Prepare a Survival Kit 6
Understand Sow Mortality 12
Watch Wean-to-Etrus Intervals 21
Principles Of Quality Management 32
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4 Welcome to Benchmark
A message from PigCHAMP and Farms.com

6 Prepare a Survival Kit
Here are important tips to reduce feed costs and improve efficiencies.

8 Benchmarking in Dangerous Times
2008 will be remembered as a time of adjustment.

10 Summary of the 2007 Data
Productivity comparisons reveal similarities, differences and areas for improvement.

12 Understand Sow Mortality
A wide range of variation proves there is significant room for improvement in this production parameter.

16 Get Ready for Higher Inputs
While inputs will remain high, livestock prices should also be favorable in 2009.

20 Monitoring Sows Bred by Seven Days
There is a reason to consider the use of proportions in more detail and in more applications.

21 Watch Weaning-to-Estrus Intervals
Management is especially important during this critical time.

22 Consider the Alternatives
Here’s a look at the impact of changing ingredient economics on diets and pig performance.

24 Feed Management is Key
Here’s a system that will help you document and manage your biggest cost.

26 Managing Respiratory Disease
Respiratory disease in grow-finish pigs is more challenging than ever, but good management strategies can minimize the effects.

28 Variation in Sow Farm Output
Both underproduction and overproduction create undue costs in an operation.

30 New Handling Strategies
Minimizing injury and death during transportation and at the packing plant is more important than ever.

32 Principles of Quality Management
Optimization through quality management provides producers with the framework to reach new levels of profitability.

33 Profitability Begins with People
Overcoming challenges with employee retention starts with a good plan.
Farms.com Ltd and PigCHAMP are pleased to bring you the 2008 edition of *Benchmark – Setting Higher Standards in Pork Production*. With the current challenges facing the pork industry, it is more important than ever to look for ways to gain extra advantages in efficiency and productivity. This is the objective of *Benchmark*, and we have expanded the content this year to include more authors on more subjects to help you find solutions to today’s challenges.

Benchmarks are identified as stable points to provide reference for further measures. As such, they help you identify areas of – and opportunities for – improvement as well as areas in which you are doing well compared to the “average.” Producers who participate in the PigCHAMP Benchmarking program receive quarterly updates of how their operations compare to benchmark averages. In addition, PigCHAMP offers in-depth, customized reports for a small fee, however there is no charge to participate in the basic Benchmarking program.

We have supplemented the benchmark information with other articles to help you set higher standards for your operation, including management tips to improve profitability, respiratory disease management, new animal handling equipment, feed ingredient usage and quality management principles.

PigCHAMP would like to extend a special thank you to Dr. John Deen and Sukumarannair S. Anil at the University of Minnesota for compiling the benchmark data. Susan Olson, Benchmarking Manager at PigCHAMP, has worked closely with Dr. Deen and his staff to make sure the information in the magazine is as accurate and timely as possible. Sincere thanks also to our advertisers – your support is appreciated.

PigCHAMP is a proud member of the Farms.com Family of Companies, and strives to deliver on the mission of the organization, which is to provide: *Innovative Information Products and Services for the Global Agriculture and Food Industries*. We believe the data, analysis and articles provided in *Benchmark* help support this mission. Visit http://pigchamp.com and http://farms.com to learn more about our company, products and services.

We hope you find this year’s *Benchmark* publication helpful in your operation, and we welcome the opportunity to discuss how we can work with you in the future.

Graham Dyer
President and CEO
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PREPARE A SURVIVAL KIT
Here are important tips to reduce feed costs and improve efficiencies.

By David Meisinger

Times are tough for U.S. pork producers. Feed prices are high and likely will stay at some new high level for the foreseeable future. Market hog prices are currently low with a record volume of pork on the market. Demand is good and packer slaughter capacity is not being challenged, which are both blessings. However, in spite of the positives in the market, essentially all producers are seeking ways to economize, cut costs, improve efficiencies and generally work to improve profitability. It was in this vein that the National Pork Board began accumulating a list of tips for addressing high feed costs and high production costs.

These statements were collected from a large list of Pork Checkoff committee members representing many facets of the pork industry: producers with small and large hog operations, extension specialists, veterinarians, allied industry representatives, researchers and government employees. Dr. Ken Stalder of Iowa State University, Dr. Mark Boggess of the Pork Board and I embellished the list of tips by adding content. We developed recommendations in each area with a firm link to some publication where more information could be found to support the assertions made in the tips.

Some of the tips are so easy and commonplace that they almost go unnoticed by many operators.

There were 44 tips in eight categories including feed processing and manufacturing, feed management, feed formulation, management, health, marketing and genetics. Eighteen different sources of information were found to support the recommendations made in the tips document. These included references from most of the Midwest hog states publications which are shown as links in the publication.

Some of the tips are so easy and commonplace that they almost go unnoticed by many operators. Some have small impacts while others can add significantly to the bottom line. The following is a quick review of a few of the tips specific to feed formulation, feed management and feed processing that can help producers optimize their operations and maximize their profits:

**FEED FORMULATION**

**Monitor feed ingredients for potential mycotoxin contamination:** Scientists have identified several mycotoxins that cause significant, detrimental health and performance problems in swine fed contaminated plant-based feedstuffs. Fungal infestation and subsequent mycotoxin production can occur during plant growth, maturity, harvesting, storage and processing of grains, and is influenced primarily by moisture level, temperature and availability of oxygen. In addition, grain that is damaged, immature, drought stricken or otherwise stressed is more susceptible to mold growth.

**Monitor feed allocations or budgeted amounts and utilize least-cost formulations:** Follow feed budgets aggressively to ensure accurate compliance for each class of pig. Inaccurate rations or incorrect budgets decrease efficiencies and increase costs. For example, rations that have mistakes due to inaccurate scales or measurement, or rations that are formulated for the incorrect class or pig weight are inefficient and increase costs. Formulating diets with economic costs in the equation, as well as modeling input requirements, will allow the development of diets at optimum performance and least-cost ingredients. There are always trade-offs, so be aware of any detrimental effects of diet formulation on overall cost and/or performance.

**Reevaluate phase feeding and options for split sex feeding:** Review all protocols for each ration phase. Make sure your weight categories and genetic description fit your current rations for each phase as closely as possible. Consider split-sex feeding to further increase feed efficiency. Both of these techniques can improve the accuracy of your rations and increase your production efficiencies. Consider finishing rations that limit or eliminate excess nutrients just prior to slaughter to lower feed costs on your heaviest hogs.

**Target sows’ nutrients:** Improve sow productive lifetime by targeting diets for different parity ranges. Diets should have higher protein and energy levels for replacement gilts through parity two to prevent excess mobilization of body reserves during lactation. As sows become older, micronutrients (zinc, copper, iron, etc.) become critical nutrients that need to be maintained at high levels in order to maximize production efficiency. Consider the added costs of additional feed storage and delivery equipment in gestation and lactation, and strategies to sort and feed sows accordingly against the benefits of targeting sow nutrition more accurately and efficiently.
Decrease/eliminate feed outages: Feed outages significantly impact the efficiency of feed utilization in pigs. The frequency and duration of feed outages should be assessed and minimized or eliminated whenever possible.

Make measuring of feed intake/wastage part of the work routine: While difficult to measure feed intake on individual pigs, pen feed intake should be monitored continually to quickly recognize feed wastage, pen health problems, water quality/availability, ventilation challenges and other issues.

Check water flow and quality often: Water is an often-overlooked essential nutrient. Inadequate flow or availability of water or poor water quality can seriously impact performance or even cause death. Waterers should be easily accessible and checked regularly. Be sure they are delivering the designed volume at the proper rate. Check waterers furthest from the well head as this is the point at which pressure is likely to be the weakest. Excessive water use is also inefficient because it has to be hauled or pumped as manure.

Practice proper feed withdrawal prior to marketing hogs. Consider withdrawing feed from pigs to be marketed for up to 12 hours prior to harvest to save on feed consumed, lighten the actual live weight of the hogs marketed and enhance average carcass quality. For medicated feed, follow recommended withdrawal times for feed additives to prevent costly carcass condemnations, disruption of market channels, bad publicity for the pork industry or costly rejections of pork in foreign markets. Inadvertently including an ingredient that requires a withdrawal period may force a producer to feed a group of pigs longer than desired, which adversely impacts feed efficiency.

**FEED FORMULATION**

Use DDGS when available at cost effective prices. Distillers dried grains with soluble (DDGS) are readily available in most areas where pigs are fed and corn is grown. Where transport distance is feasible and product quality and variability can be verified, these byproducts are usually available at competitive prices. Be careful with feed formulation. Typical DDGS have only about 90% of the nutrient value of corn with a poor amino acid balance. Follow guidelines for inclusion rates closely.

Sows and older market hogs can utilize higher percentages of DDGS in their ration. However, high levels of DDGS in market hogs may negatively impact carcass quality. In proceedings from the 2007 Al Leman Conference, J.E. Pettigrew suggests the following:

- Buy DDGS from one or a few plants with which you have developed a relationship
- Buy only light-colored DDGS
- Buy only DDGS in which lysine is at least 2.8 percent of crude protein
- Avoid DDGS with a high level of “syrup balls”

**Look for alternative feed ingredients:** Alternative feedstuffs and byproducts are available in many areas. Some of these have become competitive with high grain prices. However, determine the nutritional profile of an alternative feedstuff and its feeding value at the price quoted before you decide to use it. Also, make sure you know the form in which it will be delivered so extra labor or machinery is not required to make it practical. Examples of alternative feedstuffs include bakery products, glycerin (byproduct of biodiesel manufacturing), poultry fat, etc.

**Use crystalline amino acids to replace protein ingredients:** The cost of many crystalline amino acids such as lysine, methionine, tryptophan and threonine have decreased to the extent that replacement of soybean meal in the diet can result in a very palatable, semi-synthetic diet for the pigs with real cost savings. Producers should aggressively monitor ingredient prices and reformulate rations accordingly.

**Reduce traditional animal protein sources in starter diets for pigs:** Animal protein sources should be strictly budgeted in starter diets. Research from North Dakota State University suggests that lower cost, nutrient-dense, high performance, transition pig starter diets can be effectively prepared using reduced levels of spray-dried animal plasma, soy protein concentrate, spray-dried blood meal and dried whey when high energy hull-less oats and hard red spring (HRS) wheat are selected as basal grains. The nutrient-dense ingredients to use in pig starter formulations will depend largely on availability and current economics.

**Reformulate rations based on energy:** Review animal requirements for both energy and amino acid levels. Historically, protein has been the most expensive component of a swine ration. Energy costs are currently higher in many rations than protein. Consequently, producers should pay close attention to both energy and protein costs to meet their pigs’ nutritional requirements. Rations should be reformulated as often as ingredient prices change. Currently

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From Stein, H.H. 2007. Distillers dried grains with solubles (DDGS) in diets fed to swine. Swine Focus #001, Department of Animal Sciences, College of ACES, The University of Illinois at Urbana-Champaign.
BENCHMARKING IN DANGEROUS TIMES

2008 will be seen as a time of adjustment.

By John Deen and Sukumarannair S. Anil

Benchmarking is a term and a methodology that has been abused, misused and yet, in spite of our faults, it has survived and provided useful guidance to the industry. The etymology of benchmarking is interesting:

A “benchmark” was originally a mark cut into a stone or a wall by surveyors measuring the altitude and/or level of a tract of land. The cut was used to secure a bracket called a “bench” upon which they mounted their measuring equipment, and all subsequent measurements were made in reference to the position and height of that mark. Voila, “benchmark,” which first appeared in English around 1842, and quickly began to be used figuratively in the “standard of quality” sense we see today... The surveying term is first recorded in 1842, and the figurative use arose by 1884. (http://www.etymologie.info/~e/u_/us-manage. html#Benchmark, accessed March 29, 2008)

In this application, benchmarks are identified as stable points to provide reference for further measures. Often benchmarks have provided that point of comparison, and success in pig farming has been defined through comparisons to such benchmarks.

