Foreword and Supplemental Information, Swine Day

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Abstract
It is with great pleasure that we present the 2016 Swine Industry Day Report of Progress. This report contains updates and summaries of applied and basic research conducted at Kansas State University during the past year. We hope that the information will be of benefit as we attempt to meet the needs of the Kansas swine industry.

Keywords
swine

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Authors
Foreword

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2016 Swine Day Report of Progress Editors
Bob Goodband, Mike Tokach, Steve Dritz, Joel DeRouchey, and Jason Woodworth
**Standard Abbreviations**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADG</td>
<td>average daily gain</td>
<td>Mcal</td>
<td>megacalorie(s)</td>
</tr>
<tr>
<td>ADF</td>
<td>acid detergent fiber</td>
<td>ME</td>
<td>metabolizable energy</td>
</tr>
<tr>
<td>ADFI</td>
<td>average daily feed intake</td>
<td>mEq</td>
<td>milliequivalent(s)</td>
</tr>
<tr>
<td>AI</td>
<td>artificial insemination</td>
<td>min</td>
<td>minute(s)</td>
</tr>
<tr>
<td>avg</td>
<td>average</td>
<td>mg</td>
<td>milligram(s)</td>
</tr>
<tr>
<td>bu</td>
<td>bushel</td>
<td>mL</td>
<td>cc (cubic centimeters)</td>
</tr>
<tr>
<td>BW</td>
<td>body weight</td>
<td>mm</td>
<td>millimeter(s)</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter(s)</td>
<td>mo</td>
<td>month(s)</td>
</tr>
<tr>
<td>CP</td>
<td>crude protein</td>
<td>MUFA</td>
<td>monounsaturated fatty acid</td>
</tr>
<tr>
<td>CV</td>
<td>coefficient of variation</td>
<td>N</td>
<td>nitrogen</td>
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<tr>
<td>cwt</td>
<td>100 lb</td>
<td>NE</td>
<td>net energy</td>
</tr>
<tr>
<td>d</td>
<td>day(s)</td>
<td>NDF</td>
<td>neutral detergent fiber</td>
</tr>
<tr>
<td>DE</td>
<td>digestible energy</td>
<td>NFE</td>
<td>nitrogen-free extract</td>
</tr>
<tr>
<td>DM</td>
<td>dry matter</td>
<td>ng</td>
<td>nanogram(s), .001 Fg</td>
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<tr>
<td>DMI</td>
<td>dry matter intake</td>
<td>no.</td>
<td>number</td>
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<tr>
<td>F/G</td>
<td>feed efficiency</td>
<td>NRC</td>
<td>National Research Council</td>
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<tr>
<td>ft</td>
<td>foot(feet)</td>
<td>ppb</td>
<td>parts per billion</td>
</tr>
<tr>
<td>ft²</td>
<td>square foot(foot(s))</td>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>g</td>
<td>gram(s)</td>
<td>psi</td>
<td>pounds per square inch</td>
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<tr>
<td>µg</td>
<td>microgram(s), .001 mg</td>
<td>PUFA</td>
<td>polyunsaturated fatty acid</td>
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<tr>
<td>gal</td>
<td>gallon(s)</td>
<td>SD</td>
<td>standard deviation</td>
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<td>GE</td>
<td>gross energy</td>
<td>sec</td>
<td>second(s)</td>
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<td>h</td>
<td>hour(s)</td>
<td>SE</td>
<td>standard error</td>
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<tr>
<td>HCW</td>
<td>hot carcass weight</td>
<td>SEM</td>
<td>standard error of the mean</td>
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<tr>
<td>in</td>
<td>inch(es)</td>
<td>SEW</td>
<td>segregated early weaning</td>
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<tr>
<td>IU</td>
<td>international unit(s)</td>
<td>SFA</td>
<td>saturated fatty acid</td>
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<td>kg</td>
<td>kilogram(s)</td>
<td>UFA</td>
<td>unsaturated fatty acid</td>
</tr>
<tr>
<td>kcal</td>
<td>kilocalorie(s)</td>
<td>wk</td>
<td>week(s)</td>
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<tr>
<td>kWh</td>
<td>kilowatt hour(s)</td>
<td>wt</td>
<td>weight(s)</td>
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<tr>
<td>lb</td>
<td>pound(s)</td>
<td>yr</td>
<td>year(s)</td>
</tr>
</tbody>
</table>
K-State Vitamin and Trace Mineral Premixes

Diets listed in this report contain the following vitamin and trace mineral premixes unless otherwise specified.

- **Trace mineral premix**: Each pound of premix contains 10 g Mn, 33 g Fe, 33 g Zn, 5 g Cu, 90 mg I, and 90 mg Se.

- **Vitamin premix**: Each pound of premix contains 1,600,000 IU vitamin A, 400,000 IU vitamin D3, 8,000 mg vitamin E (dl-α-tocopherol acetate or 4,000 mg d-α-tocopherol acetate), 800 mg menadione, 1,500 mg riboflavin, 5,000 mg pantothenic acid, 15,000 mg niacin, and 7 mg vitamin B12.

