Closed herd technology: Breedover vs. depop/ repop

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Introduction

Depopulating and repopulating (depop/repop) a swine production system as an avenue to control disease is a highly expensive method of improving productivity and reducing production costs. Current industry attempts to control PRRS (and other diseases, i.e., Aujeszky's Disease, Swine Influenza Virus, pneumonia, etc.) through depop/repop strategies have resulted in limited success. In many cases, this process has failed to prevent the reintroduction of virus for any consequential period of time. Even when herds have been completely depopulated and repopulated with PRRS-negative animals, the virus manages to return to the herd through the introduction of infected gilts or infected semen. Furthermore, attempts to eliminate the virus transfer through long isolation/acclimation periods for gilts, has had mixed results. Longer isolation periods make it more difficult for the producer to manage a consistent pigflow. Additionally, the longer the isolation, the more nonproductive days a replacement animal accumulates.

Utilizing proven breedover methods to eliminate expensive depop/repop management practices while maintaining a consistent pigflow through a system has proven beneficial and economical for many pork producers.

Industry Movement

A rapidly growing trend in herd stabilization practices is closed herd technology – closing the herd to all outside animal introductions. This process, when done according to proven management and biosecurity protocols, has had repeatable, proven success. In the countless herds that Babcock Genetics has assisted in closing, depopulating the herd has not been a suggested option. Rather, utilizing proven breedover management practices, indexing strategies and utilizing semen from a closed nucleus have yielded positive, highly repetitive and consistent results.

Research indicates and supports that closing an unstable herd to all outside animal introduction promotes viral stability in the herd. Viral stability results in a high state of herd health, despite the presence of disease. Closing the herd prevents the introduction of diseases and maintains herd health, because it eliminates the introduction of the most common vector … sick animals. It also eliminates the introduction of susceptible naive animals that perpetuate the disease. The result is healthier animals all the way through finishing. The method to do this is via a proven, scientifically selected breedover program, utilizing the existing genetics within a system and breeding over them with semen sourced from a closed nucleus boar stud.

The following paper compares the production and cost benefits associated with utilizing proven breedover protocols vs. expensive depop/repop strategies to stabilize disease and production flow.

Materials and methods

The drawback to most depop/repop operations is the cost associated with the process. Research has shown that the return on investment of a depop/repop program usually takes two years (in a stable swine market). The other drawback to depop/repop programs – producers and veterinarians know it is a temporary fix and that the negative status of repopulated herds is in jeopardy every time new animals are introduced to the system. The following data set looks at how well PRRS-positive closed herds are performing vs. open herds that are both PRRS-negative and PRRS-positive.

Our PigCHAMP data (Figure 1) is a collection of data from multiple closed herds. This data represent over 58,000 sows in

closed herd systems. These data represent herds that are both PRRS-positive and PRRS-negative and are five years to 20 years old. None of these herds have undergone a depop/repop program. All of the herds were closed due to disease pressure that was greatly influencing production quality and costs.

As our data indicate from research presented at the 2002 AASV meeting, our older closed herds are performing as well as herds that were either brand new or underwent an expensive depop/repop (Figure 2). The older herds (>5 years) are performing as well as the herds that are <5 years old. Also, the herds that underwent a closed herd breedover program are performing as well as the new herds. Likewise, death loss is lower than the national average, even in the PRRS-positive herds. This holds true when looking at sow death loss averages in comparison between older closed herds vs. newer closed herds (both averaging 4). Statistically there is no production difference between these closed PRRS-positive herds and those that are PRRS-negative. The undeniable fact of this data is the consistency demonstrated across all the closed farms. All farms are demonstrating a higher than average farrowing rate, average pig born per litter and litters per mated female vs. open herds that are new or have undergone a depop/repop (Figure 3).

We have never had to repop/depop a single herd once we have closed it. These herds continue their genetic progress through Babcock Genetics' Closed Herd System program. They don't have disease hiccups and are consistent year-in/year-out from a production standpoint. Closing the herd to outside animal introductions and utilizing semen from a totally closed nucleus will maintain your genetic progress and performance equal to any new herd or depop/repop herd, and at a fraction of the cost.

Further case studies

Utilizing closed herd technology in the place of expensive, suspect depop/repop strategies has proven beneficial for providing consistent herd stabilization, uniform pigflows and highly desirable economics for upwards of 10 consecutive years in several systems observed by Babcock Genetics. Two such instances involve closed herd systems of various herd health status (both PRRS-positive and PRRS-negative).