The problem with the definition of benchmarking and its application is where we have major changes in the industry that can, in some ways, change the basic approach to pig farming and change the expectations of individual benchmarks. To a great extent we are at such a point in the swine industry now. It is unlikely that we will go back down to the historically low feed prices and costs of production that we have seen in the past. In response to this, we will see higher values of pigs as supply adjusts to the new cost structures.

TIME OF ADJUSTMENT

2008 will be seen as a time of adjustment. We need to use the benchmarks we have as a real asset in identifying the strengths and weaknesses of this new market. We may also need to find new variables for evaluation. It is unlikely, particularly for sow units, that we will see many decisions on expansion or major renovation of facilities. Instead, the aim of benchmarking will be to maximize the profits, or minimize the losses, of the facilities that we have.

In North America, we are working with sow unit systems that utilize sunk costs as the major part of the cost of production. In other words, the majority of the costs are independent of the number of sows and the productivity of those sows. Additional output from a sow unit is going to become more valuable than ever. Marginal or extra pigs are the “gravy” of sow units, as it is difficult to identify major extraordinary costs with added productivity.

However, extra pigs also vary in their value. The most valuable pigs occur when productivity is lowest and in recent years the value of a marginal weaned pig to the enterprise can vary as much as 65% as supply varies, with most of this variation being due to seasonal infertility and inventory responses of the sow units. Secondly, extra pigs can also vary in their value based on the quality of those pigs and their performance and subsequent stages of production. Pigs weaned too young due to overproduction or pigs weaned in poor quality due to inadequate management of birthweight both can be major costs to the swine enterprise.

INDUSTRY-LEVEL OPPORTUNITIES

My list of industry-level opportunities includes the following:

• Removal rates: We see high removal rates in many herds and in some recent analyses it appears that removals to improve reproductive performance are often misguided. Conversely high levels of removal due to lameness are probably correct but the root causes of lameness need to be addressed to manage removal rates. Most of all, there is increasing evidence that high removal rates can affect the quality of subsequent progeny performance as gilt progeny are more susceptible to various insults.

• Variation of piglet production: This is another variable that indirectly affects the quality of progeny. Not only are there seasonally low levels of piglet production, but these low levels are often followed by overproduction. We see an inverse relationship between piglet production and weaning age on many farms, so that weaning ages fall below target levels and poorer performance is seen in subsequent stages of production.

As you review the benchmarks of 2007 performance, remember that the opportunities remain the same but the rewards will be increasing. In some ways, the title of the book by Spencer Johnson, “Who Moved My Cheese? An Amazing Way to Deal with Change in Your Work and in Your Life,” is an appropriate theme. We would go a step further and emphasize that the cheese has not disappeared, but it will reappear in larger amounts and in different places. However, this new market will be less forgiving of low productivity. With this reality, this benchmark review should be more appropriate than ever to allow you to emphasize the real opportunities of improvement in swine production.

Editor’s Note: John Deen DVM PhD, is an Associate Professor at the University of Minnesota, and Sukumarannair S. Anil DVM PhD, is a Research Associate at the University of Minnesota. To contact them, e-mail: deenx003@umn.edu or sukum001@umn.edu.
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SUMMARY OF THE 2007 DATA

Productivity comparisons reveal similarities, differences and areas for improvement.

By John Deen

The summary data can be segmented in various ways, but a common comparison is between the United States and Canada. As in previous years, Canada has many areas of higher productivity. The reasons have been discussed, but the most probable reason is that the higher financial pressures have forced Canadian farms to be more efficient. Secondly, there is a larger proportion of herds that sell weaned pigs in Canada, with their income directly tied to sow productivity. Finally, there may be lower likelihood of infectious disease outbreaks, particularly in Western Canada, where the distance between farms is quite large.

We continue to see some general trends across the industry as well.

Sow productivity continues to increase, particularly through litter size. Mortality rates have reached a prior plateau, though the last quarter rates of Canadian herds are significantly higher, suggesting that slaughter alternatives may be limited.

<table>
<thead>
<tr>
<th>Pigcare variables</th>
<th>PigCHAMP variables used</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Upper 10 percentile</th>
<th>Lower 10 percentile</th>
</tr>
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<td>Repeat services</td>
<td>Number repeat services</td>
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<td>258.00</td>
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<td>% Repeat services</td>
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<td>Total services</td>
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<td>8166.00</td>
<td>979.00</td>
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<td>Number of sows farrowed</td>
<td>3063.41</td>
<td>2960.68</td>
<td>1660.00</td>
<td>6710.00</td>
<td>764.00</td>
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<td>Farrowing rate</td>
<td>Farrowing rate</td>
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<td>7.85</td>
<td>80.60</td>
<td>87.80</td>
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<td>Total born</td>
<td>Total pigs born</td>
<td>38303.38</td>
<td>37979.12</td>
<td>20320.00</td>
<td>84096.00</td>
<td>9189.00</td>
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<tr>
<td>Total born per litter</td>
<td>Average total pigs per litter</td>
<td>12.34</td>
<td>0.762</td>
<td>12.40</td>
<td>13.25</td>
<td>11.30</td>
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<tr>
<td>Total liveborn</td>
<td>Total pigs born alive</td>
<td>34158.49</td>
<td>33771.83</td>
<td>18169.00</td>
<td>74588.00</td>
<td>8113.00</td>
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<tr>
<td>Liveborn per litter</td>
<td>Average pigs born alive/litter</td>
<td>11.06</td>
<td>0.704</td>
<td>11.10</td>
<td>11.88</td>
<td>10.10</td>
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<td>Liveborn/female/year</td>
<td>litters/fem/yr * ave pigs born alive per litter</td>
<td>23.93</td>
<td>2.980</td>
<td>24.31</td>
<td>27.20</td>
<td>20.30</td>
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<td>Total stillborn</td>
<td>Total stillborn pigs</td>
<td>2825.43</td>
<td>2916.13</td>
<td>1559.00</td>
<td>6553.00</td>
<td>611.00</td>
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<tr>
<td>Stillborn per litter</td>
<td>Average stillborn pigs</td>
<td>0.95</td>
<td>0.292</td>
<td>0.92</td>
<td>1.30</td>
<td>0.60</td>
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<tr>
<td>Total mummified</td>
<td>Total mummified pigs born</td>
<td>895.57</td>
<td>1229.39</td>
<td>400.00</td>
<td>2297.00</td>
<td>42.00</td>
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<td>Mummified per litter</td>
<td>Average mummies per litter</td>
<td>0.24</td>
<td>0.183</td>
<td>0.20</td>
<td>0.40</td>
<td>0.04</td>
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<tr>
<td>Sows weaned</td>
<td>Sows farrowed and weaned</td>
<td>3070.02</td>
<td>3001.70</td>
<td>1694.00</td>
<td>6746.00</td>
<td>756.00</td>
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<td>Piglets weaned</td>
<td>Total pigs weaned</td>
<td>29862.78</td>
<td>29449.07</td>
<td>15928.00</td>
<td>67241.00</td>
<td>7125.00</td>
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<td>Piglets weaned per litter</td>
<td>Pigs weaned per litter weaned</td>
<td>9.60</td>
<td>0.693</td>
<td>9.69</td>
<td>10.40</td>
<td>8.70</td>
</tr>
<tr>
<td>% Total losses of liveborn</td>
<td>Pre-weaning mortality</td>
<td>12.26</td>
<td>3.685</td>
<td>12.17</td>
<td>16.60</td>
<td>8.14</td>
</tr>
<tr>
<td>Average weaned weight</td>
<td>Average litter weaning weight (N= 120)</td>
<td>114.67</td>
<td>34.318</td>
<td>120.60</td>
<td>146.85</td>
<td>84.45</td>
</tr>
<tr>
<td>Piglets age at weaning</td>
<td>Average age at weaning</td>
<td>19.26</td>
<td>1.894</td>
<td>19.50</td>
<td>20.90</td>
<td>17.30</td>
</tr>
<tr>
<td>Piglets weaned/sow/year</td>
<td>Pigs wnd / mated female / yr</td>
<td>22.16</td>
<td>2.742</td>
<td>22.40</td>
<td>25.50</td>
<td>18.95</td>
</tr>
<tr>
<td>Piglets weaned/female/year</td>
<td>Pigs wnd / female / year</td>
<td>20.89</td>
<td>2.812</td>
<td>21.10</td>
<td>24.10</td>
<td>17.76</td>
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<tr>
<td>Total boars</td>
<td>Ending boar inventory</td>
<td>11.44</td>
<td>29.940</td>
<td>4.00</td>
<td>24.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Sows added</td>
<td>Females entered</td>
<td>793.01</td>
<td>943.280</td>
<td>394.00</td>
<td>1799.00</td>
<td>169.00</td>
</tr>
<tr>
<td>Sows culled or sold</td>
<td>Sows and gilts culled</td>
<td>671.21</td>
<td>732.822</td>
<td>346.00</td>
<td>1528.00</td>
<td>141.00</td>
</tr>
<tr>
<td>% Cull per year</td>
<td>Culling rate</td>
<td>48.65</td>
<td>17.035</td>
<td>47.00</td>
<td>66.10</td>
<td>32.10</td>
</tr>
<tr>
<td>Sows died</td>
<td>Sow and gilt deaths</td>
<td>126.61</td>
<td>136.732</td>
<td>66.00</td>
<td>312.00</td>
<td>22.00</td>
</tr>
<tr>
<td>% sow deaths per year</td>
<td>Death rate</td>
<td>8.74</td>
<td>3.222</td>
<td>8.70</td>
<td>12.50</td>
<td>4.80</td>
</tr>
<tr>
<td>Total sows</td>
<td>Ave female inv - Ave gilt pool inv</td>
<td>1318.72</td>
<td>1250.590</td>
<td>740.40</td>
<td>2792.00</td>
<td>338.00</td>
</tr>
</tbody>
</table>

Farms received in Cd = 110. One farm had no data, 4 had % change >40 and 4 farms had incomplete data. Care farms = 270. Farms used for summary= 371
RANGE OF PERFORMANCE TOO WIDE

The problem is really not where you live, though. The summary indices of most interest are the range of performance estimates. Take a look at the range of performance across the major indicators. Whether in Canada or the United States, there is a wide range of performance that is not explained by location. Moreover, the capability to reach high levels of productivity appears to be similar across both industries.

Recognizing that the capabilities to excel are similar and the design of sow units also does not differ greatly, it is mostly a function of the management within the farms. It may be useful to start looking at availability of skilled labor for estrus detection and breeding, inspection and treatment frequency for sick sows, and the general effects of genotype and housing methods.

As we look at future changes in the industry, it is probable that poor performing herds will not survive in any market. It may very well be that the higher financial pressures on Canadian herds will create an even greater difference in performance in the future. However, all farms should recognize their opportunities to improve within the ranges shown by this database.

