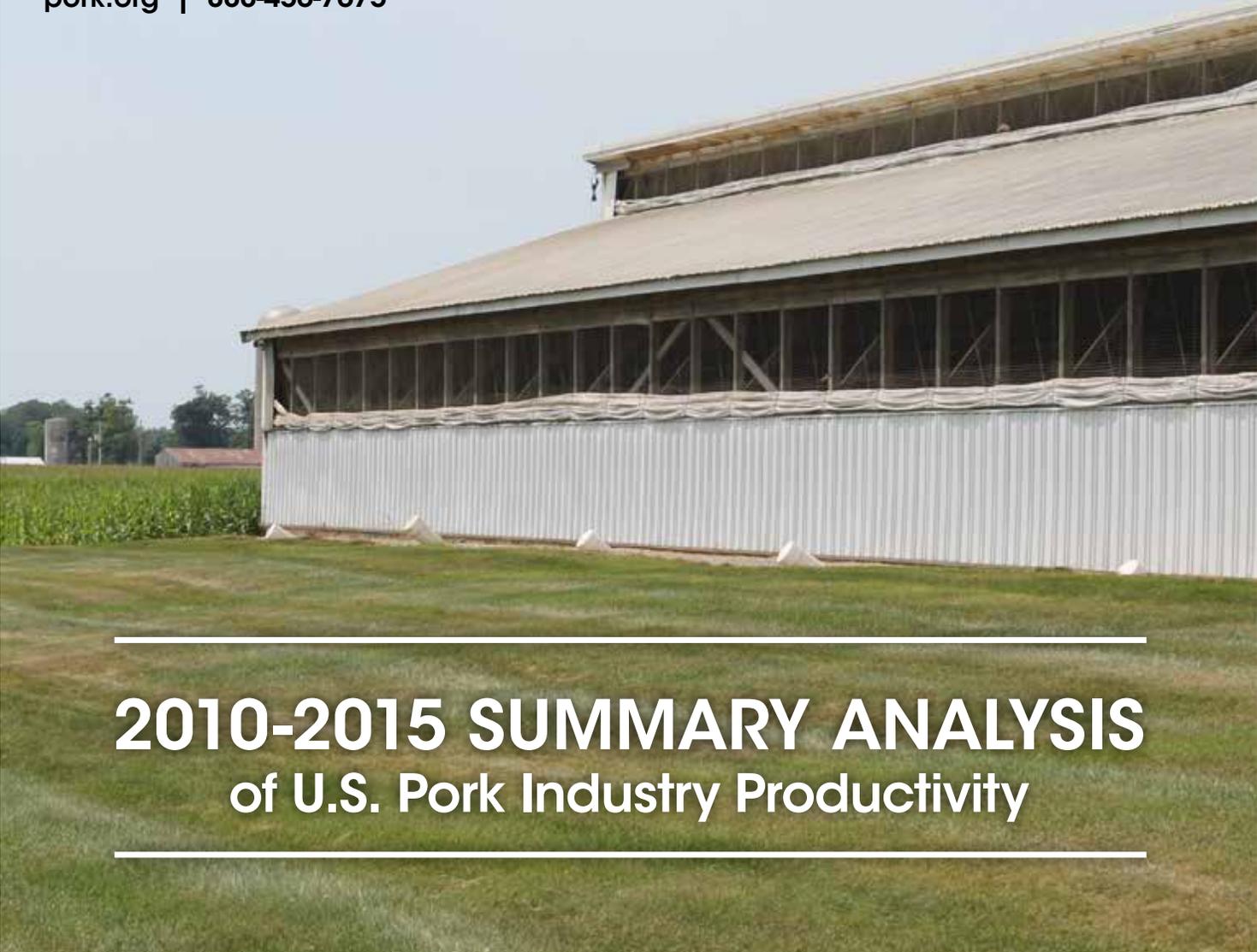




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2010-2015 SUMMARY ANALYSIS of U.S. Pork Industry Productivity

The National Pork Board's Animal Science Committee initiated the Industry Productivity Analysis to make data publicly available for producers to use when benchmarking productivity in various phases of production. The information gathered from analysis of this data is intended to benefit all producers through improved productivity at the farm level. Comparison of the data contained in this report with data collected on participating producers' farms allows all producers to identify key productivity indicators that may rapidly improve profitability. This analysis can also serve to inform the direction to take with Checkoff-funded programs, academic research and other research funded by others about which areas of research are most likely to have the greatest impact on productivity.

