ECONOMIC COST OF MAJOR HEALTH CHALLENGES IN LARGE US SWINE PRODUCTION SYSTEMS—PART 2
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Finishing herd
In the finishing herd, swine influenza, Mycoplasma hyopneumoniae, and PRRSV were the top three. Swine influenza was cited as a health challenge in the finisher for 18 of 19 companies surveyed with an average rank of 3.1. Swine influenza in combination with PCV2 was cited as a health challenge for 3 herds with an average rank of 3.3. PRRSV was ranked as a health challenge for 16 of the 19 companies with an average rank of 3.1. PRRS in combination with Mycoplasma hyopneumoniae was ranked as a health challenge for 11 companies with an average rank of 4.0. PRRS in combination with PCV2 was ranked for 5 companies with an average rank of 2.4.

While a relatively infrequent health challenge in the finisher at the time the survey was conducted, when PRRSV in combination with PCV2 was cited as a problem, productivity losses were ranked greater, on average, than for any other health challenge in finishing.

Ileitis was ranked as a health challenge for 14 of the 19 companies surveyed with an average rank of 4.9. Ileitis in combination with Salmonella was ranked by a single company with an average rank of 3.0. PMWS was ranked by 10 companies with an average rank of 4.0.

Figure 3: Rank of health challenges in the finishing herd
The yield of this process is approximately 86 percent glycerol, 10 percent water, and 3 to 7 percent salt. The gross energy value ranges for fats are reacted with alcohols (usually methanol) in the presence of a catalyst (sodium or potassium hydroxide) and converted to ethyl esters and glycerin. The yield of this process is approximately 86 percent biodiesel, 9 percent glycerin, and 4 percent alcohol.

The co-product glycerin can be used in the manufacturing of soaps and other products. However, it also has potential value for the use in swine diets. Crude glycerol from biodiesel production contains approximately 85 percent glycerol, 10 percent water, and 3 to 7 percent salt. The gross energy value ranges from 3600 to 3750 depending on its purity (pure glycerol contains 4305 kcal/kg gross energy).

Studies in finisher pigs have shown that glycerol is highly palatable and improved feed intake was observed with 10% supplemental glycerol without effects on daily gain (Kijora, 1996; Kijora et al., 1995, 1997; Mouro et al., 1994). Kuhn (1996) reported that 10 percent technical rapeseed glycerol could be fed to finishing pigs without affecting growth performance. However, an increased proportion of saturated fatty acids in the body fat was observed in pigs fed glycerol. Most recently, Lammers and coworkers (2007) reported results from a study published at the Midwest American Society of Animal Science meetings. They studied the digestible energy value of crude glycerol in weanling pigs and finishing pigs. Crude glycerol was added to the diets such that glycerol concentrations were 0, 5, 10, and 20 percent. The apparent digestible energy value (DE) of crude glycerol was 3386 kcal/kg for nursery pigs and 3772 kcal/kg for finishing pigs. They reported that these values were not different from the GE of the crude glycerol examined (3625 kcal/kg for the product they used), which indicated that glycerol is highly digestible. They further reported that the metabolizable energy (ME) content of glycerol
in nursery pigs, but not finishing pigs, depended on the level of glycerol that was fed. As glycerol level in the nursery diet increased, ME content of the glycerol decreased, indicating increased loss of energy (in this case from glycerol) in urine with increasing dietary glycerol. The authors concluded that the ME value for crude glycerol when included at 0 to 10 percent was 3463 kcal/kg for nursery pigs and 3081 kcal/kg in finishing pigs when included up to 20 percent.

**Dried Distillers Grains with Solubles (DDGS)**

A summary of research with DDGS in swine was recently published by Dr. Hans Stein in Volume 30, No. 1 of Swine News. Since then, several other studies were reported at the Midwest American Society of Animal Science meetings, recently held in Des Moines, IA. One of these studies (Feoli et al., 2007) evaluated the DE content of DDGS obtained from either corn or sorghum. Diets consisted of a reference diet containing 97.5 percent corn with added vitamins, minerals, and amino acids. The test diets contained either one of two sources of corn-based DDGS or one of two sources of sorghum-based DDGS and replaced 50 percent of the corn in the reference diet. The measured DE content of corn-based DDGS were 3,628 and 2,940 kcal/kg for the two different sources and 3,205 and 2,918 kcal/kg for the two different sources of sorghum-based DDGS. The authors concluded that both substrates used in the ethanol production process and the plant from which the DDGS was derived greatly affect the digestible energy content of DDGS.