Case study 1

This system chose not to depop/repop due to the economic drain on the producer. Instead, they utilized a breedover program bringing in semen from either a closed boar stud sourced from Babcock Genetics' closed nucleus or they brought in their own tested boars once a year into their own boar stud. While the latter is not suggested due to disease introduction throughout the system, the veterinarian overseeing the boar stud is working on eliminating this production strategy and relying solely on semen from a closed nucleus boar stud.

In this health and production company operated by Brian Schantz, DVM, Laurel, Neb., they mostly work with farrow-to-wean operations that are cooperatively owned by finish operations. Their goal has been to produce a predictable number of healthy, nonviremic, inexpensive, weaner pigs. And, their goal has always been to be able to produce those pigs, and they believe they can once debt is eliminated, for $24 to $26 per pig. With debt service, their goal is to do it for around $28 to $29. They are not achieving that in the purchased gilt, pyramid-type system. They decided to take the variability and risk out of these systems by closing them to outside gilt introduction.

Closed herd advantages

The producers have not increased their gilt pool on the farm, but they've increased their daily target of gilts that are mature and ready to breed. They know what their ages are, their genetic structure, what heat cycle they're in, etc., because they're tracking their gilts in-house. The closed herd system allows them to have about the same number of gilts to choose from that are ready to breed.

This particular farm (Figure 4) is limited on space. They have about 100 spaces in their isolation/acclimation barn that they use to bring in gilts. They will isolate them first and then acclimate them over time. On this particular farm, they will have up to 250 open gilts. The gilts are raised on a different site and then brought to this farm every two weeks where they are bred. They're on their second or third heat cycle, and they're able to tie up less of their space with gilts that are isolated and acclimated. It decreases their gilt pool, but it increases their productive female inventory.

Figure 4 references their productive inventory, which would be the gilts that are old enough to breed plus sows that are on the farm. This goes back to 1997, when this farm started. They struggled to maintain inventory on this farm prior to closing it. Part of the problem was because of disease. They were purchasing anywhere from 100 to 200 gilts at a time and, oftentimes, their flow would be totally disrupted because they'd have to wait on the multiplier. Other times, the multiplier couldn't provide the animals because of disease issues in their system. Then there were times they couldn't accept gilts because of the PRRS problems in their own herd. Over time, their inventory eroded, and they struggled to maintain enough bred gilts. Once they closed the herd, their ability to maintain a productive gilt inventory and consistent pigflow was a problem of the past (Figure 5).

The other reported advantage since closing this herd is much healthier, durable gilts in the system, where they are raising their own gilts. Regardless of genetics, they have seen a definite improvement because the gilts have gone through all of the disease challenges at a young age.

They've also increased the selection process for their internal gilts. In their closed herd system, they've got maternal selection in place, plus they have selection on the gilts as they grow, which is a huge advantage. In the closed herd selection process, they're able to cull on the maternal performance very aggressively. In the past, they were culling based on availability of gilts, and were always compromising themselves. They were forced to keep sows that they knew they should cull, but had to keep something back to reach breeding targets. Now, they're able to reach breeding targets all the time, plus get rid of the low-performing cull sows.

The variability on the pigs weaned per month is tightening up (Figure 6). This particular farm has a ways to go, but should be able to reach the point where they can predict, on a weekly basis, with very good accuracy, what it's going to be per week. In a system where you're fluctuating up and down like that and trying to flow barns, it's nearly impossible to be productive or profitable.

Another advantage they've seen in the closed herds they maintain is a decrease in genetic expense. Dr. Schantz's partner is an accountant, and they do the financials for all the farms that they manage. They were always faced with cash-flowing these farms. They never knew from one farm to another where their break-even points were. In the closed herd system (Figure 7), they can accurately predict cash flow. Figure 7 includes the cost of raising the gilts. They know what it's going to cost every month for replacements. Plus, in this particular farm's case, they've cut the genetics cost in half for replacement females.

In December 2001, they officially closed the farm and started raising their own internal replacement gilts. This farm is just an example, but this is what we're seeing in all the farms that we're closing to outside gilt introduction. In 1997, they were producing weaner pigs for $33 on this farm. After closing the herd, they're now producing weaner pigs for $28. That figure includes debt service. After closing this facility to outside gilts, this farm is now a highly effective part of their system.

Case study 2

The following data set are from two herds that have been both opened and closed, and the data look historically at what's happened to that farm.

