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# Economic impact of filtration as an intervention to prevent PRRS introductions: A case study of a 3200 farrow-to-finish system

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## Summary of case facts

- The following information is presented to summarize the economic performance of a 3200 head breed-to-wean farm located in a pig dense area in southern Minnesota/northern Iowa and its direct wean-to-finish production system.
  - The date of filtration was September 1, 2008. The scope of the study includes equal periods of time (120 weeks) both prior to and after filtration.
  - The case study farm experienced 10 PRRS introductions dating back to the farm's stocking date in 1998: 9 introductions prior to filtration (an average of 1 every 1.12 years). Of the 10 PRRS introductions prior to filtration, 5 introductions were experienced in only 48 months leading up to the filtration date, or 1:9.6 months.
  - One PRRS introduction occurred in the pre-filtration period, one introduction occurred in the post-filtration period.
- difficulty in capturing and comparing all variables
  - the decision to segregate or combine the economic impact of the breed-to-wean farm and the wean-to-finish system
  - the producer's ability and decision to manage fixed costs by replacing sub-standard farrowing performance with external weaned pigs to maximize fixed asset utilization or reduce fixed asset obligations if possible to match breed-to-wean throughput
  - changes in prices of inputs and revenue over time that may have the potential to either mask or magnify actual variance or force an alternative direction due to market-based economic analysis
  - the biological variability (i.e. one health challenge vs. another, feed quality change from crop year to crop year, etc.)

## Opening comments

When trying to evaluate the economic impact of results between pre-filtration and post-filtration periods, numerous confounders may prevent accurate analysis. While time is preferred to understand the effectiveness of filtration (specifically with regard to frequency of PRRS introductions), time creates additional confounders in measuring the economic impact due to broad changes in cost and price structures, genetic potential improvement, and overall management improvement. Therefore, the information presented is designed to educate and display actual results of a case study farrow-to-finish system *using a standardized cost and price structure* based on the cost and price structure experienced at the date of filtration (09/01/2008) as applied to both "non-filtered" and "filtered" periods of time while acknowledging the potential for impact from genetic and management improvement over the case study period.

## Confounders in economic analysis

Analyzing and segregating changes in the economics of pig production due to performance changes is very difficult, even within the same system, due to the following:

However, we can attempt to draw some reasonable conclusions using the performance data by standardizing the cost and price structure applied to the performance results realized over the case study periods. **The primary considerations to be analyzed over varying health challenges are as follows:**

- Variable cost considerations with health challenges:
  - › Feed grade medications and feed conversion changes (additional product)
  - › Vaccinations (additional product and labor)
  - › Animal health costs (additional vet services/diagnostics)
- Throughput considerations with health challenges:
  - › Fewer pigs marketed due to lower farrowing/weaning performance and/or higher mortality in finishing.
  - › Less pounds marketed due to sub-performance resulting from health challenges assuming same days on feed

## Analysis detail of the case study farm

The economic summary was compiled for the case study farm as reflected in Table 1 using actual farrowing performance data gathered from the pre-filtration and post-filtration periods, along with mortality and other performance indicators summarized from wean-to-finish data for the six 20-week periods preceding filtration as compared to the six 20-week periods following filtration. Table 2 summarizes an analysis of the cost of PRRS introductions experienced in each of the non-filtered and filtered periods by comparing the margin from the “PRRS Break” period as compared to the average margin resulting in the 20-week periods adjacent to the “PRRS Break” period. Tables 1 and 2 are summaries of the information presented in Table 3.

Table 3 is designed to summarize specifically the revenue and cost factors that were noted to have a quantitative variance. The revenue factors reflect the throughput impact and the ability to cover the primary cost factors (i.e. fewer pounds sold in one period vs. another). The primary cost factors reflect major considerations related to feed performance and changes in variable costs experienced. The analysis assumes that a static number of finishing spaces is dedicated to the production system and assumes that external weaned pigs were purchased (at a standard cost) to replace weaned pigs that did not exist due to farrowing sub-standard performance from a PRRS introduction. It is also important to note that the analysis is designed to eliminate price and performance volatility due to market influences and/or input quality.