### 2007 Year-End Summary for Canadian Herds

<table>
<thead>
<tr>
<th>Pigcare variables</th>
<th>PigCHAMP variables used</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>Upper 10 percentile</th>
<th>Lower 10 percentile</th>
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</thead>
<tbody>
<tr>
<td>Repeat services</td>
<td>Number repeat services</td>
<td>239.46</td>
<td>250.322</td>
<td>113.00</td>
<td>514.00</td>
<td>54.00</td>
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<td>% Repeat services</td>
<td>Percent repeat services</td>
<td>8.45</td>
<td>2.518</td>
<td>8.30</td>
<td>10.80</td>
<td>5.20</td>
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<tr>
<td>Total services</td>
<td>Total number of services</td>
<td>2769.92</td>
<td>2459.049</td>
<td>1653.00</td>
<td>4782.00</td>
<td>722.00</td>
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<tr>
<td>Farrowings</td>
<td>Number of sows farrowed</td>
<td>2327.62</td>
<td>2051.463</td>
<td>1482.00</td>
<td>3785.00</td>
<td>607.00</td>
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<tr>
<td>Farrowing rate</td>
<td>Farrowing rate</td>
<td>84.46</td>
<td>3.549</td>
<td>84.80</td>
<td>89.30</td>
<td>79.80</td>
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<tr>
<td>Total born</td>
<td>Total pigs born</td>
<td>28912.08</td>
<td>25357.607</td>
<td>17126.00</td>
<td>47032.00</td>
<td>7495.00</td>
</tr>
<tr>
<td>Total born per litter</td>
<td>Average total pigs per litter</td>
<td>12.52</td>
<td>0.828</td>
<td>12.42</td>
<td>13.58</td>
<td>11.71</td>
</tr>
<tr>
<td>Total liveborn</td>
<td>Total pigs born alive</td>
<td>25962.62</td>
<td>22865.983</td>
<td>16202.00</td>
<td>41651.00</td>
<td>6882.00</td>
</tr>
<tr>
<td>Liveborn per litter</td>
<td>Average pigs born alive/litter</td>
<td>11.26</td>
<td>0.757</td>
<td>10.96</td>
<td>12.10</td>
<td>10.60</td>
</tr>
<tr>
<td>Liveborn/female/year</td>
<td>litters/fem/yr * ave pigs born alive per litter</td>
<td>25.34</td>
<td>2.536</td>
<td>24.90</td>
<td>27.83</td>
<td>23.00</td>
</tr>
<tr>
<td>Total stillborn</td>
<td>Total stillborn pigs</td>
<td>1895.15</td>
<td>1790.709</td>
<td>1149.00</td>
<td>3530.00</td>
<td>467.00</td>
</tr>
<tr>
<td>Stillborn per litter</td>
<td>Average stillborn pigs</td>
<td>0.86</td>
<td>0.265</td>
<td>0.70</td>
<td>1.10</td>
<td>0.60</td>
</tr>
<tr>
<td>Total mummified</td>
<td>Total mummified pigs born</td>
<td>630.85</td>
<td>607.571</td>
<td>431.00</td>
<td>1426.00</td>
<td>66.00</td>
</tr>
<tr>
<td>Mummified per litter</td>
<td>Average mummies per litter</td>
<td>0.25</td>
<td>0.113</td>
<td>0.30</td>
<td>0.40</td>
<td>0.10</td>
</tr>
<tr>
<td>Sows weaned</td>
<td>Sows farrowed and weaned</td>
<td>2298.23</td>
<td>1964.267</td>
<td>1462.00</td>
<td>3775.00</td>
<td>596.00</td>
</tr>
<tr>
<td>Piglets weaned</td>
<td>Total pigs weaned</td>
<td>22706.08</td>
<td>19203.074</td>
<td>14776.00</td>
<td>37659.00</td>
<td>5806.00</td>
</tr>
<tr>
<td>Piglets weaned per litter</td>
<td>Pigs weaned per litter weaned</td>
<td>9.86</td>
<td>0.831</td>
<td>9.70</td>
<td>11.00</td>
<td>9.20</td>
</tr>
<tr>
<td>% Total losses of liveborn</td>
<td>Pre-weaning mortality</td>
<td>11.37</td>
<td>3.232</td>
<td>10.30</td>
<td>15.62</td>
<td>7.80</td>
</tr>
<tr>
<td>Average weaned weight</td>
<td>Average litter weaning weight (N= 11)</td>
<td>99.98</td>
<td>63.048</td>
<td>61.30</td>
<td>188.00</td>
<td>55.30</td>
</tr>
<tr>
<td>Piglets age at weaning</td>
<td>Average age at weaning</td>
<td>21.02</td>
<td>2.371</td>
<td>20.40</td>
<td>25.70</td>
<td>19.10</td>
</tr>
<tr>
<td>Piglets weaned/sow/year</td>
<td>Pigs wnd / mated female / yr</td>
<td>23.40</td>
<td>2.794</td>
<td>23.40</td>
<td>26.00</td>
<td>21.60</td>
</tr>
<tr>
<td>Piglets weaned/female/year</td>
<td>Pigs wnd / female / year</td>
<td>22.38</td>
<td>2.506</td>
<td>22.10</td>
<td>25.20</td>
<td>20.80</td>
</tr>
<tr>
<td>Total boars</td>
<td>Ending boar inventory</td>
<td>15.62</td>
<td>9.535</td>
<td>13.00</td>
<td>31.00</td>
<td>2.00</td>
</tr>
<tr>
<td>Sows added</td>
<td>Females entered</td>
<td>537.46</td>
<td>493.107</td>
<td>306.00</td>
<td>1253.00</td>
<td>99.00</td>
</tr>
<tr>
<td>Sows culled or sold</td>
<td>Sows and gilts culled</td>
<td>450.00</td>
<td>380.969</td>
<td>288.00</td>
<td>987.00</td>
<td>107.00</td>
</tr>
<tr>
<td>% Cull per year</td>
<td>Culling rate</td>
<td>42.33</td>
<td>12.326</td>
<td>43.20</td>
<td>58.70</td>
<td>27.20</td>
</tr>
<tr>
<td>Sows died</td>
<td>Sow and gilt deaths</td>
<td>113.31</td>
<td>116.918</td>
<td>51.00</td>
<td>270.00</td>
<td>12.00</td>
</tr>
<tr>
<td>% sow deaths per year</td>
<td>Death rate</td>
<td>9.52</td>
<td>4.048</td>
<td>10.20</td>
<td>14.30</td>
<td>4.50</td>
</tr>
<tr>
<td>Total sows</td>
<td>Ave female inv - Ave gilt pool inv</td>
<td>986.61</td>
<td>869.365</td>
<td>582.00</td>
<td>1659.00</td>
<td>254.70</td>
</tr>
</tbody>
</table>
UNDERSTAND SOW MORTALITY
A wide range of variation proves there is significant room for improvement in sow mortality.

By Kenneth Stalder, Locke Karriker and Anna Johnson

Sow mortality is a contributing factor to the relatively low average number of parities a sow remains in the breeding herd of U.S. commercial sow herds. A sow remaining in the breeding herd for fewer parities will wean and sell fewer pigs over her productive lifetime.

PIGCHAMP 2007 MORTALITY RESULTS
One of the best data sets against which to benchmark your farms’ values on various data points are the yearly PigCHAMP summaries. In the 2007 PigCHAMP summary, the average sow mortality rate from 372 sow farms was 8.76%.

The amount of variation among the herds can be measured several ways. First, the range of sow mortality values observed in the 2007 PigCHAMP summary was from 1.4% to 22.7%. As is the case with all data, one must use caution as there are a variety of factors that can influence these values, like farm size, type of gestation system, etc. These values clearly illustrate the extremes that can be seen on individual farms for sow mortality. A farm on the high end of the range might consider trying to get below 10 or even 15% as an initial goal. In this manner, goals are clearly achievable and can be adjusted once initial goals are met.

In some cases, high mortality rates may be difficult to avoid. A classic example is when a disease-causing organism enters the breeding herd and has a devastating impact on sow mortality rates. Of course, many herds try to avoid disease through proper vaccination programs and strict biosecurity procedures. However, occasionally even with our best efforts, livestock operations have a disease challenge and the associated negative impacts on production parameters occur. Often the severity of any disease challenge can be limited by excellent animal care and treatment.

USE STANDARD DEVIATION
Another way to evaluate the variation that exists among the herds in the 2007 PigCHAMP summary is by determining the standard deviation for the trait. In this case, the standard deviation for the 2007 PigCHAMP mortality rate was 3.22. Here is an explanation of the standard deviation in this case:
• Expect 66% of the mortality values to fall within + or – 1 standard deviation, or between 5.6 and 11.9%
• Expect 86% of the mortality values to fall within + or – 2 standard deviations, or 2.38 and 15.1
• Expect 95% of the mortality values to fall between 0 and 18.3%.

From the present data, four herds had a reported mortality rate above 3 standard deviations from the mean, indicating they clearly have room to improve. On the other hand, 43 herds in this data set, or 11.65%, have a sow mortality rate below 5%. Two-thirds or 66% of the herds in the 2007 PigCHAMP summary have a sow mortality rate below 10%. Furthermore, the top 10% of the herds for sow mortality have an average sow mortality rate of 4.7%. Therefore, producers who wish to benchmark themselves against the best 10% of producers should strive for an average sow mortality rate of 4.7%.

When compared to other countries participating, the average U.S. mortality rate of 8.8% is better than the average mortality rate of herds in Canada (9.5%; range 1.3 to 16.1%) and Spain (9.9%; range 2.1 to 17.7%).

The range in sow mortality rates from the three countries where sufficient data are available to make general comparisons are quite similar. Readers should keep in mind that the number of reporting farms in 2007 using PigCHAMP is significantly smaller from Canada and Spain.

NUMEROUS FACTORS ARE INVOLVED
Sow mortality rates have been increasing in commercial swine herds over the past decade, and sow mortality rates of 10% or more are unacceptable. Yet, as seen by the 2007 PigCHAMP data summaries, many pork producers perform exceedingly well when evaluating breeding herd female mortality rates.

Sow mortalities can make up a substantial portion of sows removed from the breeding herd on an annual basis. Further, annual sow mortality rates have been gradually increasing in the past 10 to 15 years (Irwin and Deen, 2000; Duran, 2001). Sow mortalities as a percentage of total breeding herd

<table>
<thead>
<tr>
<th>Study</th>
<th>Avg. Parity at Culling</th>
<th>Culling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joubert, 1960</td>
<td>3.2</td>
<td>NR1</td>
</tr>
<tr>
<td>Pomeroy, 1960</td>
<td>3.75</td>
<td>NR</td>
</tr>
<tr>
<td>Jones, 1967</td>
<td>3.7</td>
<td>NR</td>
</tr>
<tr>
<td>Straw, 1984</td>
<td>5.8</td>
<td>NR</td>
</tr>
<tr>
<td>Friendship et al., 1986</td>
<td>4.4 purebreds 5.3 crossbreds</td>
<td>NR</td>
</tr>
<tr>
<td>Zivkovic et al., 1986</td>
<td>4.4 purebreds</td>
<td>NR</td>
</tr>
<tr>
<td>D’Allaire, 1987</td>
<td>3.77</td>
<td>50%</td>
</tr>
<tr>
<td>Stein et al., 1990</td>
<td>NR</td>
<td>50%</td>
</tr>
<tr>
<td>Coderberg and Johnson, 1996</td>
<td>4.7</td>
<td>NR</td>
</tr>
<tr>
<td>Paterson et al., 1996</td>
<td>3.7</td>
<td>NR</td>
</tr>
<tr>
<td>Pedersen, 1996</td>
<td>4.8</td>
<td>50%</td>
</tr>
<tr>
<td>Sehested and Schjerve, 1996</td>
<td>3.01 purebreds, 3.61 crossbreds</td>
<td>NR</td>
</tr>
<tr>
<td>Boyle et al., 1998</td>
<td>4.58</td>
<td>43%</td>
</tr>
<tr>
<td>Koketsu et al., 1999</td>
<td>5.6</td>
<td>NR</td>
</tr>
<tr>
<td>Lucia et al., 2000</td>
<td>3.3</td>
<td>NR</td>
</tr>
</tbody>
</table>

1 NR = not reported.
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4. **RSS News Feeds**
5. **Expanded Commentaries**
6. **Deeper Content**
7. **More Classifieds**
8. **Interactive Chat**
9. **AgCareers**
10. **Real Estate Listings**
females, can commonly reach 10% or higher (D’Allaire et al., 1987; Stein et al., 1990; Pederson, 1996).

When evaluating the reasons for sow mortality, the common causes for sow death which have been reported in the scientific literature include torsion and other abdominal organ injuries, heart failure, and cystitis (D’Allaire and Drolet, 1999). Common reasons for sow deaths from various research studies are summarized in Table 1. Evaluating the scientific literature for sow mortality causes by parity, locomotion or leg related problems including arthritis, pneumonia, ulcers, and endometriosis tend to be associated with gilts and young sows. Heart failure, cystitis, uterine prolapse and torsion tend to be the more common mortality reasons reported for older sows (D’Allaire et al., 1987; Chagnon et al., 1991; Maderbacher et al., 1993). It has been shown that similar sow mortality challenges still exist today (Table 2).