The farms represented in this study are managed by Tom Wetzell, DVM and his colleagues at South Central Veterinary Associates in Wells, Minn. They deal with multiple types of genetics and are multiple-sized farms with 100% PRRS-positive sow herds. There is not a single PRRS negative sow farm in the area. Over time, as health problems and source problems have developed with multiplier farms, the practice reports they are seeing more farms go to closed herd systems. Today, they're working with at least 10 farms (about 12,000 inventoried sows) that are totally closed – no live animal introductions. It is also important to note that none of these farms chose to depop/repop, but rather, utilize a breeding program consisting of semen from closed nucleus boar studs.

Production advantages of the closed herd

The practice reports that the No. 1 benefit of not depopulating the herd first was pure economics associated with the rising cost of PRRS-naive gilts. Their number one objective was to reduce the cost of production by closing the herds to outside animals while improving pigflow.

The throughput is up in their closed herds and the variation is down. They're also seeing an increased number of pigs on a year-by-year basis. The practice's best herd (based on PigCHAMP® data for four years in a row) is utilizing the Babcock Closed Herd system. That Babcock herd went six years in a row with over 22 pigs per mated female per year. The closed herds continue to generate data showing that the cost of production is going down in the closed herds because of their ability to control productivity, uniformity and health costs. The veterinary costs, as well as animal health products costs, are reduced, and the genetic costs are also drastically reduced.

PRRS control – the benchmark for closed herd success

Figure 8 depicts what one 1,200-sow farm was experiencing prior to a PRRS break and afterwards. A PRRS abortion storm is a huge gaping wound for these producers, and it's driving some producers out of business if they have this happen to them more than once over a two- or three-year period of time. This is where depop/repop is not an economic consideration. The goal on this farm was to produce 500 pigs per week. They were well over that goal prior to PRRS exposure. As Figure 6 shows, prior to PRRS, they were producing 539 pigs; post-PRRS they were down to 409. Their total cost per pig shot up by close to $8.50 to $9.00 per pig.

The next farm (Figure 9) is a 2,400-sow herd that went from an open system to a totally closed system. This farm was originally populated in 1998. For more than two years, it never reached the productivity that the South Central Veterinary Associates' veterinarians expected. It was sourced out of a PRRS-negative breeding stock company. After initially stocking the farm, they experienced a major PRRS break. They changed out their gilt/boar source a second time and again broke with PRRS. There were three source changes and three PRRS breaks in this operation. This company was about to get out of pork production when they decided to close the herd to all outside animals. After the herd was closed in 2001, they instantly improved the farm's bottom line (Figure 9). Just as the veterinary practice has documented in their other closed herds, they quickly improved weaned pig costs. They're now in that $28 to $29 range (with debt service). There were big changes all across the operation in overall costs and improved productivity by closing the herd.

Production and health improvements

Figure 10 shows pigs weaned per mated female per year from January 1999 through October 2002. The solid red line is an average of pigs per mated female per year on a yearly basis, the line with the red dots is a three-month rolling average, and the dotted line represents monthly number of pigs per mated female per year.

This herd was closed in January 2001. It took a little while for that response to occur in pigs per mated female per year. But the consistency since closing the herd has been phenomenal (see Figure 10). From January through October 2002, animal consistency was something they weren't able to obtain before closing the herd. They experienced a slight drop in the extremely hot summer months of 2002, but the production came back up through the wintertime and early spring of 2003. The key is that the flat line of the pigs per mated female per year on a 12-month rolling average has really not changed much at all over that period of time.

Figure 11 looks at stillbirths vs. mummies. It is not difficult to see exactly when they had a PRRS break in this herd prior to closing it. There is a big spike in stillbirths and mummies in January, February and March 2000. This PRRS abortion storm caused upwards of 25% preweaned mortality. Since closing the herd, they have never again seen those types of numbers. However, open herds continue with these types of numbers when a new strain of PRRS comes through the area.

Figure 12 examines and points out the significant change they made in sow mortality after closing this herd. They are still faced with some management issues in this farm and, at 9% sow mortality, they're not where they want or need to be. But, it's certainly better than when they went through their last break of PRRS in January 2000, with close to 18% sow mortality on this farm.

Because of the success experienced with the closed herd technology – as well as the savings of not repopulating the herd with expensive gilts – the owners are looking at expansion of the farm. They are totally satisfied with what's happening now and are even more excited about how these animals are performing in their grower/finisher facilities.

Conclusions

Based on these data, it is clear that when comparing the costs and success ratio between depop/repop vs. closed herd technology, closing a herd provides more measurable benefits. Developing a closed herd strategy based on proven technologies (closed nucleus-based semen, biosecurity, computerized selection process, etc.) provides pork production systems consistent production, greater and longer disease stability and economical gains.