The following information was prepared from the final report submitted by Dr. Ken Stalder at Iowa State University. This report is only a summary, but the full report can be found at pork.org/research.

Introduction

The swine industry strives to continually improve production efficiency over time. In order to quantify the overall pork industry improvement, a national database must continue to be analyzed for production changes between seasons, across years and among different production systems. The results presented in this study are based on a group of pork production companies representing approximately 40% of the U.S. swine industry. The study objective was to quantify the annual production levels and the variation associated with several key performance indicators for the swine industry in all swine production phases (i.e. sow farm, nursery, wean-to-finish, and conventional finisher facilities) from 2010 to 2015 and to quantify seasonal effects associated with the key performance indicators.

The results of this study indicate that the swine industry continues to be successful in improving production efficiency, however there are some performance indicators, such as pre-weaning mortality, that require continued focus in coming years. Changes have been made to increase the pounds of pork produced in a given time frame while reducing finishing mortality. This, along with increased litter size, has increased the throughput of the swine industry as a whole. These industry improvements seen over time can be attributed to better genetics, health, management, stockmanship, etc.

The results from this analysis can be used to determine when management practices need to be improved and/or maintained to ensure the maximum performance level for each swine production stage based on where each farm ranks for a given performance indicator. Knowing the time of year when production levels decrease allows producers and researchers to focus efforts on improving production practices during that time to increase production levels, improve production efficiency and ultimately improve operational profitability.

Demographics and Production Measures

The farms reporting in this data set may represent a single farm or multiple sites owned by an overarching company. The results presented in this study are based on a group of pork production companies representing approximately 40 percent of U.S. pork production. Records were reported to a data collection company monthly for each production stage. All data are presented as means and their associated standard deviation. The top 10 percent, top 25 percent and bottom 25 percent of farms in each production stage was determined. The farms in each percentile were determined for each production indicator meaning that the farms in each percentile are not necessarily the same for each production indicator. The top and bottom were defined as desirable and undesirable for each trait rather than numerically higher and lower. The key productivity indicators measured in this analysis are listed in the table below.

Key Productivity Indicators in this Analysis:

Conventional Finisher	Wean-Finish*	Nursery	Sow Farm
Mortality (%)	Mortality (%)	Mortality (%)	Pigs/Mated Sow/Year
Finishing Weight (lbs)	Finishing Weight (lbs)	Exit Weight (lbs)	Litters/Mated Sow/Year
Days in Finisher	Days in Finisher	Days in Nursery	Total Born
Average Daily Gain (lbs/day)	Average Daily Gain (lbs/day)	Average Daily Gain (lbs/day)	Stillborn and Mummies
Feed Conversion (F:G)	Feed Conversion (F:G)	Feed Conversion (F:G)	Number Born Alive
			Number Weaned
			Pre-weaning Mortality (%)
			Weaning Weight (lbs)
			Weaning Age (d)

Results

Overall Productivity

The Porcine Epidemic Diarrhea Virus (PEDV) has had a dramatic impact on those herds experiencing the disease in the form of extensive mortality of piglets from 1 to 7 days of age and slightly increased mortality rates as the pigs become older. Pigs that do survive tend to be slower performing throughout the grow-finish phase. In 2013, the ramifications of this infection were just beginning to become evident, particularly in the poorer performing sow herds. In 2014, the effects of PEDV were much more apparent across all production levels and phases. Conventional finisher and wean-to-finish mortality rose by almost a full percent for each, while in the nursery mortality rose by over 1.5 percent. End weights and days in finisher also rose, most likely a result of a lack of flow entering into the finisher, considering an increase in sow piglet mortality.

The results of PEDV are more evident in the sow farm, where pigs per mated sow per year dropped by 1.5 pigs, number weaned dropped by 0.5 pigs, and mortality rose for a second straight year, but almost doubled the rise from the previous year by 3.2 percent. The swine industry took action and reports indicate that the severity of PEDV was at peak in 2014. With increased or reassessed biosecurity and decisive action the reports for farms reporting PEDV in 2015 decreased significantly. While some values are not back to pre-PEDV levels, they are trending that way and mirror closely the onset of PEDV in 2013. This should be reassuring that the corrective action taken was successful in containing the disease. Conventional finisher and nursery mortality dropped by 0.2 percent, while wean-to-finish mortality still continued to rise. Finish weights were still greater across all finishing phases. In the sow farm, pigs per mated sow per year rose by 1.2 pigs, number weaned rose by 0.3 pigs, and mortality dropped by 3.1%. Reports for 2016 should show the last of the effects felt by PEDV unless the virus reappears.