## Conclusions

The case study farm has had 1 confirmed PRRS introduction since filtration, or 1:2.86 years – an improvement over the 48 month frequency experience prior to filtration of 1:9.6 months.

The results of the “PRRS Break” periods in Table 2 as compared to their adjacent periods within both the “non-filtered” and “filtered” studies are significant, comparable, and consistent with industry estimates of the cost of PRRS on a farrow-to-finish operation. Therefore, the data suggests that “a PRRS break is a PRRS break” regardless of filtration. The purpose of filtration is to reduce frequency of a new PRRS introduction.

The results experienced in the “filtered” period vs. the “non-filtered” period are significant in terms of throughput and related economic impact. However, we must acknowledge a portion of this throughput improvement could be due to genetic and or management improvement over 240 weeks, a 4.6 year period.

A PRRS introduction was experienced in the filtered period and was determined to be caused by a non-filter bio-security breach. PRRS introduction frequency data summarized on 15 filtered farms (which includes the case study farm) reports significant improvement of PRRS introduction frequency within the population of reporting farms (see Table 4).

## Acknowledgement

The author would like to thank Dr Gordon Spronk, Pipestone System, for sharing and challenging ideas on this topic and contributing informational material.

**Table 1:** Summary of pre-filtration and post-filtration farrow-to-finish performance (see Table 3 for detail).

	Pre-filtration	Post-filtration	Change
<b>Breed-to-wean performance:</b>			
PSY (see Figure 1)	23.3	25.1	+1.8
Farrowing rate (see Figure 2)	81.1%	88.8%	+7.7%
Live born (see Figure 3)	11.7	12.3	+0.6
Pre-wean mortality (see Figure 4)	13.3%	13.6%	+0.3%
Sow mortality (see Figure 5)	12.4%	6.6%	-5.8%
Total pigs weaned (see Figure 6)	161,561	175,744	+14,180
<b>Wean-to-finish performance:</b>			
Mortality	10%	6%	-4%
ADG	1.54	1.55	+0.01
FC	2.64	2.52	-0.12
Pounds sold (Live)	41,748,980	43,900,200	+2,151,220
Operating margin	\$3,218,462	\$5,471,434	+\$2,252,972
Per sow space (Annualized)	\$436	\$741	+\$305