A clear seasonal affect on sow mortality has been reported in the scientific literature. Typically, sow mortality increases during months where hot temperature and high humidity levels occurs (Chagnon et al., 1991; Drolet et al., 1992; D’Allaire et al., 1996; Deen and Xue, 1999; Irwin et al., 1999). Further, the peripartum phase appears to be a time when a high proportion of sow deaths occur (Chagnon et al., 1991; Deen and Xue, 1999; Duran, 2001; Deen, 2003). As with many challenges facing pork producers, management and housing can contribute to the underlying causes for breeding herd female mortality. It has been reported that rough handling and movement can play a role in abdominal torsion (Morin et al., 1984). Further, feeding management, including how often the sows are fed and dietary changes in the make up of the lactation and gestation rations appear to play a role in the occurrence of gastric torsion (Morin et al., 1984; Sanford et al., 1984). More specifically, it has been reported that providing three meals per day decreases the risk of mortality when compared to feeding twice per day (Abiven et al., 1998).

The occurrence of heart failure among breeding herd females is typically associated with stressful events. The scientific literature has associated the peripartum period with the incidence of heart failure (Drolet et al., 1992) with nearly two-thirds of sow mortalities occurring as a result of cardiac failure taking place during this time period. This same study reported that other stressful events like fighting, mating, transport, elevated temperature and other similar activities which sows typically encounter can contribute to an increased prevalence of cardiac failure. This same study suggests that increases in heart size have not kept pace with increased mature body size of modern lines of pigs and may need further evaluation.

Some management factors appear to increase breeding herd mortality rates, while others can lower the risk. Some of the reported management factors that can lower mortality include weaning pigs at an older age (28 days or greater), having a smaller litter size at birth (12 piglets or less), reaching maximum daily lactation feed intake before the 15th day of lactation, and having maximum daily feed intake at less than 8 kg. One research report (Brandt et al., 1999) found that females with the largest body size have an increased mortality risk between the third weaning and parity five. This work is supported by the findings of Deen and Xue (1999) and Tiranti et al. (2003) who reported that mortality risk increased as parity increased. Additionally, Brandt et al. (1999) found that poor leg quality scores of gilts also significantly impacted survival rates. This is of particular interest to the authors of this paper, as the increased use of artificial insemination and increased emphasis on lean content of modern genetic lines can contribute animals with higher rates of feet and leg soundness problems. Studies that utilized PigCHAMP data (Koketsu, 2000) found that higher annual sow mortality rates were associated with larger herd size, increased parity at farrowing, shorter lactation length, and seasonality (summer), which continues to support the findings of several earlier studies. In this study, increasing herd size by 500 sows resulted in an increased mortality risk by approximately 0.5%.

### ECONOMIC IMPACT IS SIGNIFICANT

Sow mortality can have a large economic impact on commercial pork operations and one factor that makes this even more important is that many sow mortalities occur after substantial costs have already been incurred. Schultz et al. (2001) reported that 38-40% of sow deaths occurred 100 to 125 days post-breeding, a time at which a substantial gestational economic investment had already been made. Considering the relatively high feed costs experienced by producers today, the cost of sow mortalities occurring this late in gestation is magnified.

As we’ve shown, high sow mortality in commercial pork production systems can lead to economic inefficiency and animal well-being concerns. Animal agriculture is under increasing scrutiny from a variety of internal and external sources. From both of these standpoints, it behooves the industry to make a conscientious effort to improve this production parameter.

### TABLE 2. Causes for mortality in breeding sows (Adapted from Stalder et al., 2004)

<table>
<thead>
<tr>
<th>Study</th>
<th>Arthritis</th>
<th>Mastitis &amp; Encephalitis</th>
<th>Cystitis</th>
<th>Pneumonia</th>
<th>Paratuberculosis</th>
<th>Lameness &amp; Arthritis</th>
<th>Strangulation &amp; Abdominal</th>
<th>Gastritis</th>
<th>Heart Failure</th>
<th>Acute General</th>
<th>Other</th>
<th>Prolapse</th>
<th>Gastric Torsion</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones, 1967</td>
<td>NR</td>
<td>21.7</td>
<td>4.3</td>
<td>2.2</td>
<td>NR</td>
<td>2.2</td>
<td>6.5</td>
<td>2.2</td>
<td>6.5</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Svendsen et al., 1975</td>
<td>25.5</td>
<td>7.9</td>
<td>9.6</td>
<td>4.4</td>
<td>8.8</td>
<td>7.0</td>
<td>3.5</td>
<td>4.4</td>
<td>14.9</td>
<td>3.5</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>D’Allaire et al., 1987</td>
<td>29.0</td>
<td>23.0</td>
<td>11.0</td>
<td>4.0</td>
<td>11.0</td>
<td>2.2</td>
<td>3.6</td>
<td>3.6</td>
<td>31.4</td>
<td>2.2</td>
<td>NR</td>
<td>NR</td>
<td>15.3</td>
<td>14.6</td>
</tr>
<tr>
<td>Chagnon et al., 1991</td>
<td>6.6</td>
<td>5.1</td>
<td>3.6</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>6.6</td>
<td>2.2</td>
<td>NR</td>
<td>6.6</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Sanford et al., 1994</td>
<td>NR</td>
<td>2.6</td>
<td>2.6</td>
<td>10.5</td>
<td>NR</td>
<td>21.0</td>
<td>2.6</td>
<td>NR</td>
<td>NR</td>
<td>47.4</td>
<td>2.6</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>Christensen et al., 1995</td>
<td>15.2</td>
<td>3.4</td>
<td>12.3</td>
<td>14.8</td>
<td>13.3</td>
<td>6.1</td>
<td>11.5</td>
<td>2.7</td>
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<td>NR</td>
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<td>NR</td>
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<tr>
<td>Irwin et al., 1999</td>
<td>NR</td>
<td>12.1</td>
<td>2.2</td>
<td>9.9</td>
<td>NR</td>
<td>NR</td>
<td>12.9</td>
<td>4.0</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>11.8</td>
</tr>
</tbody>
</table>

* NR = not reported.
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GET READY FOR HIGHER INPUTS

While inputs will remain high, livestock prices should also be favorable in 2009.

By Denise Faguy

The United States Department of Agriculture (USDA) provides a gauge of livestock and crop intentions through its quarterly reports. Sometimes those reports create angst and uncertainty among producers, as was the case with the March Hogs and Pigs report as well as the March planting intentions report. From a swine perspective, the biggest surprise was the prediction of larger than expected hog supplies through September 2008.

“The initial reaction on the production side can only be described as shock and despair,” says Farms.com Senior Risk Management Consultant Victor Aideyan. “The Hogs and Pigs report was a negative surprise, to say the least.”

While the market reacted with lower prices for the first few trading days following the report, they have since rebounded, says Aideyan. “Farms.com Risk Management believes that tightening hog supplies in the 2nd quarter compared to the last quarter will support hog prices between April and early June,” he adds.

For pork producers, it will continue to be important to manage input costs, including corn, meal, and any protein sources. “The price risk management work you do during this period will determine your level of profitability, if any, during 2009,” points out Aideyan.

“Barring any exceptional events, we expect the meat complex (hogs and cattle) to hit all time highs in 2009.”

SOYBEAN ACRES AHEAD OF CORN

The USDA Planting Intentions Report released in late March indicated more acres planted to soybeans than expected and slightly fewer acres planted to corn than anticipated. If these intention reports are correct, the situation points to U.S. corn production in 2008 being substantially less than projected for the 2008 marketing year. Soybean production would be on track to meet 2008 requirements, but it would leave the marketplace relatively tight for the 2008 marketing year.

“The implication for corn is that it seems destined for higher prices going into this summer, at least,” predicts Aideyan. “This is good news for cash crop producers as corn and soybeans will go higher, but bad news for livestock producers.”

“Given tight reserves, Farms.com Risk Management believes that in the spring of 2009 the competition for acres between soybeans and corn will be even more pronounced than this year,” Aideyan notes. He adds cautiously, “But don’t forget, the crops are not planted yet, and things could easily change.”

SEASONAL IOWA/MINNESOTA WEIGHED AVERAGED CASH HOG PRICES – 5 AND 10 YEARS

“For pork producers, it will continue to be important to manage input costs, including corn, meal, and any protein sources. The price risk management work you do during this period will determine your level of profitability in 2009.”

— Victor Aideyan, Farms.com Risk Management

WHAT THIS MEANS

For livestock producers, Farms.com Risk Management had already advised clients to have one to two years worth of corn hedged using cash bookings and bull call corn option spreads. In addition, crop producers had been advised to buy back any corn they had priced, using call options or preferably bull call spreads. The company advises its clients to maintain this position.

Farms.com Risk Management is an agriculture commodity marketing and price risk management service provider; helping clients across North America market commodities at the best possible prices. Risk Management works in the markets every day to ensure its clients get the best possible price for their commodities. While you are working the farm, Farms.com Risk Management is working the markets. For more information, visit www.riskmanagement.farms.com or call 877.438.5729.
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MONITORING SOWS BRED BY SEVEN DAYS
There is a reason to consider the use of proportions in more detail and in more applications.

By John Deen and Sukumarannair S. Anil

As we review various production indices, it has become evident that there are two main methods of summarizing such indices. The first is a classical method, of providing an average. The second is what we call a “proportion” or a “management by specification.” In the case of measuring the wean-to-service interval, PigCHAMP provides two alternatives. The first is the average and the second is the proportion of sows bred by seven days. Many producers analyze both, and recognize the utility of the latter, but there is a place to consider the use of proportions in more detail and in more applications.

LESS EMPHASIS ON AVERAGES
The use of proportions can be considered part of management by specifications. For management purposes, I believe we should stop monitoring averages and instead monitor specifications. The question at each stage of production, whether it is reproductive performance or transfer of pigs from farrowing room to nursery, is not a measure of the average performance but rather the proportion of pigs that meet the specifications for ease of production. In other words, what proportion of sows with poor performance is acceptable? Management by specifications, rather than averages, is driven by a number of factors:

• Distributions of performance are often not bell-shaped distributions. This is especially true for wean-to-service interval. Averages can be driven by a small population of sows that are at extreme distances from the mean. In the case of this variable, they always exist on one side of the main and therefore create what we call a skewed distribution.
• Measurement that focuses on good and bad sows also is relatively easy. Classification of sows may allow us to focus on the correct population. Not only is the proportion a useful number, but the classification of sows that exceed the specification can allow us to identify the correct animals to manage.
• It’s a good business practice. Production that is out of specification is simply a bad business practice. Such production has extraordinary costs that need to be identified in more detail. In the case of sows coming into estrus beyond seven days, there can be costs in management of the breeding space and extra costs of continued monitoring. There can also be a fatigue in that monitoring so that the likelihood of estrus detection goes down.

AN INDUSTRIAL MODEL
Most industrial monitoring systems focus on specifications. Performance is viewed in terms of value and out-of-specification product is viewed as being detrimental to the production flow and the time required for management of the sow. Quality manufacturing guidelines always focus on meeting specifications derived by the next stage of production.

Figure 1 shows the cumulative sum of weeks with the proportion of sows bred by seven days. This figure exemplifies a great deal of opportunity for improvement and also emphasizes that until this variable is under control, producers must make specific plans for its management.

Saying that, it should be emphasized that this is not a perfect variable. The main problem is actually in the denominator. In other words, which sows are included in this analysis? If a sow is culled because of a lack of estrus, it is not included in this analysis. Moreover, the pressures upon the burden may result in variation from week to week and season to season, and the decision to retain sows for breeding may also vary.

Nonetheless, consider this as an important management variable in improving the success and manageability of the sow herd. Through such management by specifications, producers will see real changes.