Highlights

The highlights of the 2016 analysis are listed below. The data in the tables are presented as an average and their associated standard deviation. Key productivity indicators that have large variation may represent areas where the most progress can be made.

- Mortality fell by 0.2% between 2014 and 2015 for conventional finishers but continued to rise by another 0.6% for wean-to-finish facilities.
- Finishing weights have increased over time for both conventional finisher and wean-to-finish facilities; however, days in finisher remains consistent for conventional and wean-to-finish facilities.
- Feed conversion had slightly improved for the conventional finisher and had remained consistent in wean-to-finish facilities from 2010 through 2013, however increased in 2014 and 2015 in both conventional and wean-to-finish feed conversion.
- Nursery mortality had decreased by almost 0.3% from 2010 to 2013, but from 2013 to 2014 rose by approximately 1.6% and remained similar in 2015.
- Exit weights are slightly higher, but are also reaching this higher exit weight in roughly the same amount of days from 2010 to 2014, but both rose by 2 lbs. and 2 days in 2015.
- Average daily gain and feed conversion have shown minimal change from 2010 to 2015, but have continued to make improvement across time.
- Pigs/mated sow/year had increased by approximately 0.5 pigs from 2010 to 2012, but decreased by 1.5 pigs from 2013 to 2014, but recovered most of the loss from 2014 to 2015.
- Litters/mated sow/year has changed little suggesting that most of the increase in pigs/mated sow/year has been a result of increasing litter size.
- Total born has increased by almost a pig from 2009 to 2014, while the stillborn and mummies have little change over the same time period, resulting in all of the increase in total born being realized in the number born alive.
- Weaning age has increased by 1.2 days and weaning weight has increased by 0.9 lbs. from 2010 to 2015. This indicates a shift from early weaning to weaning an older pig, as a heavier pig is more desirable to move into today's wean-to-finish production systems.

Results

Conventional Finisher Productivity

	2010	2011	2012	2013	2014	2015
Percent Mortality	4.70 (± 3.05)	4.48 (± 2.49)	5.03 (± 3.30)	5.04 (± 3.07)	5.78 (± 3.21)	5.53 (± 3.32)
Finishing Weight (lbs)	268.7 (± 13.4)	271.5 (± 12.8)	269.2 (± 14.1)	272.1 (± 17.2)	279.7 (± 15.1)	277.4 (± 14.5)
Days in Finisher	124.6 (± 10.3)	122.7 (± 9.7)	121.5 (± 10.8)	122.8 (± 13.0)	124.1 (± 13.6)	121.4 (± 15.0)
Average Daily Gain (lbs)	1.76 (± 0.14)	1.81 (± 0.14)	1.81 (± 0.15)	1.81 (± 0.16)	1.85 (± 0.16)	1.85 (± 0.16)
Feed Conversion ^b	2.77 (± 0.25)	2.71 (± 0.24)	2.68 (± 0.23)	2.66 (± 0.23)	2.70 (± 0.26)	2.69 (± 0.23)

Wean-to-finish Productivity

	2010	2011	2012	2013	2014	2015
Percent Mortality	6.30 (± 3.55)	6.33 (± 3.96)	6.39 (± 4.79)	6.88 (± 4.66)	7.77 (± 4.84)	8.34 (± 5.52)
Finishing Weight (lbs)	270.5 (± 13.5)	273.6 (± 12.8)	270.1 (± 12.9)	274.0 (± 14.5)	285.3 (± 15.9)	281.2 (± 14.4)
Days in Finisher	167.9 (± 10.3)	166.4 (± 9.0)	164.3 (± 9.9)	165.3 (± 10.4)	169.5 (± 11.6)	167.1 (± 10.6)
Average Daily Gain (lbs)	1.54 (± 0.11)	1.57 (± 0.10)	1.57 (± 0.11)	1.58 (± 0.11)	1.61 (± 0.11)	1.61 (± 0.11)
Feed Conversion ^b	2.52 (± 0.20)	2.50 (± 0.20)	2.50 (± 0.18)	2.50 (± 0.18)	2.61 (± 0.16)	2.58 (± 0.17)

