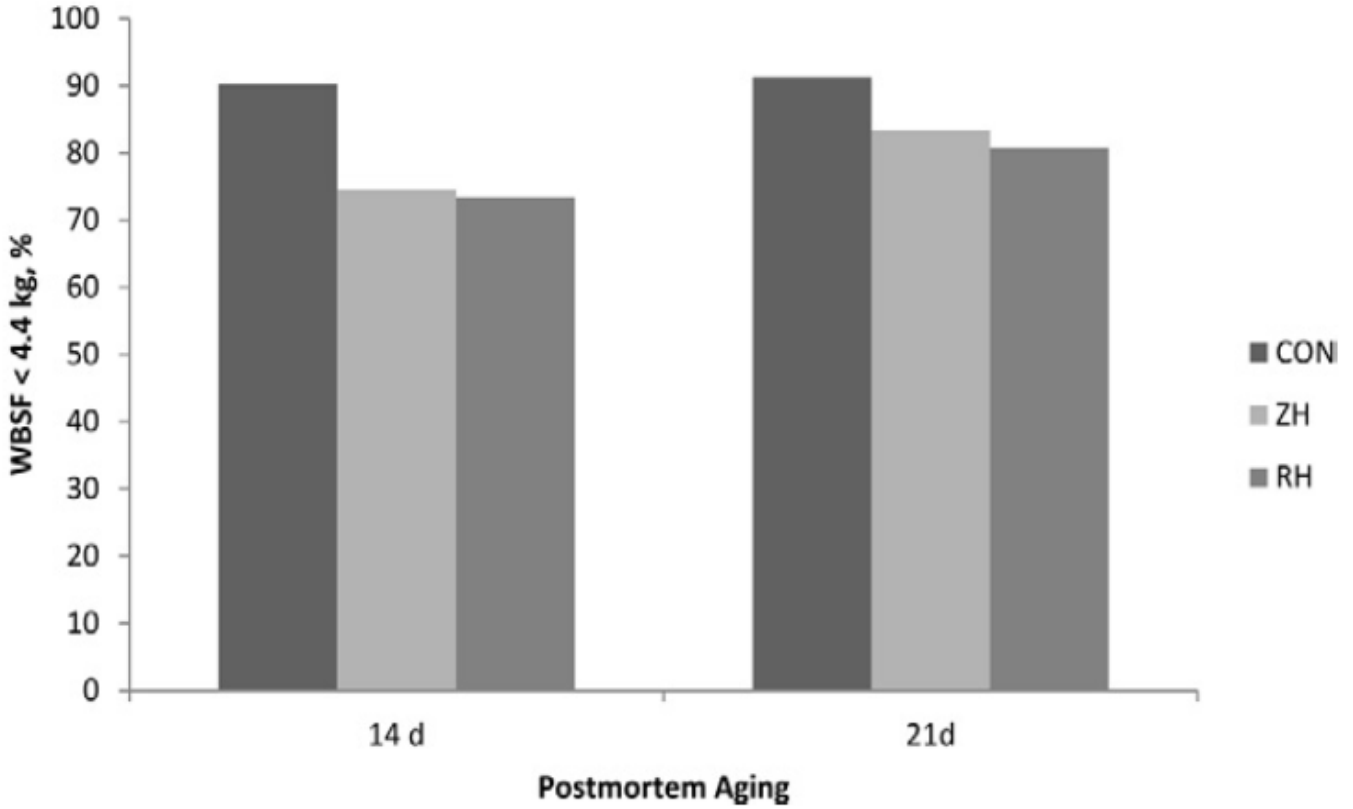


Figure 1. The percentage of 16- or 23-d-aged longissimus steaks from calf-fed Holstein steers fed zilpaterol hydrochloride (ZH), ractopamine hydrochloride (RH), or no β-agonist (CON) with Warner-Bratzler (WBSF) shear force values less than 4.4 kg. Zilpaterol hydrochloride (8.3 mg/kg DM basis) was fed for 20 d with a 3-d withdrawal before harvest (Merck Animal Health, DeSoto, KS). Ractopamine hydrochloride (300 mg $head^{-1} \cdot d^{-1}$) was fed for 28 d (Elanco Animal Health, Greenfield, IN).