Figures/Charts

Figure 1

Closed Herd Multiple Farm Performance (1/99 - 12/02)
(Represents PigCHAMP® data on 58,134 sows in closed herds over three years)

	Jan '99 Dec '99	Jan '00 Dec '00	Jan '01 Dec '01	Jan '02 Dec '02	Jan '99-'02 Dec '99-'02
Number of sows farrowed	9,285	15,910	16,451	16,488	58,134
Farrowing rate	88.2	86.5	87.6	86.5	87.1
Average pigs born alive/litter	9.9	10.0	10.1	10.2	10.1
Average stillborn pigs	0.7	0.8	0.9	0.9	0.8
Litters/mated female/year	2.51	2.46	2.46	2.48	2.48
Preweaned mortality	8.9	10.5	10.5	10.5	10.3
Pigs weaned/mated female/year	22.3	21.6	21.7	21.9	21.8
Death rate	3.1	4.8	3.1	4.9	4.0

Figure 2

Closed Herd Multiple Farm Performance (1/99 - 12/02)

Breedover vs. New Herd (Farms <5 Years Old)

Reproductive Performance	Jan '99 Dec '99	Jan '00 Dec '00	Jan '01 Dec '01	Jan '02 Dec '02	Jan '99-'02 Dec '99-'02
Average nonproductive sow days	104.2	70.6	69	69.6	76.8
Farrowing rate	88.2	86.5	87.6	86.5	87.1
Average pigs born alive/litter	9.9	10.0	10.1	10.2	10.1
Litters/mated female/year	2.51	2.46	2.46	2.48	2.48
Total pigs weaned	76,867	138,776	144,424	144,759	504,826
Preweaning mortality	8.9	10.5	10.5	10.5	10.3
Death rate	3.1	4.8	3.1	4.9	4.0

Breedover vs. New Herd (Farms >5 Years Old)

Average nonproductive sow days	63.7	65.2	63.7	61.8	63.6
Farrowing rate	84.6	84.2	84.6	84.9	84.6
Average pigs born alive/litter	10.2	10.1	10.1	10.1	10.1
Litters/mated female/year	2.42	2.4	2.41	2.43	2.42
Total pigs weaned	438,676	537,355	562,442	579,795	2,118,268
Preweaning mortality	10.3	10.7	9.9	10.0	10.2
Death rate	3.9	3.8	4.1	4.3	4.0

Farms over ≥5 years old perform as well as farms ≤5 years old.

Figure 3

Closed Herd Multiple Farm Performance (1/99 - 12/02)

Breedover vs. New Herd (Farms <5 Years Old)

Reproductive Performance	Jan '99 Dec '99	Jan '00 Dec '00	Jan '01 Dec '01	Jan '02 Dec '02	Jan '99-'02 Dec '99-'02
Average nonproductive sow days	76.0	68.8	68.1	66.9	69.6
Farrowing rate	85.4	84.5	85.4	84.8	85.0
Average pigs born alive/litter	10.1	10.0	10.1	10.1	10.1
Litters/mated female/year	2.47	2.43	2.43	2.44	2.44
Total pigs weaned	378,270	530,245	556,918	568,001	2,033,434
Preweaning mortality	9.4	10.6	10.2	10.3	10.2
Death rate	3.4	4.1	3.7	4.4	3.9

Breedover vs. New Herd (Farms >5 Years Old)

Average nonproductive sow days	58.5	54.9	53.9	52.3	54.8
Farrowing rate	81.7	83.8	82.9	83.1	82.9
Average pigs born alive/litter	10.1	10.2	10.1	10.0	10.1
Litters/mated female/year	2.34	2.36	2.37	2.4	2.37
Total pigs weaned	163,604	182,152	183,158	190,777	719,691
Preweaning mortality	11.7	10.6	9.9	9.1	10.3
Death rate	6.2	5.1	5.9	5.3	5.6

Data shows new pops vs. breedovers, i.e., herds started fresh vs. breedover; no difference last four years.