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Figure 1: PSY

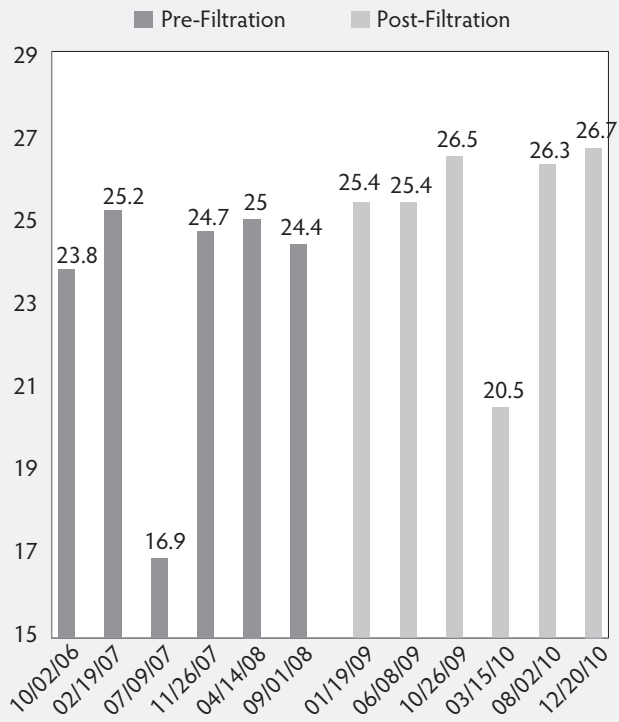


Figure 2: Farrowing rate

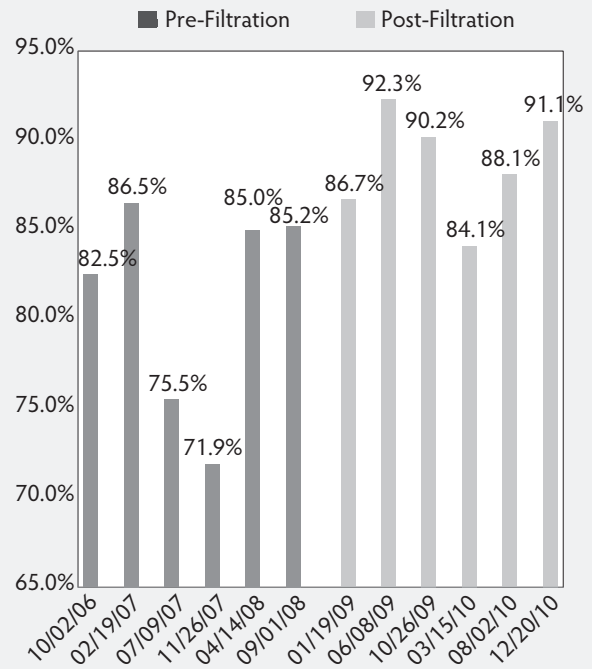


Figure 3: Live born

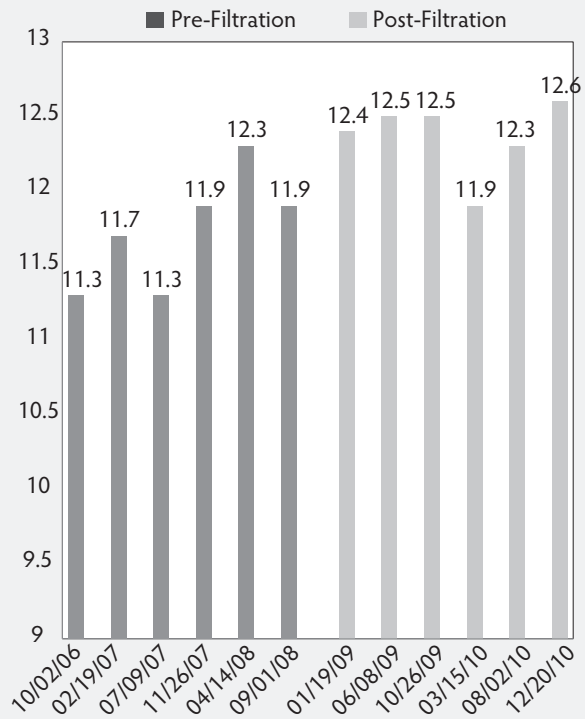
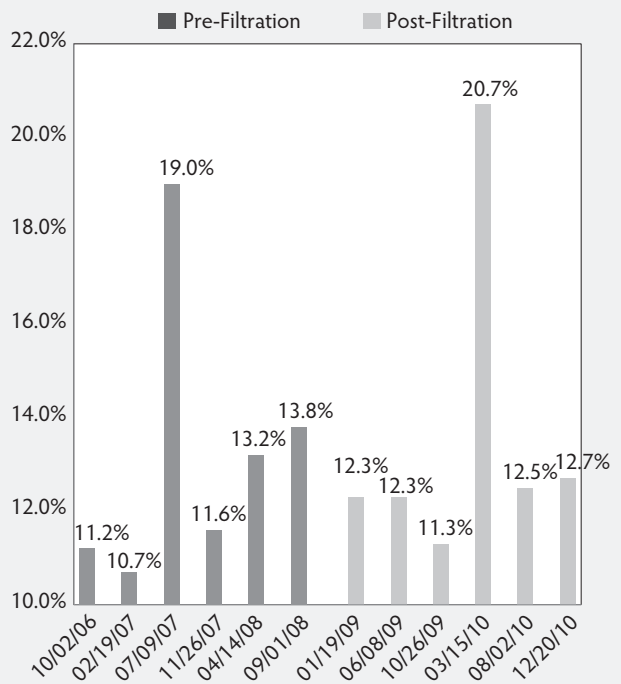
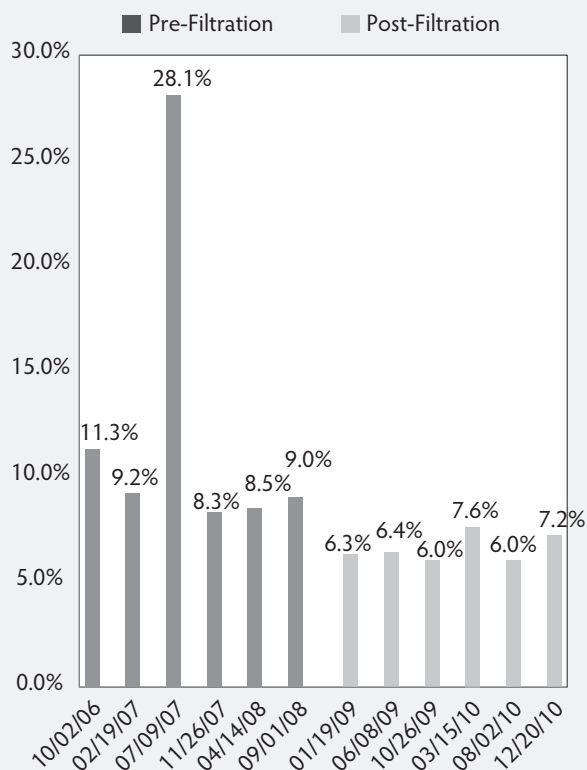