Editor’s Note: John Deen DVM PhD, is an Associate Professor at the University of Minnesota, and Sukumaran Anil DVM PhD, is a Research Associate at the University of Minnesota. To contact them, e-mail: deenx003@umn.edu or sukum001@umn.edu.
**WATCH WEANING-TO-ESTRUS INTERVALS**

Management is especially important during this critical time.

By W.L. Flowers

One of the greatest influences on weaning-to-estrus interval is the management of sows during lactation. During this time, the reproductive organs of sows have a chance to recover from their previous pregnancy. It is well established that levels of reproductive hormones in the brain that stimulate estrus and ovulation are very low immediately after farrowing.

Most research studies have shown that between 12 and 16 days are required for the levels of these hormones to be replenished. Lactation plays a critical role in this recovery process because the suckling action of the piglets serves to keep the sow’s brain in a state of quiescence, and the secretion of these hormones at very low levels. Once weaning occurs, the suckling-induced inhibition of these hormones is gone; if they have been replenished sufficiently, then estrus and ovulation should occur within four to eight days. If they haven’t, then the rebreeding interval will be extended or, perhaps, a post-weaning estrus may not occur at all.

**OPPORTUNITY FOR EVALUATION**

From a management perspective, weaning-to-estrus intervals present the first opportunity for producers to evaluate how well sows have recovered from their previous pregnancy. It also is a good opportunity to determine how well management during lactation has aided this process. The general assumption is that if sows return to estrus within eight days post weaning, then their recovery is complete. If the rebreeding interval is longer than this, then perhaps their recovery wasn’t quite finished when weaning occurred and their subsequent reproductive performance may be compromised.

A recent analysis of adjusted farrowing rates and number of pigs born alive based on a farm’s average weaning-to-estrus interval seems to support this assertion (Table 1). Farms with weaning-to-estrus intervals of less than eight days averaged between 10.9 and 11.0 pigs born alive. In contrast, farms with weaning-to-estrus intervals of eight days or more averaged about 0.5 pigs less per litter. The relationship between weaning-to-estrus intervals and farrowing rate was less clear. However, there was a general trend for farrowing rates to decrease as the weaning-to-estrus intervals increased.

**WORK ON PROBLEM-SOLVING**

If a herd has an extended rebreeding interval, then there are several areas associated with lactation management that should be examined. The most obvious is feed intake during lactation. It has been well documented that nutritional management during lactation has a significant impact on subsequent reproductive performance of sows. Lactation is a period in which the sow is under an enormous amount of metabolic stress. It has been estimated that about 75% of the nutrients that a sow consumes during peak lactation goes to support production of milk for her litter. Consequently, it is quite common and actually normal for sows to have to mobilize protein and fat to meet the metabolic demands of lactation. When this happens, the sow loses weight and body tissues. And if she loses too much body condition during lactation, her subsequent reproductive performance post-weaning can suffer. As a result, rebreeding intervals, subsequent farrowing rate and litter size can all be affected. Anything that can be done to increase feed intake during lactation should help improve weaning-to-estrus intervals.

Another area that can influence the weaning-to-estrus interval is lactation length. As mentioned earlier, the brain needs time to replenish reproductive hormones after farrowing. If sows are weaned before these levels are established, then suboptimal amounts are released. This creates a situation in which sows would probably show a delayed estrus and ovulate a lower-than-normal number of eggs. Recovery of the brain and replenishment of these hormones is also sensitive to the metabolic demands of lactation. Consequently, if excessive amounts of body tissue are lost during lactation, then recovery can take longer than the normal 12 to 16 days. Collectively, lactation lengths of less than 16 days often are not conducive for optimizing the subsequent reproductive performance of sows.

Finally, split or partial weaning strategies can contribute to problems with extended rebreeding intervals. It is important to remember that whenever pigs are removed, the suckling stimulation is reduced. If enough pigs are removed, there could be a high enough reduction in the suckling intensity that the suppression of the endocrine system caused by suckling is removed and the sow may begin normal reproductive activity. What happens in many situations with split weaning is that the largest pigs in the litter are weaned two to three days before the rest of the litter. If enough piglets are removed from the sow at this time, then from a physiological perspective, she thinks the entire litter has been weaned. If this occurred on day 16, then the reproductive consequences are similar to those that occur with early weaning.

**THE SOW’S PERSPECTIVE**

As we’ve pointed out, management is the key to maximizing wean-to-estrus intervals. Keeping the needs of the sow herd as a top priority will help you make the necessary changes to improve this important production parameter. ●

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**TABLE 1: Reproductive Performance on Farms Based on Weaning-to-Estrus Intervals in U.S. Herds**

<table>
<thead>
<tr>
<th>Weaning-to-Estrus Interval (days)</th>
<th>Farrowing Rate (%)</th>
<th>Number of Pigs Born Alive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5.9 (21 farms)</td>
<td>84.0 + 1.4</td>
<td>11.0 + 0.1</td>
</tr>
<tr>
<td>6.0 – 6.9 (40 farms)</td>
<td>83.9 + 1.0</td>
<td>10.9 + 0.1</td>
</tr>
<tr>
<td>7.0 – 7.9 (18 farms)</td>
<td>82.0 + 1.4</td>
<td>10.9 + 0.1</td>
</tr>
<tr>
<td>8.0 – 8.9 (13 farms)</td>
<td>80.8 + 1.5</td>
<td>10.4 + 0.2</td>
</tr>
<tr>
<td>9.0 – 9.9 (6 farms)</td>
<td>79.3 + 2.5</td>
<td>10.3 + 0.3</td>
</tr>
<tr>
<td>&gt;10.0 (8 farms)</td>
<td>74.7 + 4.1</td>
<td>10.4 + 0.3</td>
</tr>
</tbody>
</table>

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Editor’s Note: Dr. Flowers is a professor in the Animal Science Department at North Carolina State University with a 50% teaching and 50% research appointment in swine reproductive physiology. Dr. Flowers has published over 90 peer-reviewed journal articles and book chapters and more than 325 popular press / extension articles.
The rapid increase in the cost of energy for transportation and the growth of the biofuels industry has lead to tremendous change in the cost of ingredients for swine diets. It appears we are leaving a time of consistency and relative predictability in ingredient prices to an era of price volatility and the unknown. Planting acreage and yield have always impacted ingredient prices. Ten years ago, we wouldn't have dreamed that government energy policy and blending ratios for ethanol or adoption of biodiesel would be major players in our industry. With these changing ingredient economics, pork producers have made short term changes to their diets. Long term, these ingredient changes will have production systems reevaluating whether the drive towards maximum ADG will continue to be the most economical option.

The changes in corn and soybean meal price in the last year have been significant. Producers can not make enough changes to the diets or production system to overcome all these increases in ingredient prices; however, improvements in feed efficiency and diet alterations can allow a production system to limit the increase that would have occurred without productivity improvements or diet changes.

Although numerous options are available, here are four main areas where diet or management strategies can be used to lower the impact of the change in ingredient prices.

**USE OF ALTERNATIVE INGREDIENTS**

Of course, using alternative ingredients that are more economically priced than corn or soybean meal will lower diet cost. The challenge is to balance the lower cost with any other potential pitfalls that may come with the ingredients. In order to use any alternative ingredient, the nutrient composition must be understood and professional aid must be sought in diet formulation to minimize the negative effects and capture the potential value. For example, the use of dried distillers grains with solubles (DDGS) will lower diet cost in most situations; however, it also reduces carcass yield and increases the softness of the fat deposited on the carcass.

The economic impact of the change in carcass yield and fat firmness must be taken into account when determining the value of DDGS. A DDGS economic calculator is available at www.ksuswine.org to estimate the value of DDGS additions to corn-soybean meal diets for grow-finish pigs. Another excellent publication on DDGS by Dr. Hans Stein is available at www.distillersgrains.org/files/feedsource/swine_brochure.pdf.

Although DDGS is the most common alternative ingredient being used in corn-soybean meal based diets, other ingredients, such as bakery byproducts, canola meal, or alternative grains need to be evaluated for determining potential opportunities. With any of the byproducts, increased sampling and testing must occur to minimize variability in the ingredients delivered to minimize negative impacts that the variability will have on pig performance. Several good resources exist for determining quality standards and the value of byproduct options.

The increase in phosphorus price and availability of multiple sources of phytase have greatly increased the use of phytase in swine diets and decreased the cost for phosphorus additions. Differences between the phytase sources on the market must be understood to determine the optimal level of each source. Technology for the production of synthetic amino acids also continues to improve. Use of DDGS in the diet allows increased use of synthetic lysine. Recent additions of lower priced isoleucine and valine have further increased the potential for amino acids to be used to replace some of the high priced protein sources in nursery diets.

**FORMULATE WITH LOWER MARGINS OF SAFETY**

Most swine nutritionists formulate diet with a margin of safety to account for variability in nutrient levels and differences in requirements of individual pigs. We have long used relatively low margins for the more expensive nutrients, such as energy or amino acids.

Recent rises in the cost of phosphorus, vitamins and trace minerals have lead many nutritionists to reevaluate the inclusion rates for all of the nutrients in the diet. The lack of recent data on the vitamin and trace mineral requirements of modern genetics makes this a difficult process. We have little information to determine the vitamin and trace mineral requirements of healthy pigs, much less have an understanding of the impact that disease or other stressors may have on these requirements. Caution must be used

“Because energy costs have risen greatly, incremental changes in dietary energy have become more expensive. Thus, formulating to dietary energy levels that lower ADG will be more economical in many more situations in the future than in the past.” — Dr. Mike Tokach
to lower the margin of safety too greatly; however, it has become increasingly apparent that the three- to five-time margins that these nutrients are normally supplemented above NRC (1998) recommendations are becoming more difficult to justify.

**FORMULATE FOR LOWER ADG**
The mantra for most diet formulation strategies has been to formulate for maximum growth performance. In most areas of the United States, the greatest margin over feed has almost always coincided with diets that provided the greatest ADG. The reason for this is that diet cost was relatively low and most production systems are tight on space, such that any improvement in growth performance increased market weight and gross value enough to offset any small increase in diet cost. Changes in dietary energy or starter diet complexity have a greater impact on diet cost in the past leading to a reevaluation of this area. We believe that in many situations, we will lower ADG in the future to increase net margin.

Two examples that demonstrate this concept are lactose and energy (fat) use. We know that lowering the lactose level in diets for young pigs will reduce pig performance. In recent trials at K-State with 15 to 25-lb. pigs, removing the 10% dried whey from the diet lowered pig weight by 0.5 to 1 lb/pig. The savings achieved by lowering feed cost was greater than the value of weight that was lost by using the more simple diet without a lactose source.

Pigs with high muscle deposition potential typically respond to increased energy inclusion in the diet in a linear fashion under on-farm conditions. When this is the case, lowering the energy level of the diet will lower ADG and either increase the days to market or lower final market weight if they are housed in a fixed-time system. Because almost all production systems are fixed-time systems with inadequate space to achieve the desired final market weight for a good portion of the year, increasing energy intake has usually resulted in increased net margin. Because energy costs have risen greatly, incremental changes in dietary energy have become more expensive. Thus, formulating to dietary energy levels that lower ADG will be more economical in many more situations in the future than in the past.

**OTHER MANAGEMENT STRATEGIES**
Besides changes in diet formulation or ingredient selection, some management strategies can reduce the impact of the rise in ingredient cost. One of the most important of these is steady continued improvement in feed efficiency to lower the total quantity of feed required. All potential areas that impact feed efficiency need to be explored in this process with one of the most important being genetic selection. Great differences exist in the ability of different genetic lines to convert feed into gain. Genetic selection must include increased pressure on feed efficiency and ability to achieve high growth rate on lower energy diets.

The impact of weaning age on lifetime growth performance has been well documented with the results of this research having a profound impact on weaning age in the United States. The rapid rise in cost of ingredients used in nursery diets, such as dried whey, fish meal, and blood products further enhances the value of increased weaning age. Increases in weaning age reduce the amount of these expensive ingredients that must be used in the nursery diet.