Nursery Productivity

	2010	2011	2012	2013	2014	2015
Percent Mortality	4.12 (± 3.62)	4.32 (± 4.32)	3.80 (± 3.01)	3.87 (± 3.38)	5.47 (± 5.40)	5.22 (± 5.23)
Exit Weight	50.7 (± 9.1)	50.3 (± 9.3)	50.7 (± 8.4)	50.9 (± 8.7)	51.8 (± 11.9)	53.5 (± 12.6)
Days in Nursery	46.2 (± 5.5)	46.0 (± 6.1)	46.0 (± 5.1)	45.4 (± 5.7)	46.4 (± 8.1)	48.1 (± 8.8)
Average Daily Gain (lbs)	0.82 (± 0.14)	0.81 (± 0.14)	0.82 (± 0.13)	0.83 (± 0.13)	0.83 (± 0.15)	0.82 (± 0.14)
Feed Conversion ^b	1.52 (± 0.28)	1.53 (± 0.25)	1.48 (± 0.19)	1.48 (± 0.18)	1.51 (± 0.19)	1.54 (± 0.19)

Sow Farm Productivity

	2010	2011	2012	2013	2014	2015
Pigs/Mated Sow/Year	23.5 (± 2.7)	24.1 (± 3.1)	23.9 (± 2.9)	23.7 (± 4.3)	22.2 (± 5.4)	23.4 (± 3.9)
Litters/Mated Sow/Year	2.33 (± 0.20)	2.33 (± 0.22)	2.31 (± 0.22)	2.30 (± 0.26)	2.26 (± 0.36)	2.27 (± 0.22)
Total Born	13.0 (± 1.0)	13.4 (± 1.1)	13.4 (± 1.0)	13.6 (± 1.1)	13.5 (± 1.0)	13.5 (± 1.0)
Stillborn and Mummies	1.22 (± 0.48)	1.24 (± 0.49)	1.17 (± 0.46)	1.14 (± 0.42)	1.21 (± 0.48)	1.35 (± 0.64)
Number Born Alive	11.8 (± 0.9)	12.1 (± 1.0)	12.3 (± 0.9)	12.4 (± 1.0)	12.3 (± 0.8)	12.1 (± 1.0)
Number Weaned	10.0 (± 0.7)	10.2 (± 0.7)	10.3 (± 0.7)	10.2 (± 1.3)	9.7 (± 1.8)	10.0 (± 1.2)
Pre-weaning Mortality %	14.6 (± 5.8)	15.5 (± 5.9)	15.5 (± 5.7)	17.3 (± 10.9)	20.5 (± 14.3)	17.4 (± 8.2)
Weaning Weight (lbs)	13.0 (± 1.4)	13.1 (± 1.4)	13.2 (± 1.6)	13.4 (± 1.7)	13.6 (± 2.1)	13.9 (± 1.9)
Weaning Age (d)	20.8 (± 2.1)	20.9 (± 2.5)	21.5 (± 2.8)	21.9 (± 2.9)	21.7 (± 3.2)	22.0 (± 3.1)

Benchmarking Productivity

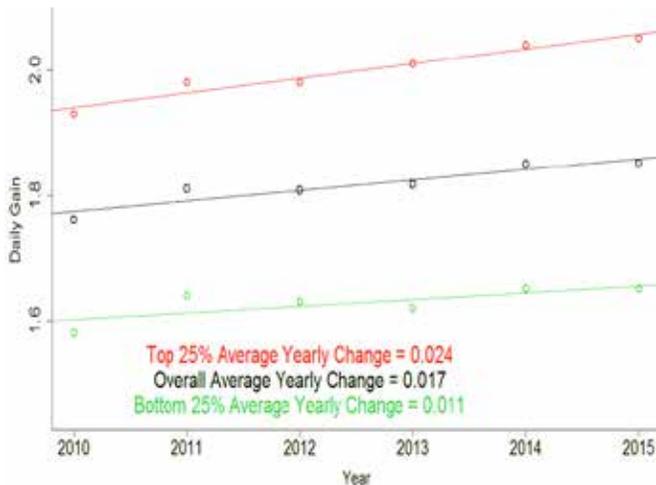
The visual representation of the graphs below clearly depicts the change over time for the top 25 percent, overall, and bottom 25 percent of farms for each productivity indicator in each production stage in the red, black, and blue lines, respectively. These graphs show traits that are changing in the same direction for all three groups, but each group may have different slopes (rate of change) depending on the trait being evaluated. For example, litter size averages have increased at almost the same rates for top 25 percent, overall, and bottom 25 percent groups. This suggests that a litter size limit has yet to be reached. On the other hand, the variation between the three groups in percent finisher mortality has substantially decreased over time. This could be the result of increased importance