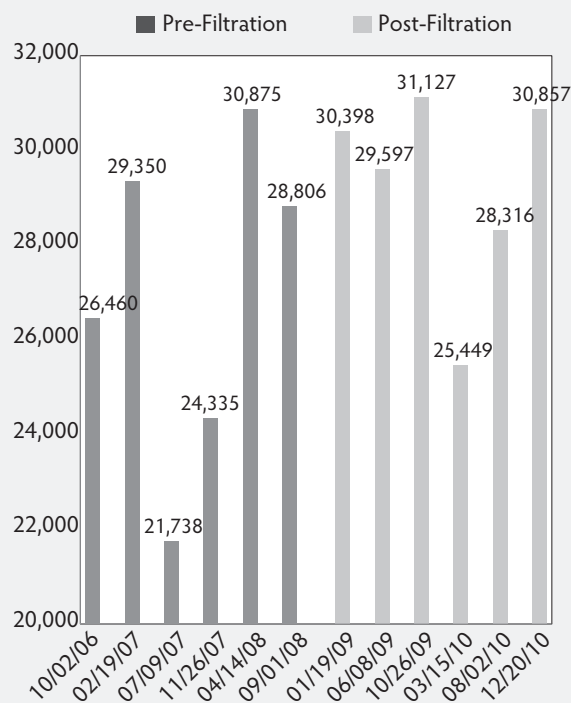
Figure 4: Pre-wean mortality



**Figure 5: Sow mortality**



**Figure 6: Pigs weaned**



**Table 2: Economic analysis of the cost of PRRS introductions.**

PRRS break period	Margin change	Per sow space	Per pig weaned (@25PSY)
Period -4 (pre-filtration)	(\$812,742)	\$660	\$10
Period +4 (post-filtration)	(\$720,564)	\$585	\$ 9

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Table 3: Performance data and economic analysis.