Examples

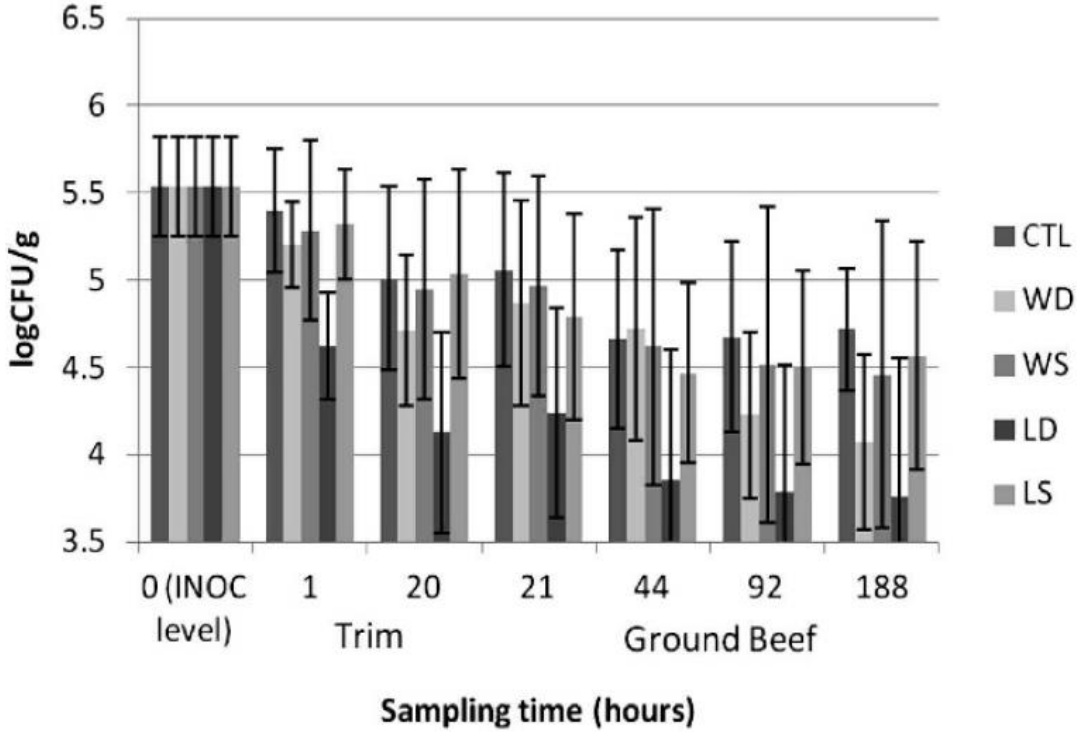


FIGURE 1. *Reduction of* E. coli *O157:H7 in beef trim and ground beef stored at refrigerated temperatures (2 to 4°C). The following treatments were applied: 4.4% lactic acid spray (LS), 4.4% lactic acid dip (LD), water spray (WS), water dip (WD), and inoculated untreated control (CTL). Beef trim was ground at 20 h after inoculation. Beef trim samples were tested at 0, 1, and 20 h, and ground beef samples were tested at 21, 44, 92, and 188 h* (n = 3). *No significant time × treatment interaction was observed for these data* ($P > 0.05$).