or focus placed on reducing mortality by owners, barn managers and barn workers as well as new vaccination developments. Moreover, most of the improvement in finishing mortality has come from producers with the highest mortality (bottom 25 percent). This trend also holds true for mortality in nursery facilities. Feed efficiency in the nursery has remained relatively unchanged for all three groups during this time, and thus it may represent an opportunity for improvement for producers in the bottom 25 percent.

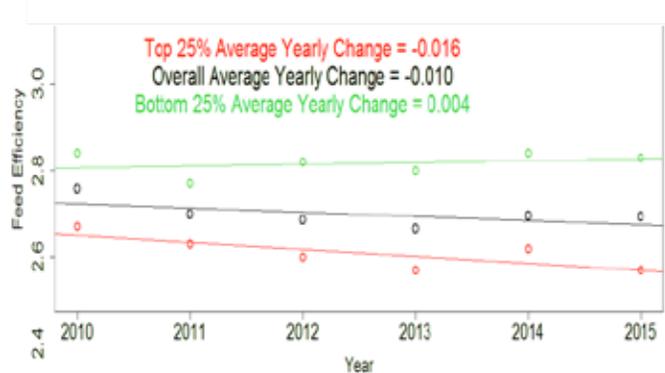
The rates of change for total born, number born alive, pigs weaned and preweaning mortality are almost identical for the three groups. There is a marked difference between the top 25 percent and the bottom 25 percent in weaning weight. This is most likely driven by weaning age as weaning age is the primary factor that influences weaning weight and a similar pattern exists between the two measures.

This information can also be used to predict future productivity for any given trait. For example, pigs per mated female per year typically increase by about 0.33 pigs per year. Given this information, producers can predict the number of pigs they are likely to produce five years from now. They may then use that information as they make decisions about, among other things, building design, animal flow, commodity purchase and health programs.

Conventional Finisher - Avg. Daily Gain



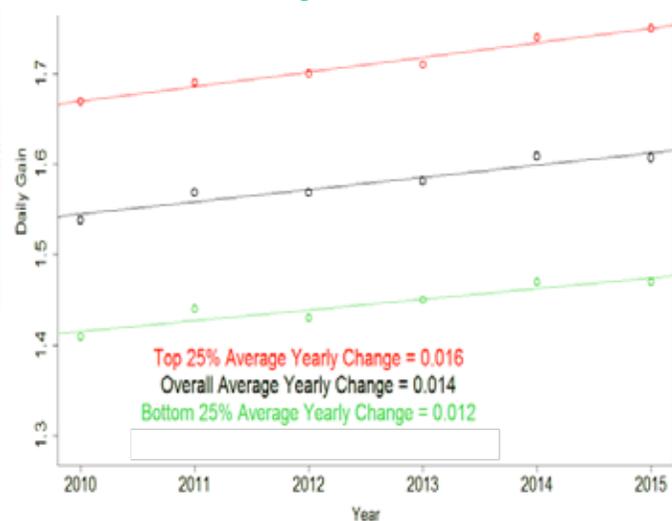
Conventional Finisher - Avg. Feed Efficiency



