January 2015

Swine Day 2015 Supplements

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Abstract
It is with great pleasure that we present the 2015 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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2015 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>
</tr>
</thead>
<tbody>
<tr>
<td>ADG</td>
<td>average daily gain</td>
</tr>
<tr>
<td>ADF</td>
<td>acid detergent fiber</td>
</tr>
<tr>
<td>ADFI</td>
<td>average daily feed intake</td>
</tr>
<tr>
<td>AI</td>
<td>artificial insemination</td>
</tr>
<tr>
<td>avg</td>
<td>average</td>
</tr>
<tr>
<td>bu</td>
<td>bushel</td>
</tr>
<tr>
<td>BW</td>
<td>body weight</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter(s)</td>
</tr>
<tr>
<td>CP</td>
<td>crude protein</td>
</tr>
<tr>
<td>CV</td>
<td>coefficient of variation</td>
</tr>
<tr>
<td>cwt</td>
<td>100 lb</td>
</tr>
<tr>
<td>d</td>
<td>day(s)</td>
</tr>
<tr>
<td>DE</td>
<td>digestible energy</td>
</tr>
<tr>
<td>DM</td>
<td>dry matter</td>
</tr>
<tr>
<td>DMI</td>
<td>dry matter intake</td>
</tr>
<tr>
<td>F/G</td>
<td>feed efficiency</td>
</tr>
<tr>
<td>ft</td>
<td>foot(feet)</td>
</tr>
<tr>
<td>ft²</td>
<td>square foot(feet)</td>
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<tr>
<td>g</td>
<td>gram(s)</td>
</tr>
<tr>
<td>µg</td>
<td>microgram(s), .001 mg</td>
</tr>
<tr>
<td>gal</td>
<td>gallon(s)</td>
</tr>
<tr>
<td>GE</td>
<td>gross energy</td>
</tr>
<tr>
<td>h</td>
<td>hour(s)</td>
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<tr>
<td>HCW</td>
<td>hot carcass weight</td>
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<tr>
<td>in</td>
<td>inch(es)</td>
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<tr>
<td>IU</td>
<td>international unit(s)</td>
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<tr>
<td>kg</td>
<td>kilogram(s)</td>
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<tr>
<td>kcal</td>
<td>kilocalorie(s)</td>
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<td>kWh</td>
<td>kilowatt hour(s)</td>
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<td>lb</td>
<td>pound(s)</td>
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<tr>
<td>Mcal</td>
<td>megacalorie(s)</td>
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<tr>
<td>ME</td>
<td>metabolizable energy</td>
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<tr>
<td>mEq</td>
<td>milliequivalent(s)</td>
</tr>
<tr>
<td>min</td>
<td>minute(s)</td>
</tr>
<tr>
<td>mg</td>
<td>milligram(s)</td>
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<tr>
<td>mL</td>
<td>cc (cubic centimeters)</td>
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<tr>
<td>mm</td>
<td>millimeter(s)</td>
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<tr>
<td>mo</td>
<td>month(s)</td>
</tr>
<tr>
<td>MUFA</td>
<td>monounsaturated fatty acid</td>
</tr>
<tr>
<td>N</td>
<td>nitrogen</td>
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<tr>
<td>NE</td>
<td>net energy</td>
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<tr>
<td>NDF</td>
<td>neutral detergent fiber</td>
</tr>
<tr>
<td>NFE</td>
<td>nitrogen-free extract</td>
</tr>
<tr>
<td>ng</td>
<td>nanogram(s), .001 µg</td>
</tr>
<tr>
<td>no.</td>
<td>number</td>
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<td>NRC</td>
<td>National Research Council</td>
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<tr>
<td>ppb</td>
<td>parts per billion</td>
</tr>
<tr>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>psi</td>
<td>pounds per square inch</td>
</tr>
<tr>
<td>PUFA</td>
<td>polyunsaturated fatty acid</td>
</tr>
<tr>
<td>SD</td>
<td>standard deviation</td>
</tr>
<tr>
<td>SE</td>
<td>standard error</td>
</tr>
<tr>
<td>SEM</td>
<td>standard error of the mean</td>
</tr>
<tr>
<td>SEW</td>
<td>segregated early weaning</td>
</tr>
<tr>
<td>SFA</td>
<td>saturated fatty acid</td>
</tr>
<tr>
<td>UFA</td>
<td>unsaturated fatty acid</td>
</tr>
<tr>
<td>wk</td>
<td>week(s)</td>
</tr>
<tr>
<td>wt</td>
<td>weight(s)</td>
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<tr>
<td>yr</td>
<td>year(s)</td>
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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 12 g Mn, 50 g Fe, 50 g Zn, 5 g Cu, 90 mg I, and 90 mg Se.

- **Vitamin premix:** Each pound of premix contains 2,000,000 IU vitamin A, 300,000 IU vitamin D₃, 8,000 IU vitamin E, 800 mg menadione, 1,500 mg riboflavin, 5,000 mg pantothenic acid, 9,000 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, and 900 mg pyridoxine.

**Note**

Some of the research reported here was carried out under special 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 $2.5 \pm 0.1$. 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

adsorbents  floor space  phytase stability
amino acid  formaldehyde  pig
amino acid ratio  gene expression  pork
analysis  gilt
antibiotics  grain
bacon  grinding cost
bioassay  growth
birth weight  growth performance
boar exposure  intermittent suckling
by-product  iodine value
carcass fat quality  lactational estrus
chemical treatment  litter separation
conditioning temperature  lysine
copeper  lysine requirement
copper sulfate  mash
corn  meal
creep feeding  method
crystalline AA  methodology
decontamination  minimum infectious dose
deoxynivalenol  mycotoxins
dried milk  nursery pig
energy  oregano
extrude  particle size
feed  particle size analysis
feed line  PCR
feed matrix  PDI
feed mill  PEDV
feed preference  pellet
feed safety  pelleting
feed truck  pellet size
fines  performance
finishing pig  phosphorus
fish meal  phytase

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Biomin USA, San Antonio, TX
DFS Inc., Newell, IA
DNA Genetics, Columbus, NE
DSM Nutritional Products, Parsippany, NJ
Elanco Animal Health, Indianapolis, IN
Farmland Foods LLC, Crete, NE
Feedlogic Corporation, Willmar, MN
Gourley Bros., Webster City, IA
Holden Farms, Northfield, MN
Hord Livestock Company, Bucyrus, OH
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
Livestock and Meat Industry Council, Manhattan, KS
Micronutrients, Indianapolis, IN
Midori USA, Cambridge, MA
Midwest Livestock Systems, Inc., Beatrice, NE
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
PIC USA, Hendersonville, TN
Purco, Edgerton, MN
Tech-Mix, Stewart, MN
Triumph Foods, St. Joseph, MO
United Sorghum Checkoff Program, Lubbock, TX
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Zoltenko Farms Inc., Hardy, NE
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Joel DeRouchey  Joe Hancock  Jason Woodworth  
Steve Dritz  Jim Nelssen
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