Figure 4

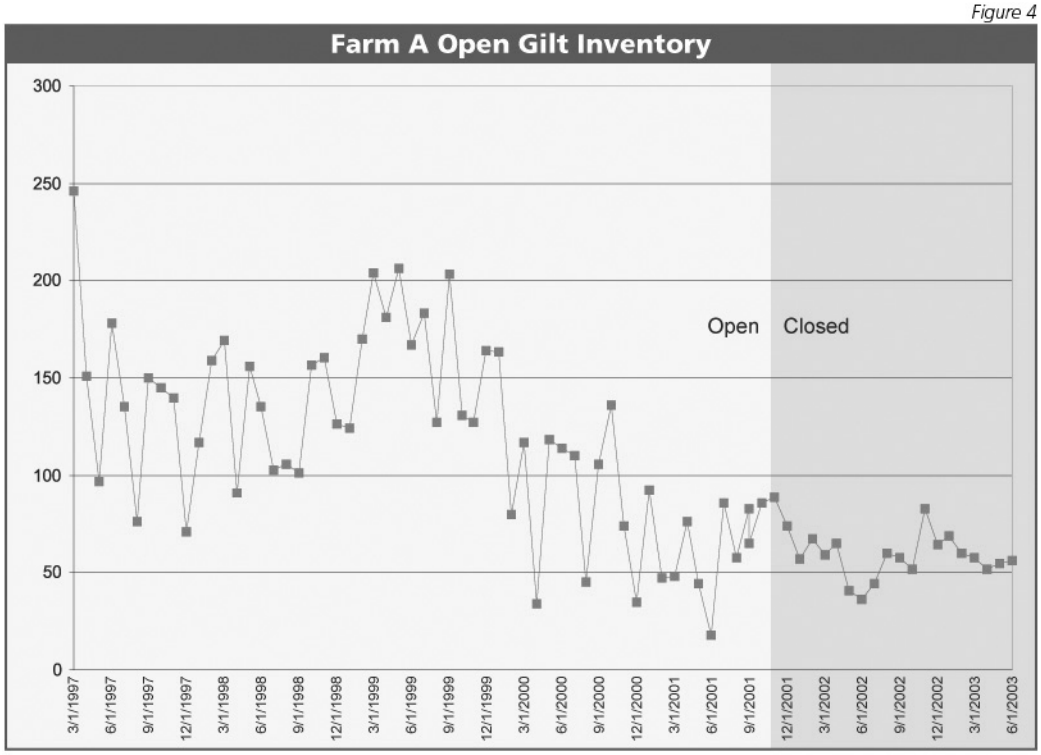


Figure 5

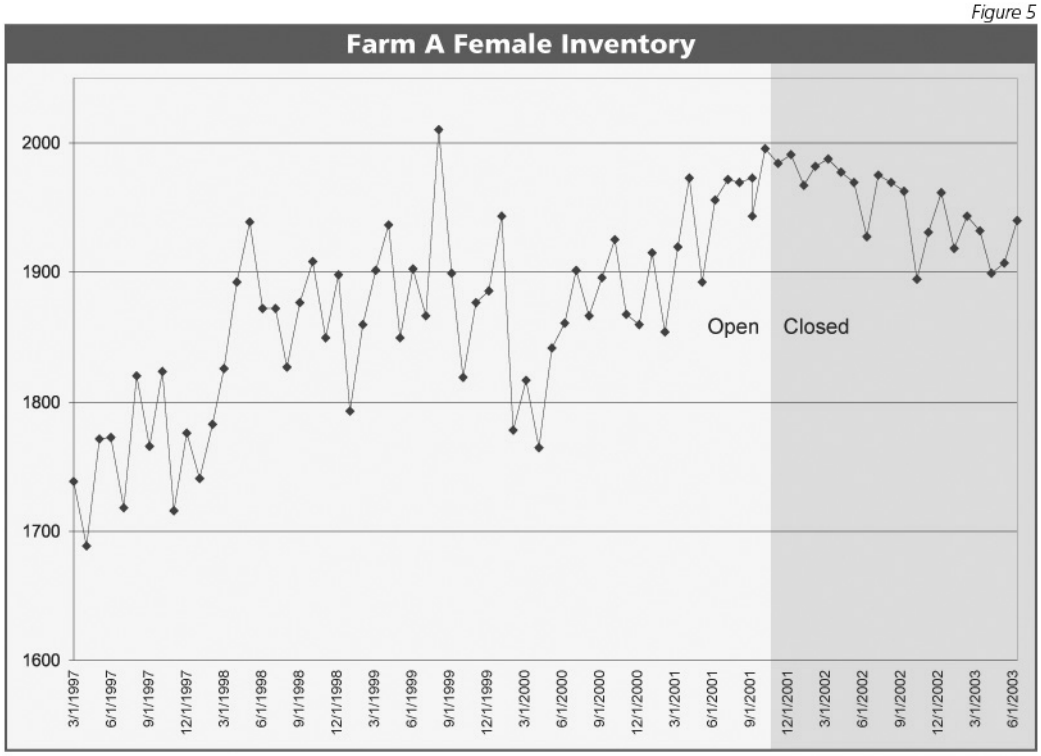


Figure 6