For swine operations located close to manufacturers that have liquid byproducts that can be used in the swine diet, liquid feeding has become a more attractive prospect. Liquid feed has been used in other countries to maintain higher levels of growth performance when increased levels of byproduct ingredients were used in the diet. As our diets decrease in energy density, use of liquid feed needs to be further analyzed. Similarly, because of the impact on feed efficiency and ability to maintain feed flow ability when higher levels of byproducts are used, pelleted diets will be considered further by production systems that are not currently using pelleted diets.

Finally, factors that are known to impact feed efficiency and, thus, feed cost will be further emphasized, including feeder adjustment and particle size. Reducing particle size improves F/G by 1.2% for every 100 micron reduction in particle size. Another way to value particle size is that the ME of corn increases by approximately 25 to 30 kcal/lb (55 to 66 kcal/kg) for each 100 micron reduction.

**POTENTIAL CONSEQUENCE OF ADOPTING THESE STRATEGIES**
Although some of these strategies can be done without greatly impacting performance, most of them have the potential to lower ADG and increase the variability in gain. If we formulate diets to be lower in energy or lower in the margin of safety, we will be below the requirement in an increasing number of situations. Certainly, this increases the variability in growth performance within groups and among groups. Adopting strategies that are known to lower ADG (lower energy diets or simpler nursery diets) will increase facility space requirements in production systems.

Production systems will need to make choices on the direction they choose to take with this new challenge. At one end of the spectrum, some systems will choose to take a relatively simple approach and not use as many alternative ingredients or push the envelope as far on margins of safety on nutrients. These systems will accept a little higher feed cost for the improvement in consistency of performance and reduced need for vigilance over the diet formulation and ingredient procurement process. At the other end of the spectrum, some systems will explore every opportunity to change diets and ingredients frequently and employ increased nutrient analysis and nutritionist oversight to lower feed input cost as much as possible. These systems may accept higher variability in gain and have to be more flexible in their space use to account for these variations. —

Editor’s Note: The lead author of this paper is Dr. Tokach, professor of swine nutrition at Kansas State University. This article was first presented at the 2008 American Association of Swine Veterinarians’ Annual Meeting. For a copy of the full article with charts and references, go to: http://farms.com
**FEED MANAGEMENT IS KEY**
This system helps producers document and manage their biggest cost.

*By JoAnn Alumbaugh*

With rising input costs and narrower profit/loss margins, it’s more important than ever to monitor feed usage. There is a system designed to do just that. The PigCHAMP Care Feed Allocation System (FAS) automates the time-consuming, sometimes complicated task of feed ordering. This web-based system allows producers to have the right feed delivered at the right time in an easy, efficient and verified manner.

Through an automated feed ordering process featured online, users determine the quantity of feed required, complete the bin distribution form, and the system sends the order with the necessary information to the vendor. The FAS process also allows producers to add an element of traceability and verification that is unique to this system.

Data entry is completed online and can be done anywhere there is an Internet connection (including “smart phones” and mobile devices), which reduces the cost of labor and paperwork required to track feed budgets and orders. Multiple budgets can be placed in the program as well as diets. The program provides users with an adjusted feed management system and suggests ration adjustments based on current inventory. This reduces feed cost and provides the proper nutrition for the remaining animals.

**FASTER, MORE EFFICIENT ORDERING**
“Our feed ordering and budgeting process has vastly improved since we went to the PigCHAMP Care Feed Allocation System,” says Joel Schmidt with AMVC Nutritional Services in Audubon, Iowa. “The accuracy and the speed with which we can order from multiple feed mills with several different feed budgets can be managed more efficiently.”

John Malin and Molly Blanchfield are with the Feed Division of Farmers Cooperative Company (FC), of Farnhamville, Iowa. This is a large company: Nearly one-third of all livestock producers in Iowa live within 40 miles of a FC feed mill. Malin is Vice President of Feed Sales and has been in the feed business for 35 years, serving in either a sales or management position. Blanchfield has been with FC for five years, and has served as Customer Service Manager for the past year. During her 15 years in the feed business, she has spent time in purchasing, administration and customer service.

“Feed costs are the number one expense to a swine operation besides the pig itself, so if producers can reduce costs by working with us and using the [PigCHAMP Care Feed Allocation System], they can save a lot of money,” says Blanchfield.

“We became involved with Feed Allocation Systems because we wanted to improve relations with our customers and their customers,” says Malin. “It can be utilized for any type of system. It’s flexible enough for integrators or for individual producers.”

Malin says the onset of circovirus helped drive the cooperative’s involvement with the system: “We had customers on a seven-phase feeding program and when they were on phase five, they were selling pigs, because they did not adjust their feed budget for death loss due to circovirus. For example, if you have 20% death loss and you aren’t adjusting your feed, you end up feeding more expensive rations meant for younger pigs to older pigs. Blanchfield emphasizes the importance of reporting and recording death loss. For people who aren’t recording this kind of information, Malin feels they could easily save $1.50 per pig, which is a 10 to 1 return on investment.

**SECURE AND PASSWORD-PROTECTED**
Additional log-ons can be created if the customer so desires for any consultant, whether nutritional, operational or financial, points out Blanchfield. “It’s very easy to do this since it’s all web-based, but it is a secure, password-protected system.”

“Every record of what has transpired is permanent, which I think is really important if someone wants to analyze those records,” points out Malin. “Are employees ordering the right feed? There’s a record of it.”

The qualitative aspects of the system are as important as the quantitative benefits. The people who regularly order feed are happier: They’re able to do their job faster, more efficiently and more accurately. And they have insight to daily production that they didn’t have in the past, because now they can track the farm, groups of pigs, health status and flow. A number of reports are quickly and easily available to multiple users, which relieves office staff of the necessity to compile reports.

The PigCHAMP Care Feed Allocation System records the cost of inputs required in a hog production system. All orders can be tracked back to a group and vendor invoices can be reconciled. Actual prices can be reviewed in the system, creating the opportunity to search for low-cost solutions. The system is a valuable cost-saving tool for producers.

Editor’s Note: For more information on the PigCHAMP Care Feed Allocation System, go to: www.feedallocationsystem.com or http://www.pigchamp.com/fms.html, or call 866.774.4242.
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MANAGING RESPIRATORY DISEASE

Respiratory disease in grow-finish pigs is more challenging than ever, but good management strategies can minimize the effects.

By Paul Yeske

Respiratory disease in the finishing stage of production is a challenge for both producers and swine veterinarians, and the complexity of managing these diseases has increased due to interaction of the agents in this stage of production. Common agents include: Swine influenza (SIV), Porcine respiratory reproductive syndrome (PRRS), Porcine Circovirus type 2 (PCV2), mycoplasma, Actinobacillus suis, Actinobacillus pleuropneumonia, Pasteurella Multocida, and other bacterial agents. Viral agents seem to be the biggest problems to control.

There is debate over which agents require vaccination and when these vaccinations should be administered for optimal control. Environmental control and making sure there is minimal additional stress to pigs are other factors that contribute to the problem.

It is not specifically understood why these viral agents are more challenging than in the past but one of the biggest changes in U.S. production systems is the transition to multi-site production systems, and in some cases, multi-sourcing as well. This has resulted in more movement of pigs from different sources in a small geographical area.

DIAGNOSTICS

Identifying the pathogens at work in the herd or flow of pigs is the first step to control. Many tools are available to evaluate these herds and flows today. Obtain information on the source of pigs and the history of the originating farms. Work with your veterinarian to understand the clinical presentation to determine the best diagnostic plan.

Post mortems are still the best source of information from infected groups, or just prior to the time that breaks typically occur. Routine post mortems can be helpful in determining the cause of the problem. Have your veterinarian train your farm staff and field supervisors to perform post mortems on a timely basis and teach the proper method of collecting tissues so the material is not compromised. The use of digital cameras by farm workers and field supervisors can be beneficial in determining the cause and severity of problems in the herd or flow.

Serology can be used to determine the presence of an agent and the timing of infection. In addition, the use of temperature loggers is a good way to see what is happening in the barns.

Records can be helpful in determining the time of the problem such as the mortality by weeks on feed that can be generated by various programs. The data can be sorted many different ways to help better define the problem. For example the flows can be sorted to see if problems vary by flow or source of pigs. They can also break down the sites by geographic area as well as single stock versus double stock, nursery to finish versus wean to finish etc. These closeout records are the best tools to help define the cost of the problem.

At this time it feels like the viruses are winning. As an industry, we may be better off trying to eliminate or eradicate some agents so they don’t complicate the disease profile on farms.

— Dr. Paul Yeske
and potential losses. The backbone to an effective control program is to have a good diagnostics plan. Once the diagnostics are done, proper control procedures can be put in place.

**SPECIFIC AGENTS AND CONDITIONS**

SIV is certainly a major player among grow-finish respiratory diseases. Its ability to continually change through both genetic shift and drift has made this an even more complex agent to control. One of the biggest challenges has been shedding from sow herds and early signs of respiratory disease in the nursery or wean-to-finish production phases.

The best diagnostic for SIV is to identify pigs with a fever (>104 degrees) and take nasal swabs for culture. Vaccination at this time is the only intervention and many herds have gone to autogenous (farm-specific) products because of the changes in the virus versus the present vaccines available. Vaccination prefarrowing has been an effective means of controlling these problems once the right strains are in the vaccine. Area spread in pig-dense areas is an additional means of spread. Vaccination in the finishing phase has been a challenge due to the maternal antibody interference with the vaccine, and some pigs break with the disease before the group can be vaccinated. Currently, acute outbreaks in the finishing phase are treated with aspirin to control fever and keep the pigs eating so fewer gastric ulcers develop from loss of intake. Antibiotics are used following the aspirin in the water to avoid secondary bacterial infections. The common choice is tetracycline but treatment depends on the pathogen profile and experience in the herd or system.

PCV2 has added a level of complexity to this problem. PCV2 vaccination has become more widely available and has proven to be very effective in improving mortality and growth and performance. Many trials are still in process, however, to evaluate the proper timing of vaccinations and dosage levels. The answers may not be the same for every herd and researchers will need to evaluate the effect of having sow herds vaccinated and replacement gilts entering the herd that have been vaccinated at a young age.

PRRS is still a problem in grow-finish pigs, partly due to the number of different strains circulating in the swine population. Generating negative pigs from the sow farm is the best control. One of the challenges is when negative pigs flow into areas with infected herds and there is aerosol cross contamination. Vaccination can be done with current modified live virus (MLV) vaccines with pigs being vaccinated at the time they enter the site. One of the best control measures is to make sure you practice good biosecurity: Changing coveralls and boots before going into finishing sites (Danish entry system) has been an effective control as well as isolating incoming products.

Mycoplasma continues to be a challenge, and we wonder if new and different strains are making this a bigger problem. Due to the difficulty of growing mycoplasma cultures, it is hard to know if this is true or not.

The industry needs new tools to help answer these questions. Vaccination has moved to the farrowing phase, with most pigs being vaccinated at processing and weaning. In herds that continue to have problems even with good vaccination programs, the use of pulse dosing of antibiotics has been helpful to get the desired control. Herds and production flows are using eradication projects to eliminate mycoplasma (or at least the clinical effects of mycoplasma) so they will have a negative downstream flow.

**Actinobacillus suis** is a more recent concern in the grow-finish phase. It can be quite severe, with sudden deaths occurring throughout finishing but primarily in the early finishing phase. Presently, there are no commercial vaccines, but the autogenous products seem to be helpful in controlling this disease. Medication is also helpful for *A. suis*.

**Actinobacillus pleuropneumonia** is less of a concern than it once was, since most herds have depopulated and eliminated the disease. New strains are being identified and some are less pathogenic than type 1 and 5. There is a new serologic test that can test for all strains (Idexx APP APXIV test) and several new antibiotics that are helpful in treating APP but they can be expensive.