Examples

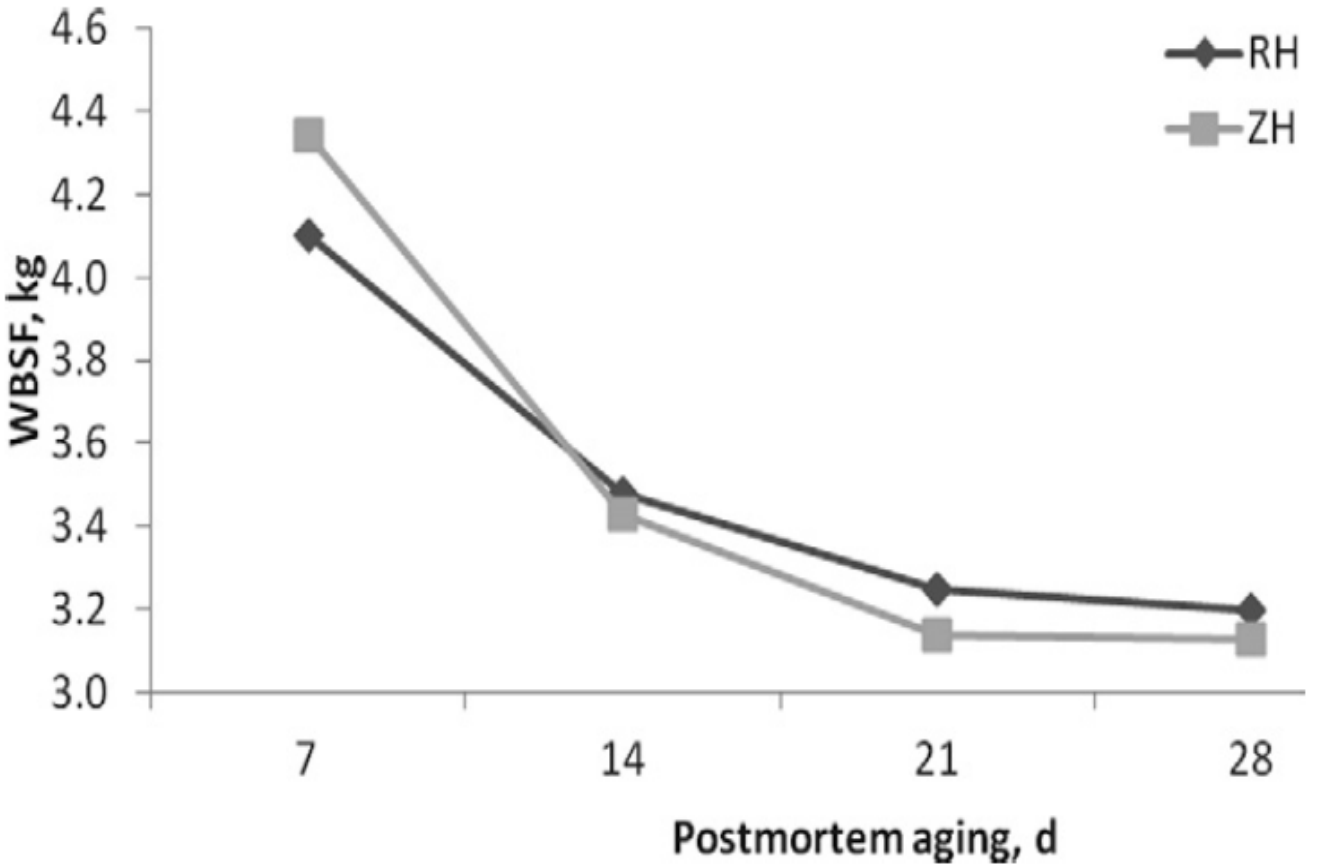


Figure 3. The comparative effects of zilpaterol hydrochloride (ZH) and ractopamine hydrochloride (RH) along with postmortem aging on LM Warner-Bratzler shear force (WBSF). Treatment × aging, $P = 0.58$; treatment, $P > 0.95$; aging, $P < 0.001$. Adapted from Van Donkersgoed et al. (2011).

Examples

Table 3. Carcass characteristics of finishing beef steers fed diets based on normal, mill-run corn or high-oil corn

Item	Mill-run corn	High-oil corn	SEM[1]	*P*-value[2]
HCW, kg	365	361	4.1	NS
LM area, cm^2	91.9	89.7	0.73	0.07
KPH, %	2.03	2.00	0.051	NS
12th-rib fat, cm	1.57	1.52	0.058	NS
USDA yield grade	3.24	3.33	0.069	NS
Marbling score[3]	477	441	8.38	0.01

[1]Pooled SE of treatment means, n = 12 pens/treatment with 5 steers/pen.
[2]NS = nonsignificant ($P > 0.10$).
[3]Slight^{00} = 300; Small^{00} = 400.