Filter Date 9/1/2008	Performance Data & Economic Analysis 3200 Farrow-to-Finish Summary: Before and After Filtration																					
	NOT FILTERED			9/1/2008			1/19/2009			6/8/2009			10/26/2009			3/15/2010						
20 Weeks Ending Period #	10/2/2006	2/19/2007	11/26/2007	4/14/2008	9/1/2008	1/19/2009	6/8/2009	10/26/2009	3/15/2010	8/2/2010	12/20/2010	7/9/2007	1/26/2007	11/2/2007	7/9/2007	4/1/2008	9/1/2008	1/19/2009	6/8/2009	10/26/2009	3/15/2010	
	-6	-5	-3	-2	-1	1	2	3	4 (PRRS Break)	5	6											
PSY	23.8	25.2	16.9	24.7	25	24.4	25.4	25.4	26.5	26.3	26.7											
Farrowing Rate	82.5%	86.5%	75.5%	85.0%	85.2%	86.7%	92.3%	92.3%	90.2%	88.1%	91.1%											
Live Born	11.3	11.7	11.3	11.9	12.3	12.4	12.5	12.5	12.5	12.3	12.6											
PWM	11.2%	10.7%	19.0%	11.6%	13.8%	12.3%	12.3%	11.3%	11.3%	12.5%	12.7%											
Sow Mortality	11%	9%	28%	8%	9%	6%	6%	6%	6%	6%	6%											
Pigs Weaned	26460	29350	21738	30875	28806	30398	29597	31127	25449	28316	30857											
<b>Sow Operations:</b>																						
Fixed Costs	\$ 35.93	\$ 32.39	\$ 45.73	\$ 40.06	\$ 30.79	\$ 31.27	\$ 32.12	\$ 30.54	\$ 39.35	\$ 33.57	\$ 30.81											
Variable Costs	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00	\$ 2.00											
Total Cost of Weaned Pigs Placed/Sold	\$ 37.93	\$ 34.39	\$ 47.73	\$ 42.06	\$ 32.79	\$ 33.27	\$ 34.12	\$ 32.54	\$ 41.35	\$ 35.57	\$ 32.81											
<b>Wean-To-Finish Operations:</b>																						
Max Pigs Placed	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000											
Placed	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000	29,000											
Extra Weaned Pigs Sold (Needed)	(2,540)	350	(7,262)	(4,665)	(1,944)	1,398	597	2,127	(3,551)	(684)	1,857											
Total Market Weight Head Sold	25,520	26,100	24,940	26,680	26,970	27,260	27,550	27,840	26,100	27,260	27,550											
Wean To Finish Mortality	12%	10%	14%	8%	8%	6%	7%	4%	10%	6%	5%											
Avg Start Weight	12.5	13.0	12.5	13.0	13.5	13.5	14.0	12.5	12.5	13.0	13.5											
Avg Sell Weight	268.0	268.0	268.0	270.0	270.0	270.0	270.0	270.0	260.0	270.0	270.0											
Avg DOF	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0	165.0											
ADG	1.55	1.55	1.49	1.55	1.55	1.55	1.55	1.55	1.50	1.56	1.55											
Avg LBS of Feed/Hd	682.50	669.50	695.50	656.50	650.00	643.50	637.00	630.50	669.50	643.50	637.00											
FC	2.67	2.63	2.83	2.63	2.56	2.51	2.48	2.46	2.71	2.50	2.48											
Avg Cost per Ton of Feed	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00	\$ 225.00											
<b>Financial Summary:</b>																						
Pig Placement Cost	\$ 1,099,849.66	\$ 997,262.08	\$ 1,384,163.68	\$ 950,869.38	\$ 1,015,000.00	\$ 964,880.12	\$ 989,423.52	\$ 943,640.83	\$ 1,199,238.71	\$ 1,031,560.60	\$ 951,390.22											
Cost of Extra Weaned Pigs Sold / Needed	\$ 96,331.66	\$ 12,035.92	\$ 346,613.68	\$ 61,478.62	\$ 67,900.00	\$ 46,513.88	\$ 20,368.48	\$ 69,211.17	\$ 146,844.71	\$ 24,330.60	\$ 60,921.78											