**MORE TO LEARN**

At this time it feels like the viruses are winning. There is still much to be learned about the various interactions of pathogens. As an industry, we may be better off trying to eliminate or eradicate some agents so they don’t complicate the disease profile on farms.

Pig flow may be one of the most important ways to manage these problems. If there are problem herds in commingled flows they will need to be flowed with other like herds or separately. Having a monitoring system to identify problem herds quickly is especially important in these commingled flows.

Environmental control is also critical to avoid stress that can set up and make these conditions worse. The new controllers available in many buildings today can do very sophisticated things but unless they’re used properly, they can result in additional problems with the pig’s environment. Evaluate the system to make sure it is setup and functioning properly. Many farms and systems are using “standard operating procedure” to make sure the barn temperature is set properly.

Using good diagnostics and defining the problem will help us to break down and solve these complex problems. Every herd and flow will have to find its own solution to challenges because there isn’t just one solution. Veterinarians and producers will have to remain creative so they can continue to adapt to changes in disease presentation.

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**Editor’s Note:** Dr. Paul Yeske is a veterinarian with the Swine Vet Center in St. Peter, Minnesota. The full text of this paper was presented at the 2008 American Association of Swine Veterinarians meeting, and can be viewed in its entirety, including sources, at http://farms.com
VARIATION IN SOW FARM OUTPUT

Both underproduction and overproduction create undue costs in an operation.

By John Deen and Sukumarannair S. Anil

One of the major determinants of the value of sow farm output is the level of production and the variation of that production. Underproduction results in downstream underutilization of growing pig capacity. It also results in more mixing of pigs as other sources of pigs are often used to fill in the gap created by a low-producing sow herd. Not only is there an on-farm component of underproduction, but there is also seasonal underproduction that results in higher prices available during the times when most sow farms underperform.

Conversely, overproduction has its own costs. The first one is that it is often closely related to underproduction where an accumulation of open sows has occurred, and this accumulation suddenly becomes productive. Think of seasonal infertility as not only a problem of underproduction, but there is also a concomitant overproduction that occurs afterwards. While there is obviously a direct effect upon the number of pigs produced during overproduction is compromised. In many farms we see a reduction of weaning age of at least two days when overproduction occurs. This reduction is quite understandable as the farrowing room manager is trying to fit too many sows through his or her facilities.

EXPLANATION OF THE MODEL

An analytic model on variation in sow farm output was made to monitor the weekly number of pigs born alive. We made the unit a week as it creates a visible and discrete unit, and there is little transport of pigs during the weekend. However, we have found problems when we define sow farm output by the number of pigs weaned. The number of pigs weaned can be manipulated by changing the weaning age, and this manipulation of the weaning age usually reduces the amount of variation in output. However, this manipulation is actually one of the costs of variation. Therefore, instead of weaned pig output, we monitor the number of pigs born alive in a week. This has a low likelihood of manipulation and allows us to avoid the noise of the manipulation of weaning age.

Figure 1 is an example of the variation in production across 10 identical sow herds that have an average production of over 1,100 pigs per week. However, the range of output is very wide. Much of this variation is due to seasonal infertility and subsequent overproduction, but there are also other causes such as disease outbreaks and breakdowns in production methods (there still is a Christmas infertility syndrome).

MANAGEMENT A THREE-STEP PROCESS

To manage this variation I believe there is a three-step process. The first is to put a price on the relative value of pigs if they are underproduced or overproduced. For underproduction, this entails a recognition that money is left on the table and that poor practices of disease containment can occur. Though it is subjective, the relative value of pigs based on level of production needs to be described throughout the whole production system.

DISCUSS METHODS OF CONTROL

The second step is to discuss methods of control of these variables. Plan on seasonal infertility and subsequent improvements in fertility. Extraordinary resources can be put into play during the summer months to improve reproductive performance. Feed quality, labor quality and cooling methods must be emphasized.

ANALYZE ROBUSTNESS

The third step is to start analyzing the robustness of sows under different insults. We can blame environmental insults and disease for much of the problem, but there are real differences among genotypes in their ability to handle such insults. Selection for maximum performance may, in fact, reduce the ability to respond to adverse conditions.

I often compare a sow unit to a feed mill. Both are expected to provide a high quality product on a consistent basis. Overproduction should not be rewarded, but underproduction should not be tolerated. Empty feed crops are of course intolerable, but empty barns may create similar economic problems.

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When battling respiratory challenges, it's easy to think of sows and piglets as liabilities. But a sow herd is actually an asset—and keeping it healthy can help you maximize profits.

Unfortunately, when producers wait until performance losses occur to respond to respiratory disease, assets can become true liabilities: deads, culls and lightweight pigs that drag down profits. By controlling respiratory disease, Pulmotil can help you avoid this costly problem. For a decade, it's been proven effective in nursery pigs. And today, more operations are discovering the additional value of respiratory disease control with Pulmotil in their sows. For example, recent studies of clinically healthy pigs show those from Pulmotil-fed sows have 3 times fewer pneumonia lesions than pigs from control sows.3

You're already investing in your sow herd. When you invest in Pulmotil to control respiratory disease, you can expect an even better return.

Protect your investment. Increase assets. Limit liabilities.


Organisms sensitive to Pulmotil
- Actinobacillus pleuropneumoniae**
- Pasteurella multocida**
- Mycoplasma hyopneumoniae†1
- Haemophilus parasuis†2

Organisms not sensitive to Pulmotil
- Salmonella choleraesuis†
- Streptococcus suis†2

* Associated with APP and PM  
** Activity against these organisms has been demonstrated clinically.  
† The clinical significance of these in vitro data has not been demonstrated.  
‡ Strain type not determined.

The label contains complete use information including cautions and warnings. Always read, understand and follow the label and use directions.

As a result of respiratory disease control, Pulmotil-treated pigs are able to perform to their full genetic potential, thus gaining weight and utilizing feed as any normal, healthy animal would. By controlling respiratory disease, Pulmotil can help you avoid this costly problem. For a decade, it's been proven effective in nursery pigs. And today, more operations are discovering the additional value of respiratory disease control with Pulmotil in their sows. For example, recent studies of clinically healthy pigs show those from Pulmotil-fed sows have 3 times fewer pneumonia lesions than pigs from control sows.3

You’re already investing in your sow herd. When you invest in Pulmotil to control respiratory disease, you can expect an even better return.

As a result of respiratory disease control, feeding Pulmotil to lactating sows resulted in 20% more pounds moved out of the nursery, compared to pigs from control sows.2 P<.05
NEW HANDLING STRATEGIES
Minimizing injury and death during transportation and at the packing plant is more important than ever.

By Nick Berry

Improved understanding of the major management factors impacting finisher pig behavioral and physiological responses during handling and transportation has recently emerged as an area of concern in the swine industry. Understanding key factors influencing losses during this timeframe will enable targeted interventions to improve both welfare and profitability.

Traditional handling and loading systems have been either poorly planned or not planned in the design and construction of finishing facilities. Therefore, during handling and marketing opportunities the industry is forced to rely heavily on negative motivators or repulsive forces to move animals. Movement is stressful for any size or type of pig, and even under the best conditions can cause significant changes in the pigs’ physiology and behavior. Consequently, this can negatively impact pig performance and meat quality.

Last fall, Premium Standard Farms in Princeton, Mo., and Iowa State University, Ames, Iowa, completed a collaborative effort geared toward evaluating the impact of loading system design on the ease of loading pigs at the time of marketing.

To minimize loading and transportation stress, Alberta Agriculture and Food livestock welfare specialist Jeff Hill, teamed up with Quality Mechanical to develop a new and improved handling system. The goal was to develop a loading chute design to efficiently move each individual pig in a humane manner, while considering the needs of the caretakers working in the system.

Planning the Project
To tackle the project, Iowa State University animal scientist Anna Johnson and graduate student Nick Berry teamed up to evaluate the usefulness of the new loading system. Johnson points out, “The U.S. swine industry is proactively addressing the complex phenomenon of the non-ambulatory and dead-on-arrival market weight pig. By dissecting the handling and transportation process, research has shown that loading and unloading the pig seems to be the most physiologically stressful part of the process. Therefore, by working on an innovative chute design we hope to reduce some of the identified stressors imposed on the individual animal.”

Innovative Design
The new chute design starts with a portable steel frame and an aluminum chute body, which provides a solid and stable loading platform. The entire unit is 30 feet long, including a pivoting level dock to provide the pig entry and exit from the unit. To aid loading crews in positioning the chute,

“By dissecting the handling and transportation process, research has shown that loading and unloading the pig seems to be the most physiologically stressful part of the [production] process.” — Dr. Anna Johnson
Setting Higher Standards in Pork Production

Benchmark

engineers included an extending system to allow for proper positioning to both the barn and trailer. An electric jack screw-system was also incorporated to mechanically raise and lower the chute into proper position.

Another added feature developed by engineers is a unique dock-bumper system. This design incorporates a cover material that has capabilities of expanding up to 500% to create a bubble effect: It traps any air exhausted from the foam cushions as the back of the chute is compressed against the finisher doorway. This inclusion eliminates air and light gaps between the barn and chute that may disrupt pig movement.

The 26-foot, angled section of the chute provides a 6-degree loading angle to the bottom deck and a 17-degree angle to the top deck. The angled section of the chute’s alley uses an inverted stair-step design, with treads spaced 6.75 inches apart and a 2-inch total step height. The inverted stair step has an anti-slip tread edge. The front of the stair tread is angled slightly to allow for natural movement, and encourages pigs to move forward for easier loading onto the truck.

The inside of the chute was carefully designed to mimic the feel of the home pen environment of the pig. The floor surface is coated with Vanberg coating epoxy, with 50% G-diamond grit. The coating replicates concrete coloring and texture, and greatly improves the pigs’ footing. The wall coloring also mimics that of concrete and, in combination with industrial rope lighting, prevents shadowing and bright spots. Together, the two features provide a soft, continuous light source throughout the animal movement area.

COMPREHENSIVE RESEARCH

To measure the loading system’s effectiveness, Johnson and Berry conducted a research study that included comparative analysis of more than 600 loads of hogs. Together, the two researchers evaluated several parameters to evaluate handling intensity, as well as losses incurred during transportation and at the packing plant. The comparison of the new loading system and the traditional system was made on the first pigs marketed from a finishing facility (first pull pigs) and last pigs marketed from a finishing facility (closeout pull pigs). Results indicate that pigs loaded on the new loading system during the first pull of marketing have fewer total deads and total losses (includes stressed and injured pigs). Additionally, pigs loaded on the new loading system experience fewer prods, slips, falls, vocalizations and pile ups regardless of pull at marketing.

Consistent with the researchers’ goal of improving the loading process, this investigation provides data to support possible changes in facility design that may ultimately lead to the improvement of performance at marketing. However, improving well-being at any stage of the marketing process is certainly advantageous to reducing the losses experienced during transportation and at the packing plant.

“With the volatility in today’s marketplace, the innovation of new management tools is certainly welcomed with open arms,” says new Cargill Animal Nutrition employee Nick Berry. He feels that several components of the recently researched loading system could add value for hog producers.

“As an industry we need to be proactive in taking a ‘whole systems’ approach to solving problems, which may include components of facility design and management,” concludes Berry.

Editor’s Note: Nick Berry, PhD, currently works with the Pork Enterprise Group for Cargill Animal Nutrition. A recent graduate of Iowa State University, he now resides in Coralville, Iowa.
PRINCIPLES OF QUALITY MANAGEMENT

Optimization through quality management provides producers with the framework to reach new levels of profitability.

By Stephanie Rutten-Ramos

As margins continue to squeeze pork producers, optimization holds the key to improving profitability. Optimization is the condition where the system is operated at its best. In many ways, the phase-segregated nature of swine production is designed for suboptimization, the opposite of optimization. We’ve established local targets and local rewards that pit one phase against another. For example, a sow unit might be recognized for the number of pigs it produces—but not the quality of those pigs. And many of the substandard pigs received at the nursery will be unable to meet the criteria required for them to move on to the finishing phase. As a result, the highly productive sow unit will cause the nursery to operate with higher mortality and poorer feed conversion.