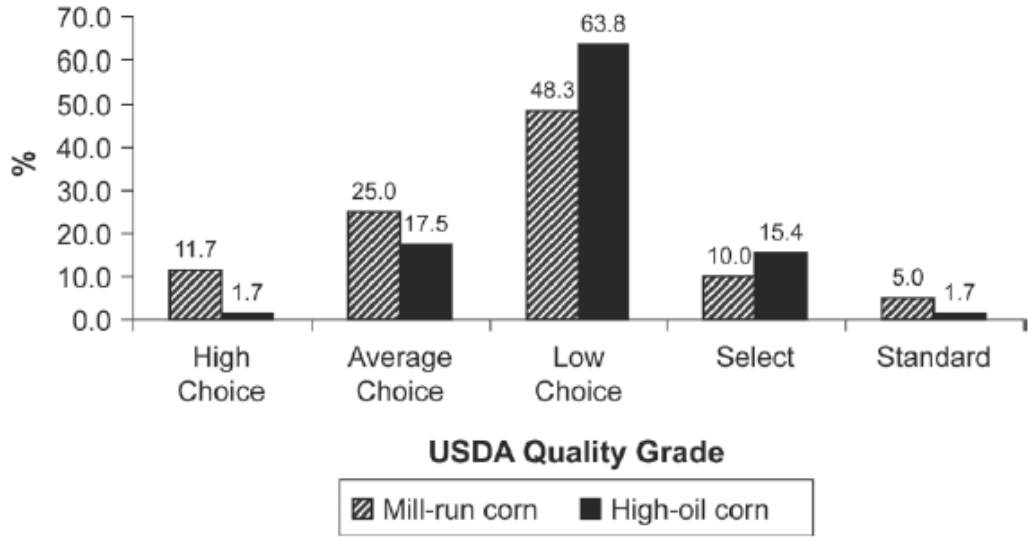


Figure 1. Frequencies of USDA quality grades from carcasses of beef steers fed diets based on normal, mill-run corn or high-oil corn. The proportion of carcasses that graded USDA Choice (High, Average, and Low Choice categories combined) did not differ between treatments, $P = 0.77$ (least squares means were 84.8 ± 4.68 and 82.8 ± 4.96% for mill-run and high-oil corn, respectively). The proportion of carcasses that graded in the upper two-thirds of the USDA Choice (High and Average Choice categories combined) was greater ($P = 0.04$) in cattle fed mill-run vs. high-oil corn (least squares means were 37.3 ± 6.30 and 19.0 ± 5.15% for mill-run and high-oil corn, respectively).

