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Foreword and Supplemental Information, Swine Day

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Foreword and Supplemental Information, Swine Day

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 DeRouche, and Jason Woodworth
## Standard Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Abbreviation</th>
<th>Description</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>
</tr>
<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>
</tr>
<tr>
<td>DMI</td>
<td>dry matter intake</td>
<td>no.</td>
<td>number</td>
</tr>
<tr>
<td>F/G</td>
<td>feed efficiency</td>
<td>NRC</td>
<td>National Research Council</td>
</tr>
<tr>
<td>ft</td>
<td>foot(feet)</td>
<td>ppm</td>
<td>parts per million</td>
</tr>
<tr>
<td>ft²</td>
<td>square foot(foot)</td>
<td>psi</td>
<td>pounds per square inch</td>
</tr>
<tr>
<td>g</td>
<td>gram(s)</td>
<td>PUFA</td>
<td>polyunsaturated fatty acid</td>
</tr>
<tr>
<td>µg</td>
<td>microgram(s), .001 mg</td>
<td>SD</td>
<td>standard deviation</td>
</tr>
<tr>
<td>gal</td>
<td>gallon(s)</td>
<td>sec</td>
<td>second(s)</td>
</tr>
<tr>
<td>GE</td>
<td>gross energy</td>
<td>SE</td>
<td>standard error</td>
</tr>
<tr>
<td>h</td>
<td>hour(s)</td>
<td>SEM</td>
<td>standard error of the mean</td>
</tr>
<tr>
<td>HCW</td>
<td>hot carcass weight</td>
<td>SEW</td>
<td>segregated early weaning</td>
</tr>
<tr>
<td>in</td>
<td>inch(es)</td>
<td>SFA</td>
<td>saturated fatty acid</td>
</tr>
<tr>
<td>IU</td>
<td>international unit(s)</td>
<td>UFA</td>
<td>unsaturated fatty acid</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram(s)</td>
<td>wk</td>
<td>week(s)</td>
</tr>
<tr>
<td>kcal</td>
<td>kilocalorie(s)</td>
<td>wt</td>
<td>weight(s)</td>
</tr>
<tr>
<td>kWh</td>
<td>kilowatt hour(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 $2.5 \pm 0.1$. 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

alternative
amino acid
amino acid ratio
antibiotic
antimicrobial
blending
bone ash
butyric acid
calorie:lysine ratio
carbadox
carcass characteristics
chemical sanitation
chemical treatment
chlorine (Cl)
chromium propionate
copper
copper amino acid-complex
crude protein
crude protein level
diet complexity
dietary electrolyte balance
duration
Elarom-F Plus
Elarom SES
electrolyte balance
electronic sow feeders
electronic sow feeding
enzymatically fermented soybean meal
essential oil
Evosure
fat source
feed additive
feed manufacturing
feed matrix
finishing feed
fish meal
flush
gilt training
gluco-oligosaccharide
glutamate
glutamine
group-housed gestating sows
growing-finishing pig
growth
growth performance
HP 300
isoleucine
K-value
lactation
Lactobacillus plantarum
late finishing
level
liquid addition
lysine
marketing
medium chain fatty acids
Micro-Aid
mix time
Sodium (Na)
net energy
nursery
nursery feed
nursery pigs
particle size
PEDV
pharmacological trace minerals
phosphorous
phytase
phytogens
pigs
post-farrow maternal weight
probiotic
protein source
reproduction
salt
sample preparation
space allowance
source
sow(s)
stocking density
superdose
swine
tri-basic copper chloride
uniformity of mix
valine
wet mix
yeast
zinc
zinc hydroxychloride
zinc sulfate
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Biomin USA, San Antonio, TX
DNA Genetics, Columbus, NE
DSM Nutritional Products, Parsippany, NJ
Elanco Animal Health, Indianapolis, IN
Farmland Foods LLC, Crete, NE
Feedlogic Corporation, Willmar, MN
Hamlet Proteins, Findlay, OH
Havercamp 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, Drummondville, 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
United Sorghum Checkoff Program, Lubbock, TX
USDA National Institute of Food and Agriculture, Washington, D.C.
Zinpro Corp., Eden Prairie, MN
Zoltenko Farms Inc., Hardy, NE
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Steve Dritz  Jim Nelssen
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