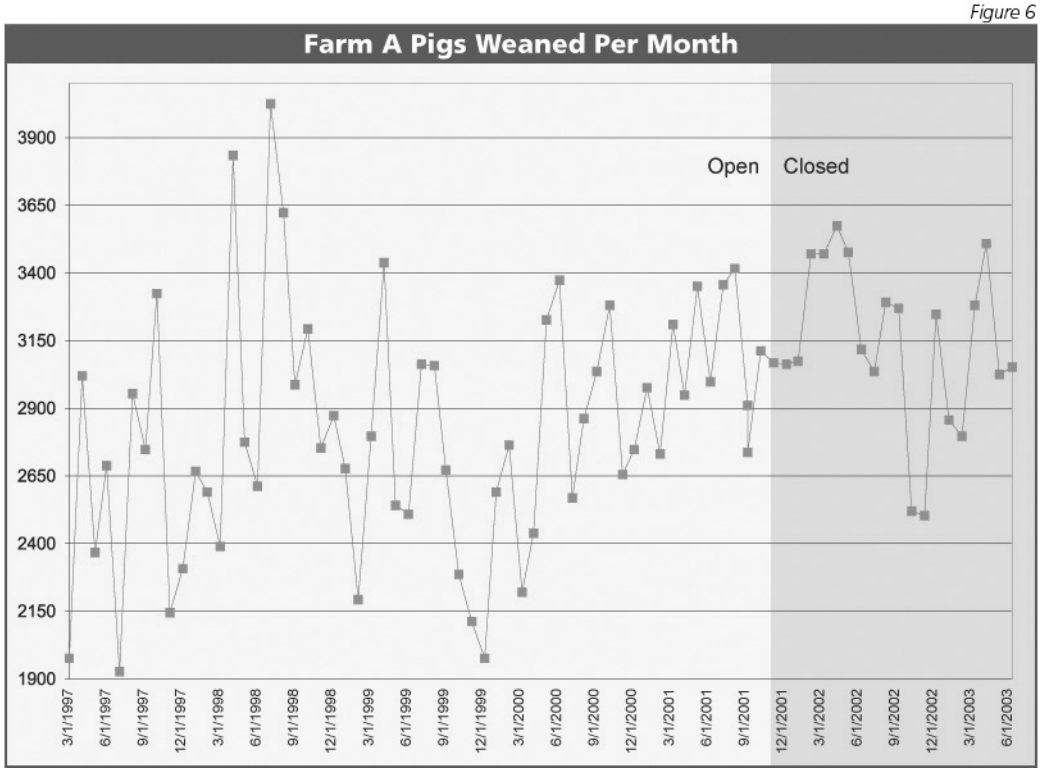


Figure 7

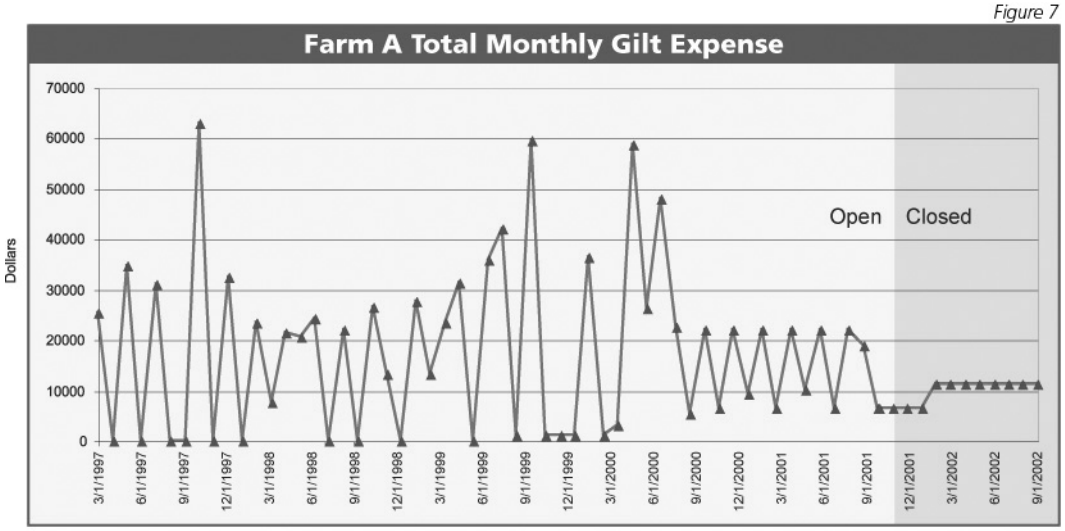


Figure 8

PRRS Outbreak Cost Comparison (1,200 Sows)