Examples

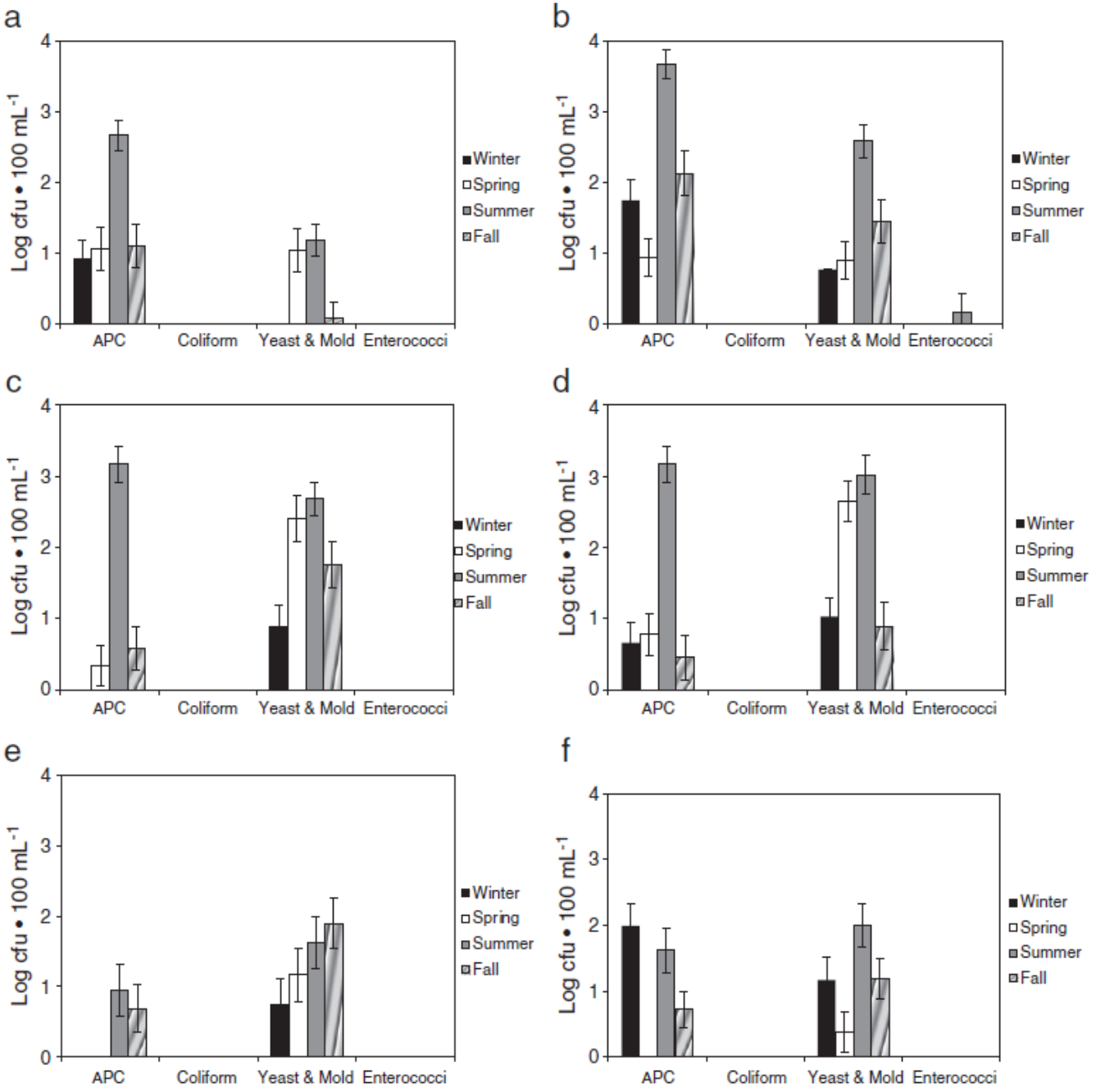


Fig. 1. The incidence of micro-organisms by processing facility and sampling time (A: harvest, pre-operation; B: harvest, during operation; C: fabrication, pre-operational; D: fabrication, during operation; E: ready-to-eat, pre-operational; F: ready-to-eat, during operation). N = 2281.

Abstracts

- Objectives
  - State the purpose of the research
  - Briefly highlight methods
  - Concisely state key findings and major conclusions
    - Show statistical significance in results

How long can/should abstracts be?

- Consult style and form guidelines for the journal you will be submitting to
  - JAS: 2,500 keystrokes (including spaces)
  - Meat Science: No more than 150 words
  - Meat & Muscle Biology: Less than 300 words
  - Abstracts for meetings (RMC, ASAS ICoMST, IAFP, PNC) will vary, but can be longer than standard journal abstracts

Common grammatical or formatting mistakes

- Abstracts/manuscripts should be written in PAST TENSE.
  - You are reporting results from research that has already been conducted.
- *P* – values
  - As a general rule of thumb, p-values are presented as capitalized/italicized *P*, but the math symbol and numbers are not.
  - You should always include a leading zero before the decimal, and 2 places after the decimal is quite sufficient.
  - Any math symbol should have a space on both sides (<, >, ≤, ≥, =, ±)
    - This applies to p-values, sample size, and any other situation involving these symbols (maybe an equation to show a calculation)
  - Therefore, *P*-values should be reported in text as follows: ($P < 0.01$) or ($P = 0.04$) or ($P > 0.05$)

JAS Abstract Guidelines

- 2500 characters and spaces
- Begin with clear statement of objective(s)
- Summary of pertinent results with statistical evidence (*P*-values)
  - Brief but understandable form
- End with conclusions
- No references or citations
- Define abbreviations at first use (unless standard JAS abbreviations)

MMB Abstract Guidelines

- 300 words or less (preferably less than 250 words)
- Contain all information that is important in the paper, by giving the basic information and also calling attention to techniques, observations, or data
- 1-2 sentences on:
  - Introductory statement of the rationale and objectives or hypotheses
  - Materials and methods
  - Results – use quantitative and statistical data when possible
  - Conclusions
- Define abbreviations at first use
  - Abbreviations discouraged
  - Must define AGAIN at first use of body of manuscript and every table and/or figure

Meat Science Guidelines

- Briefly state the purpose, principal results, and major conclusions
- Stand alone
  - References should be avoided
    - Cite author(s) and year(s) if essential
- Abbreviations
  - Avoid non-standard or uncommon
  - Define at first mention in the abstract
- 100-160 words

ICoMST Abstract Guidelines

- Abstract is to be in bold and 10 pt.
- < 120 words and should contain no references
- All symbols and abbreviations in the paper should be defined.
- Summarizes the major aspects of the complete paper
  - purpose of the study or the hypotheses investigated
  - Experimental design and methods used
  - Most important findings
  - Include key results or trends
  - Summarize the conclusions and implications of the paper.

ASAS Abstract Guidelines

- 300 words or less
- Abstract should:
  - Have clear & concise objectives
  - Pertinent methodological conditions included in the scope of the work
  - Include details that directly influence interpretation or enhance understanding of results
  - Compile, condense, present results
    - Must be in abstract to present; only data relating to objectives are reported
  - Have tables if most effective method to convey results
  - Have a clearly stated conclusion

Unacceptable ASAS Abstracts

- Contains grammatical errors and (or) meaningless statements such as: "The results will be presented."
- Presents data without appropriate statistical analyses or measurements of data variability.
- Includes no data or statements relating to the objective(s).
- Does not use the metric system.
- Contains typing errors.
- Fails to comply with submission requirements.
- Presents opinion/speculation with no demonstrated use in teaching/extension experience.

Homework

- Abstract homework already posted in Blackboard
- Table/figures homework (and any potentially required excel files) will be posted by the end of the day on Blackboard
- Complete in WORD and email (or print out and deliver).
- **Due by 5PM Monday, March 19**