- **Sow add pack**: Each pound of premix contains 100,000 mg choline, 40 mg biotin, 300 mg folic acid, 400 mg pyridoxine, 4,000 mg Vit E (dl-α-tocopherol acetate or 2,000 mg d-α-tocopherol acetate), 9,000 mg L-carnitine, and 36 mg Cr.

**Note**

Some of the research reported here was carried out under special U.S. Food and Drug Administration (FDA) clearances that apply only to investigational uses at approved research institutions. Materials that require FDA clearances may be used in the field only at the levels and for the use specified in that clearance.
Biological Variability and Chances of Error

Variability among individual animals in an experiment leads to problems in interpreting the results. Animals on treatment X may have higher average daily gains than those on treatment Y, but variability within treatments may indicate that the differences in production between X and Y were not the result of the treatment alone. Statistical analysis allows us to calculate the probability that such differences are from treatment rather than from chance.

In some of the articles herein, you will see the notation “P < 0.05.” That means the probability of the differences resulting from chance is less than 5%. If two averages are said to be “significantly different,” the probability is less than 5% that the difference is from chance, or the probability exceeds 95% that the difference resulted from the treatments applied.

Some papers report correlations or measures of the relationship between traits. The relationship may be positive (both traits tend to get larger or smaller together) or negative (as one trait gets larger, the other gets smaller). A perfect correlation is one (+1 or -1). If there is no relationship, the correlation is zero.

In other papers, you may see an average given as 2.5 ± 0.1. The 2.5 is the average; 0.1 is the “standard error.” The standard error is calculated to be 68% certain that the real average (with unlimited number of animals) would fall within one standard error from the average, in this case between 2.4 and 2.6.

Using many animals per treatment, replicating treatments several times, and using uniform animals increase the probability of finding real differences when they exist. Statistical analysis allows more valid interpretation of the results, regardless of the number of animals. In all the research reported herein, statistical analyses are included to increase the confidence you can place in the results.
Index of Key Words

alternative  fat source  nursery feed
amino acid  feed additive  nursery pigs
amino acid ratio  feed manufacturing  particle size
antibiotic  feed matrix  PEDV
antimicrobial  finishing feed  pharmacological trace
blending  fish meal  minerals
bone ash  flush  phosphorous
carboxylic acid  gilt training  phytase
carcass characteristics  gluco-oligosaccharide  phytogens
chemical sanitation  glutamate  pigs
chemical treatment  glutamine  post-farrow maternal
chlorine (Cl)  group-housed gestating  weight
chromium propionate  sows  probiotic
copper  growing-finishing pig  protein source
copper amino acid-complex  growth  reproduction
 crude protein  growth performance  salt
 crude protein level  HP 300  sample preparation
 diet complexity  isoleucine  space allowance
 dietary electrolyte balance  K-value  source
 duration  lactation  sow(s)
 Elarom-F Plus  Lactobacillus plantarum  stocking density
 Elarom SES  late finishing  swine
 electrolyte balance  level  tri-basic copper chloride
 electronic sow feeders  liquid addition  uniformity of mix
 electronic sow feeding  lysine  valine
 enzymatically fermented  marketing  wet mix
 soybean meal  medium chain fatty acids  yeast
 essential oil  Micro-Aid  zinc
 Evosure  mix time  zinc hydroxychloride
 nursery  Sodium (Na)  zinc sulfate

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DSM Nutritional Products, Parsippany, NJ
Elanco Animal Health, Indianapolis, IN
Farmland Foods LLC, Crete, NE
Feedlogic Corporation, Willmar, MN
Hamlet Proteins, Findlay, OH
Haverkamp Brothers, Bern, KS
Holden Farms, Northfield, MN
Hubbard Feeds, Mankato, MN
ILC Resources, Urbandale, IA
International Ingredient Corporation, St. Louis, MO
JYGA Technologies, St. Nicolas, Quebec, Canada
Kalmbach Feeds, Upper Sandusky, OH
Kansas Pork Association, Manhattan, KS
Kansas Swine Alliance, Abilene, KS
Kemin Industries, Inc., Des Moines, IA
Lesaffre Yeast Corporation, Milwaukee, WI
Livestock and Meat Industry Council, Manhattan, KS
Micronutrients, Indianapolis, IN
Midori USA, Cambridge, MA
National Pork Board, Des Moines, IA
Natural Foods Holdings, Sioux City, IA
New Fashion Pork, Jackson, MN
New Horizon Farms, Pipestone, MN
Novus International, St. Charles, MO
Nutraferma, Dakota Dunes, SD
Nutraquest, Mason City, IA
Pancosma North America, Drumondville, Quebec, Canada
PIC USA, Hendersonville, TN
Purco, Edgerton, MN
Thomas Livestock Company, Broken Bow, NE
Trouw Nutrition USA, Highland IL
Triumph Foods, St. Joseph, MO
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Zoltenko Farms Inc., Hardy, NE
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