Likewise, the nursery manager who is incentivized to keep mortality low is prone to carry “free pigs”—the weaned pigs accepted from but not credited to the sow unit on account of quality—and/or pass substandard pigs along to the finisher. Both come at an expense to the system. So, although the individual phases find ways to improve their local performance, they do so at the expense of the system as a whole. And as a result, they create a state of suboptimization.

FRAMEWORK FOR IMPROVEMENT

While there are no exact recipes on how to optimize, other industries have achieved success through quality management. Quality management offers a framework for improvement through the reduction of waste and development of organizational characteristics designed to eliminate internally competing interests.

There are eight Principles of Quality Management as identified by ISO 9000:2000. Following is a short description of each.

1. Customer focus: Attention to the needs of customers both internally (i.e., nurseries and finishers) and externally (i.e., packer) eliminates waste in a production system.
2. Leadership: From the perspective of production systems, management is responsible for day-to-day decisions and implementing programs and procedures, but leadership instigates change. And the success of the production system to incorporate lasting change is a function of its culture.
3. Involvement of people: For a long-lasting change to occur, it needs to be incorporated into the organization’s culture (its stated and unstated values). To develop a culture of pride in work and workplace, for example, leadership would initiate programs for site and facility maintenance and upkeep. Likewise, for a production system to successfully optimize, leadership must create a culture of optimization.
4. Process approach: The segregated nature of our industry pits one phase against another. That is, what is good for the sow unit is not necessarily in the best interest of the nursery and/or the finisher. However, a process approach considers the best interests of the entire system.
5. System approach to management: System optimization holds tremendous potential for improving profitability. However, efforts to optimize will prove futile over the long run if an organization is unwilling or unable to implement lasting change. By assuming a system approach to management, an organization is better situated to recognize root causes of problems and the effects of local interventions on the outcome of other areas, i.e., weaning age. As well, organizations with a system perspective are able to avoid assignment of blame to individuals with little or no ability to control the surrounding circumstances. While we are accustomed to thinking that performance is “all about the people,” the principles of quality management suggest that performance can and should be designed into the system.
6. Continuous improvement: Organizations and farms need to pursue improvements in order to attain and maintain their competitive advantages. Continuous improvement may be pursued through any number of routes, ranging from the use of a suggestion box, to the use of consultants, to the use of highly structured programs such as Six Sigma.
7. Factual approach to decision making: All processes have inherent variation. No doubt, the biological nature of the pig contributes to variation as well. However, with all that variation, it becomes challenging to determine when real changes occur. Variation is classified according to its cause. The use of data allows producers to identify real changes, including potential causes and effects. Further, by understanding the types of variation within production, a system can set realistic expectations for performance.
8. Mutually beneficial supplier relationships: Pork production is characterized by both internal suppliers (i.e., sow farms and nurseries) and external suppliers (i.e., feed manufacturer). Anyone who has worked in a pig barn understands the importance of quality inputs. After all, it’s nearly impossible to restore quality once it has been lost. So, although the principles of quality management do not offer a direct explanation of how to achieve optimization, it is reasonable to conclude that sustained optimization would be elusive in their absence.

Editor’s Note: Stephanie Rutten-Ramos, DVM recently finished her PhD at the University of Minnesota and is now an independent consultant. To contact her, e-mail: rutt0011@umn.edu
**PROFITABILITY BEGINS WITH PEOPLE**

Overcoming challenges with retention starts with a good plan.

*By Erika Brandt*

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Professors, authors, consultants and astute professionals lecture that the success of a business is dependent upon the people who work there - a simple and believable statement. However, achieving this success is easier said than done.

A key contributor to success is beginning with a process to bring in a new employee and make him or her feel like a part of the organization, or an “on-boarding” plan. New employees’ early experiences will significantly impact their success in their new role and drive engagement, productivity and retention. On-boarding is not only for big businesses – every organization that employs people should develop an on-boarding plan for each new employee or for current employees that may be switching roles.

“Finding the right people often proves difficult, but keeping good employees is often even more of a challenge,” says Eric Spell, President of AgCareers.com. “Retaining employees can be attributed to a number of factors, like employee engagement, satisfaction and accountability, but retention truly starts with an effective on-boarding plan.”

An effective plan goes beyond just setting goals and covering policies – a great plan starts during recruitment and follows the employee through the first year.

**DURING RECRUITMENT**

Sell the positive qualities of your company to the candidate. While this may seem basic, remember the interviewing process is a two-way street. Let the candidate know what makes your organization an exciting place to work. Explain the talent level, management style and culture of co-workers. Be sure the candidate knows the roles and responsibilities he or she will take on if hired. Finally, share the career and financial opportunities that can be attained.

In addition, involve influencers in the recruitment process, like the spouse and other family members. If the offer requires the candidate to relocate, involving outside influencers from the beginning and making them feel a part of the process will help, both short-term and long-term.

**AFTER THE OFFER**

Keep an open line of communication with the candidate, even though there might be a significant time lapse between acceptance of the offer and when the candidate actually starts. Contact the candidate regularly during this time. Before the candidate starts, be sure he/she knows where to go on the first day, what to bring and special policies to adhere to. Provide the new employee with an agenda for the first week.

If possible, limit the necessary paperwork and administrative tasks to the first day. Then, assign and discuss a project/task for the new hire to complete within the first week or two that will give the person an immediate sense of accomplishment and contribution to the organization.

“Most companies spend the first few days with a new employee reviewing company presentations, filling out paperwork, and providing reading material to review,” notes Spell. “Organizations should focus on getting new employees involved with what their job responsibilities are going to be on a routine basis. Ask new employees for input and feedback and, where possible, implement their suggestions. What better way to make them feel like they are making a difference from the start?”

Set specific objectives for the candidate to meet, and consider short-term and long-term goals. Remember, “engagement” typically drops off after six months, so as an employer, set some goals that can be monitored and measured through that period.

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**FACTORS CONTRIBUTING TO ON-BOARDING SUCCESS**

The new employee...

- Knows how their role fits into the organization and drives results
- Learns the vision and strategy of the company
- Understands responsibilities and performance expectations
- Meets other new employees
- Has immediate responsibility and work
- Is provided the tools to do the job

*Source: 2003 Recruiting Roundtable study*

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After the first week and then bi-monthly after that for the first year, ask for feedback from the new employee on the organization’s on-boarding process. Don’t be afraid to make changes based on those recommendations.

While there are other important factors, the key components will help you begin to develop effective on-boarding plans for your farm or organization that will drive engagement, productivity, retention and profitability.

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*Editor’s Note: Erika Brandt is the Marketing and Communications Manager for AgCareers.com, the leading online job board and human resource service provider for agriculture, food, natural resource, and biotechnology. For more information visit www.agcareers.com or email: agcareers@agcareers.com.*
for most producers, energy is the single most critical nutrient because it is the most expensive to provide in the diet. All other nutrients, including protein, are now less expensive and can always be included in amounts that meet or exceed the pig's requirement for optimum growth.

**Evaluate the use of antimicrobials, enzymes, acidifiers and other non-nutritive additives:** Feed grade antimicrobials have been used for many years in numerous production systems to improve growth and efficiency in nursery and grow-finish hogs. Always follow the label requirements and monitor withdrawals closely. Certain enzymes, when added to the ration, may enhance efficiency. Acid blends and feed medications fall in this category as well. These opportunities should be evaluated for value in each operation. Understand the biological activity to best match the enzyme to your production system and watch for consistency and nutritive value issues with any enzyme or additive. Consider that these compounds may produce the largest return on your feed dollars invested if they produce even a small improvement in growth and/or efficiency in your rations. Now is the time to use all reasonably priced products that have a proven positive effect on feed efficiency.

**Explore possible alternative sources of fat:** The advantages to added fat in the diet are well established. However, there may be lower-cost alternatives with similar performance or functional values. Examples include choice white grease, tallow, poultry fat, vegetable oils, restaurant grease, etc. Diets based on metabolizable energy added fat may be more expensive than those featuring lower fat inclusion levels or alternatives to typical fat sources.

**Ensure correct evaluation of ingredients:** Assays of ingredients should be done routinely for nutrient levels and digestibility values so that diet formulation is accurate. In addition, purchasing some ingredients from a single source can help ensure consistency, and routine evaluation will help provide more uniform diets for efficient production. Standard operating procedures for product handling will result in a more consistent feed product. Check with your local swine Extension educator for a list of laboratories capable of performing feed analyses.

**FEED PROCESSING AND MANUFACTURING**

**Decrease feed particle size:** For every 100 micron change in particle size, feed efficiency is impacted by 1.2%. Decreasing particle size from 750 microns to 600 microns will result in substantial savings per pig. In most cases, this particle size is not fine enough to worry about ulcer problems, but feed dust will be increased.

**Improve pellet quality:** Fines cause feed wastage but feed utilization and efficiency can be improved by implementing a quality pelleting process that ensures less than 20% fines at the feeder. Research at Kansas State University (KSU) shows that pelleted diets result in more highly available nutrients, less dust, less feed wastage, better feed conversion and lower incidence of ulcer problems. Always check the cost of pelleting against expected efficiency gains to determine if pelleting is economically beneficial.

**Maintain equipment for optimal efficiency:** Rotate or replace hammers in the hammer mill to ensure consistent particle size. Also, make sure rolls on the roller mill are properly maintained for the desired particle size. Make sure that mixing equipment is maintained so that distribution of nutrients is ensured throughout the entire volume of feed. Also, calibrate and maintain the scales for weighing pigs and feed at least twice per year.

**Consider use of wet-dry feeders:** Wet-dry feeders may reduce feed wastage and dust because pigs can wet the feed to the consistency they desire. Palatability also is improved over dry diets, thereby increasing consumption and performance in some cases.

**Repair or replace broken feeders:** Broken or damaged feeders can result in excess cost due to feed wastage or inadequate feed provisions for the pigs, resulting in poor performance. Consider replacing older or inefficient feeders with well designed, efficient feeders that minimize feed wastage and promote maximum performance.

**Adjust feeders to reduce waste:** Adjusting feeders to reduce feed wastage should be a routine practice. Minor adjustments of feed bins and transport systems can also result in big savings. KSU recommends the following steps for proper feeder adjustment:

- Close feeder completely after cleaning before putting any feed in the feeder.
- Open feeder just enough to start small feed flow.
- Shake feeder to increase amount of pellets or meal in pan (to cover 1/3 of pan).
- Clean corners daily instead of increasing feeder adjustment to increase feed flow.
- Prevent moisture damage and spoilage in feed systems and storage.
- Eliminate all rodents, birds and other pests.

Editor's Note: Dr. Meisinger is Executive Director of the U.S. Pork Center of Excellence. The entire list of tips, which provide suggestions for additional savings and efficiencies can be seen on the Pork Information Gateway by clicking the hot button on the home page at www.porkgateway.org and additional information can be found at www.farms.com. Also, all the references for more information showing extension publications, fact sheets, and brochures are linked on the site as well.
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**collaborate > create > succeed**

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It’s easy to look at a barn full of pigs and handle them all the same. And, while pigs are viewed as individuals when born and when marketed, consider how many never reach their target because they aren’t addressed as individuals in the grow-finish phase. To us, Individual Pig Care means ensuring every pig has the proper feed, water, environment and health interventions to be free of pain, disease, discomfort and injury. This requires keen observation skills, knowing what to look for and how to best intervene. It means caretakers follow best animal husbandry practices, use preventative measures first that fits what the pig needs, recognize early signs of disease or discomfort and react swiftly with the proper intervention. The positive, measurable impact of Individual Pig Care can be seen in everything we do, from pig performance and labor retention to industry sustainability and the public perception of pork. So talk with your veterinarian or Pfizer Animal Health representative about establishing individual pig care protocols for your own operation. It’s the right thing to do—for your pigs and your profits.