Feed Costs	\$ 1,959,457.50	\$ 1,965,819.38	\$ 1,951,399.13	\$ 1,970,484.75	\$ 1,972,181.25	\$ 1,973,453.63	\$ 1,974,301.88	\$ 1,974,726.00	\$ 1,965,819.38	\$ 1,973,453.63	\$ 1,974,301.88											
Standard Health Costs / Head Placed	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50	\$ 3.50											
Extra Health Costs (apply if Mort%>8%)	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00	\$ 1.00											
Total Health Costs	\$ 114,840.00	\$ 117,450.00	\$ 112,230.00	\$ 93,380.00	\$ 94,395.00	\$ 95,410.00	\$ 96,425.00	\$ 97,440.00	\$ 117,450.00	\$ 95,410.00	\$ 96,425.00											
Total Costs	\$ 3,270,478.82	\$ 3,092,567.38	\$ 3,794,406.48	\$ 3,499,320.12	\$ 3,076,212.75	\$ 3,088,366.25	\$ 3,080,257.63	\$ 3,085,018.88	\$ 3,429,352.80	\$ 3,124,754.83	\$ 3,083,038.88											
<b>Marketing</b>																						
Total Pounds Sold (Live)	6,839,360	6,994,800	6,434,520	7,203,600	7,281,900	7,360,200	7,438,500	7,516,800	6,786,000	7,360,200	7,438,500											
Live Price	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55	\$ 0.55											
Market Hog Sales	\$ 3,761,648.00	\$ 3,847,140.00	\$ 3,538,986.00	\$ 3,961,980.00	\$ 4,005,045.00	\$ 4,048,110.00	\$ 4,091,175.00	\$ 4,134,240.00	\$ 3,732,300.00	\$ 4,048,110.00	\$ 4,091,175.00											
Extra Pig Sell Off @ \$35	\$ -	\$ 12,250.00	\$ -	\$ 65,250.00	\$ -	\$ 48,930.00	\$ 20,895.00	\$ 74,445.00	\$ -	\$ -	\$ -											
Total Revenue	\$ 3,761,648.00	\$ 3,859,390.00	\$ 3,538,986.00	\$ 4,027,605.00	\$ 4,005,045.00	\$ 4,097,040.00	\$ 4,112,070.00	\$ 4,208,685.00	\$ 3,732,300.00	\$ 4,048,110.00	\$ 4,156,170.00											
Operating Margin	\$ 491,169.18	\$ 766,822.63	\$ (255,420.48)	\$ 347,819.88	\$ 951,392.25	\$ 1,016,782.38	\$ 1,031,551.13	\$ 1,123,667.00	\$ 302,947.20	\$ 923,355.17	\$ 1,073,131.13											
Margin / Sow Space - Annualized	\$ 399.07	\$ 623.04	\$ (207.53)	\$ 282.60	\$ 773.01	\$ 826.14	\$ 838.14	\$ 912.98	\$ 246.14	\$ 750.23	\$ 871.92											
<b>Before &amp; After Totals:</b>																						
Operating Margin	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -											
Per Sow Space (Annualized Average)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -											
Operating Margin Change	\$ 812,741.73	\$ 660.35	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73	\$ 812,741.73											
Per Sow Space (Annualized Average)	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09	\$ 5305.09											

Production

**Table 4:** Filter farm PRRS infection frequency data.

<b>PRRS introduction frequency analysis (Date 7/28/2011)</b>	
# of farms in data set	15
# of spaces	45,400
# of breaks-prior to filtration (highlighted in light grey)	83
# of breaks-after filtration (highlighted in dark grey)	2
<b>Barn years:</b>	
Pre-filter barn years	134.5
Pre-filter avg. barn year	9.0
Filtered barn years	33.3
Filtered avg. barn year	2.2
<b>Pre-filter PRRSv breaks:</b>	
Avg. days between breaks	592
Avg. years between breaks	1.6
% breaks vs. barn years	61.7%
<b>Filtered PRRSv breaks:</b>	
Avg. days between breaks	6071.5
Avg. years between breaks	16.6
% breaks vs. barn years	6.0%