	Pre-PRRS	Post-PRRS
Wean/Week	539	409
Feed	$6.91	$8.61
Labor	$5.94	$7.01
Health	$1.34	$3.28
Cull Value	$2.10	$1.26
Total Cost/Pig	$30.54	$39.18

Figure 9

Production Cost Comparison (2,400 Sows)

	2000	2002
Wean/Week	887	1,010
Feed	$7.76	$6.35
Livestock	$4.18	$2.72
AI	$2.41	$1.60
Health	$2.80	$2.09
Labor	$6.27	$5.71
Total Cost/Pig	$36.51	$28.10

Figure 10

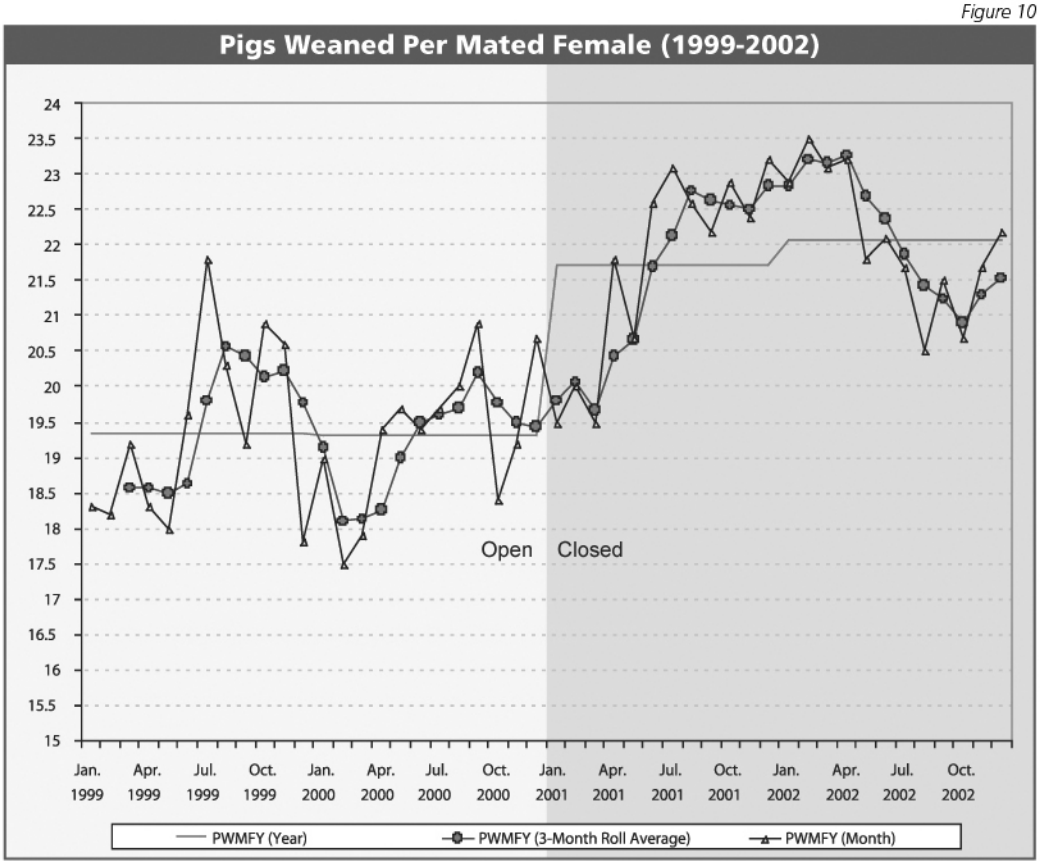