In a subsequent study (Feoli et al., 2007), these researchers used the DDGS from corn with high and low DE (as obtained in the previous study) and the DDGS from sorghum with the highest DE in a growth performance study. They used 11 pigs per pen and 4 pens per dietary treatment. The three sources of DDGS were included at 40 percent in a corn-soybean meal based diet and the impact on pig performance was evaluated compared to a control without DDGS. Their research showed decreased average daily gain in pigs fed the DDGS-based diets compared to the control. In addition, pigs fed the corn-based DDGS with high DE content had reduced daily gain and feed intake, but better feed efficiency compared to the other two treatments. Dressing percentage was lower for all pigs fed DDGS.

Researchers from Kansas State University (Linneen et al., 2007) evaluated the effects of DDGS inclusion in three separate experiments. In the first experiment, 1,050 pigs (24 to 26 pigs per pen; 7 pens per treatment) were fed diets with either 0 or 15 percent DDGS to which 0, 3, or 6 percent fat was added (6 diets total). Addition of DDGS to the diet did not affect pig performance. However, addition of fat improved average daily gain, and gain to feed ration, regardless whether DDGS was included in the diet. In experiment 2, 1,038 pigs (25 to 28 pigs per pen; 10 pens per treatment) were fed diets with 0, 10, 20, or 30 percent DDGS. Diets containing more than 10 percent DDGS appeared to have lower daily gain and feed intake, but there were no differences in gain to feed ration. In exp. 3, 1,112 pigs (25 to 28 pigs per pen; 9 pens per treatment) were fed diets containing 0, 5, 10, 15, and 20 percent DDGS. Pigs fed diets without DDGS had greater daily gain compared to those fed 20 percent DDGS. Feed intake tended to be decreased with increasing levels of DDGS. The authors concluded that 15 percent DDGS from that particular source could be added to diets without affecting growth rate.

Research from JBS United, Inc. (Gaines et al., 2007) aimed to determine the effects of DDGS inclusion with or without enzyme addition. Pigs (880 total; 12 pens per treatment) were fed a diet with either 0 or 30 percent DDGS or a diet with 30 percent DDGS with a supplemental cellulose enzyme. No differences were observed for daily gain or feed intake. However, gain per unit of feed was lower for pigs fed 30 percent DDGS, regardless of enzyme supplementation. Carcass yield, loin depth, and carcass percent lean were lower for pigs fed DDGS, irrespective of enzyme supplementation. The authors concluded that when feeding high levels of DDGS, a reduction in carcass yield and lean should be considered in the economic evaluation.

In a second study from JBS United, Inc. (Spencer et al., 2007), two experiments were conducted to evaluate DDGS supplementation (DDGS contained 10.2 percent fat, 25.4 percent CP, and 0.86 percent lysine) to nursery pigs. In experiment 1, 1,500 pigs (20 to 27 pigs per pen; 15 pens per treatment) were assigned to 4 treatments as follows: 1) control with 0 percent DDGS; 2) 7.5 percent DDGS in the phase 1 diet and 15 percent throughout the remainder of the 6-week nursery period; 3) 15 percent DDGS starting in phase 2 diets; and 4) 15 percent starting in phase 3 diets. The feeding program consisted of 4 dietary phases. Pigs fed DDGS had greater gain to feed ratios,
regardless of when DDGS was introduced to the diets. No other differences were observed. In experiment 2, 300 pigs weighing 9.0 kg and 31 days of age (10 pigs per pen; 10 pens per treatment) were used to determine the impact of DDGS feeding (30 percent) with or without the addition of a combination of enzymes (alpha-galactosidase, galactomannanase, xylanase, beta-glucanase). Pigs fed diets containing 30 percent DDGS had greater gain to feed ratios than pigs fed control diets. Supplementation of enzyme to the diet with DDGS improved daily gain compared to the other two diets. The authors concluded that DDGS can be supplemented to diets for nursery pigs at 7.5 to 15 percent at any time during the nursery period without negatively affecting pig growth performance. In addition, the authors indicated that the supplementation of enzymes to diets with DDGS may further improve nursery pig performance.

Eric van Heugten

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**CALENDAR OF EVENTS**

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<tr>
<th>May</th>
<th>June</th>
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<tbody>
<tr>
<td>16-18 Pork Management Conference Destin, Florida</td>
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<tr>
<td>22-24 Pork 101 College Station, Texas</td>
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<tr>
<td>7-9 World Pork Expo Des Moines, Iowa</td>
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<td>July</td>
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<td>7-12 ADSA/ASAS 2007 Joint Annual Meeting San Antonio, Texas</td>
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