Conventional Finisher - Avg. Percent Mortality



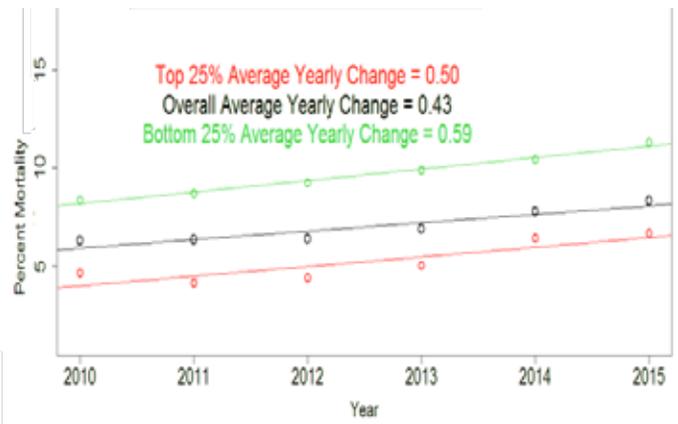
Wean-To-Finish - Avg. Daily Gain



Wean-To-Finish - Avg. Feed Efficiency



Wean-To-Finish - Avg. Percent Mortality



Nursery - Avg. Daily Gain



Nursery - Feed Efficiency



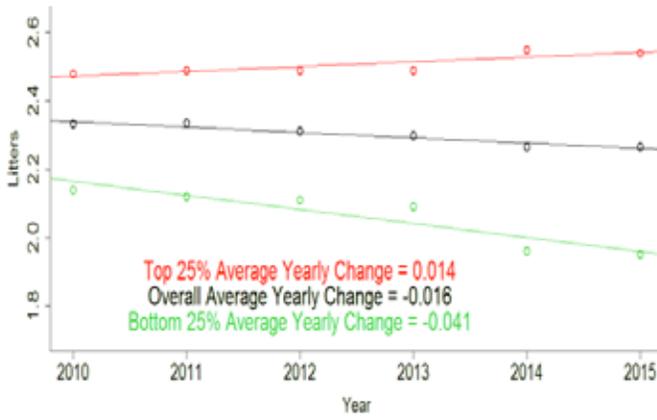
Nursery - Avg. Percent Mortality



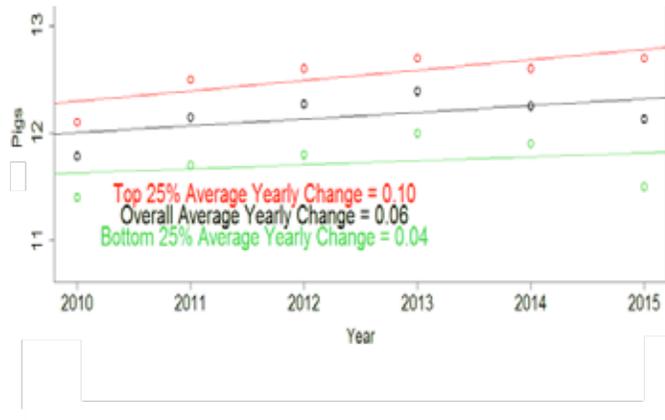
Avg. Pigs/Mated Sow/Year



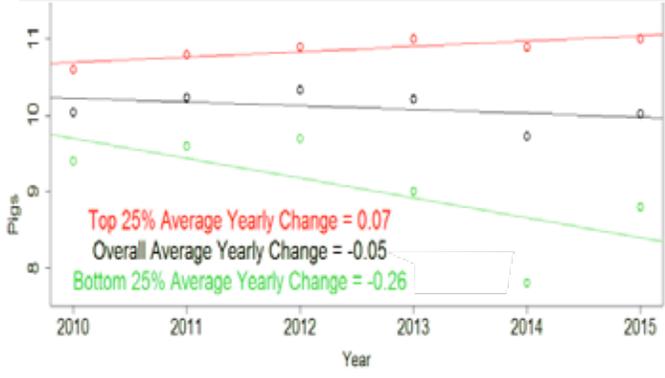
Avg. Litters/Mated Sow/Year



Avg. Born Alive per Litter



Avg. Pigs Weaned per Litter



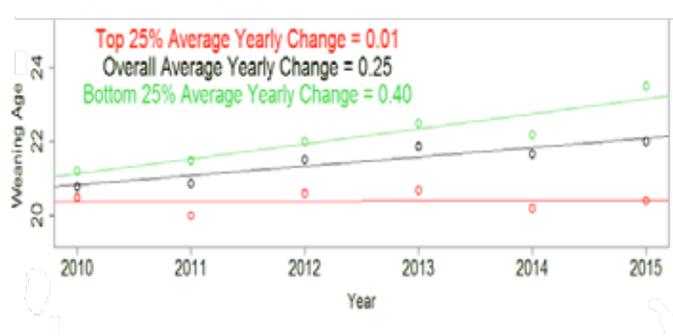
Avg. Pre-Weaning Mortality



Avg. Weaning Weight



Avg. Weaning Age





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