Figure 11

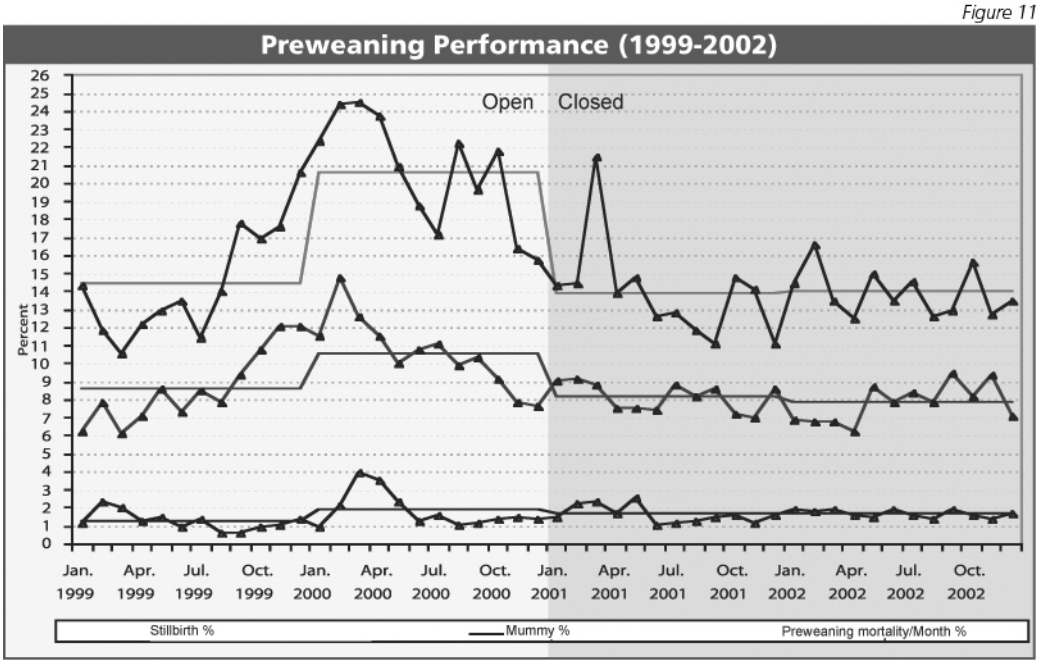
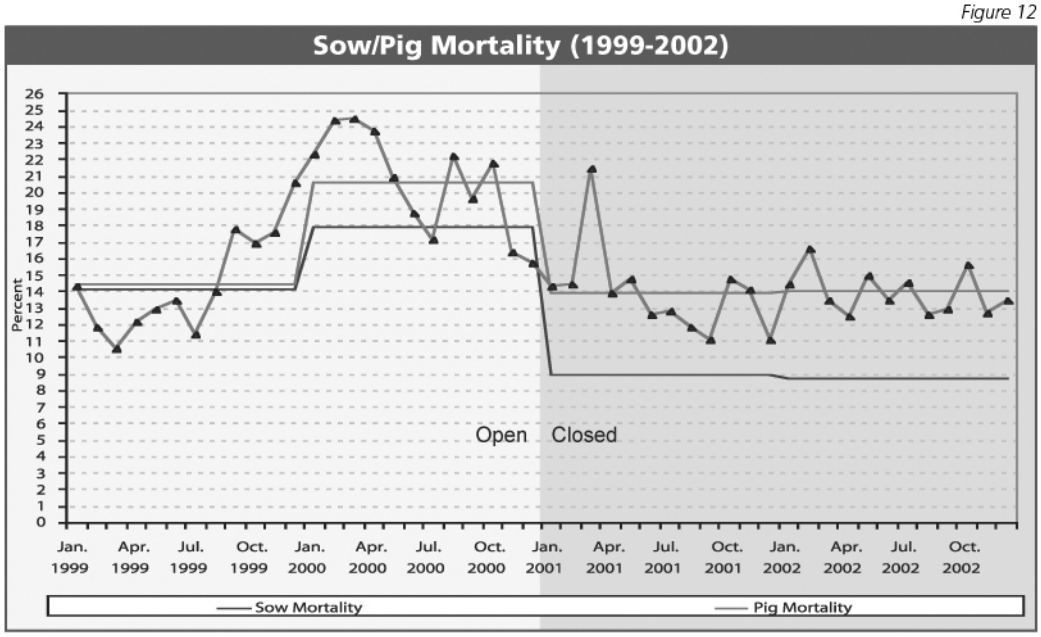


Figure 12


Sow/Pig Mortality (1999-2002)
Percent
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
Open
Closed
Jan. 1999
Apr. 1999
Jul. 1999
Oct. 1999
Jan. 2000
Apr. 2000
Jul. 2000
Oct. 2000
Jan. 2001
Apr. 2001
Jul. 2001
Oct. 2001
Jan. 2002
Apr. 2002
Jul. 2002
Oct. 2002
Sow Mortality
Pig Mortality