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# Economic Impact of Porcine Reproductive and Respiratory Syndrome Virus on U.S. Pork Producers

## A.S. Leaflet R2671

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### Summary and Implications

Information is provided on the productivity and economic impacts of PRRS disease in the U.S. breeding herd and growing pig herd.

The total annual loss from PRRS in U.S. breeding herds was estimated at \$302.06 million, i.e., \$52.19 per breeding female or \$2.36 per pig weaned. The majority of the loss in the breeding herd was due to reduced revenue (\$300.4 million) resulting from weaning 8.3 million fewer pigs. Combining the losses in the breeding and growing pig herds resulted in 9.9 million fewer pigs, or 2.41 billion fewer pounds of pork (carcass weight), sold per year in the U.S. The estimated annual loss in the growing pig herd was \$361.8 million or \$62.52 per breeding female. As in the breeding herd, lost revenue of \$1.62 billion, rather than increased cost, was the primary source of losses attributed to PRRS. With PRRS, costs were lowered by \$1.25 billion because fewer pigs and pounds of pork were produced, thereby partially offsetting the lost revenue. In summary, the estimated total cost of PRRS in the U.S. national breeding and growing pig herd was at \$664 million annually (\$1.8 million per day).

In addition, information on veterinary costs, biosecurity costs, and other costs from the survey of expert opinion were used to estimate these annual costs attributed to PRRS virus. The additional veterinary costs were estimated to be \$140.11 million annually. The annual biosecurity and other outbreak related costs attributed to PRRS were estimated to be \$191.86 million and \$145.82 million, respectively. The total additional costs attributed to PRRS for veterinary, biosecurity and other outbreak related costs were \$477.79 million annually.

### Introduction

An economic analysis published in 2005 estimated that productivity losses from clinical porcine reproductive and respiratory syndrome (PRRS) virus infections cost U.S. pork producers \$560 million dollars annually. Since the 2005 study, pig production and health strategies have evolved, PRRS virus control/elimination strategies have improved,

and structural adjustments have occurred in the industry. Because of these developments, it was reasonable to question whether the incidence, severity, and/or impact of PRRS outbreaks on pig health and productivity in the U.S. herd may have changed since the 2005 study was conducted.

The primary objective of the 2011 study was to estimate the current economic impact of PRRS virus in the U.S., taking into account the noted changes in the industry. The secondary objective information obtained from this analysis will provide data useful for veterinarians and producers responsible for the control and/or elimination of PRRS virus at the herd, local, regional, and national levels and for use by decision makers responsible for the allocation of resources for swine health research. Furthermore, the information will help producers and veterinarians make better decisions when considering strategies to control or eliminate PRRS virus from individual herds.

To initiate the study, a review of the literature was done to collect all information available in the public domain on the economic impact of PRRS virus. Thereafter, data for the economic analysis was compiled from several sources: (1) swine health surveillance data collected by the USDA National Animal Health Monitoring System (NAHMS) from commercial U.S. pork producers; (2) a survey of swine veterinary experts on the incidence and impact of clinical PRRS on pigs.

### Materials and Methods

The economic impact of PRRS virus was estimated separately for the U.S. national breeding and growing pig herds. Costs evaluated included those arising from productivity losses, veterinary expenses, implementation of enhanced biosecurity measures, and changes to pig management implemented to reduce the impact of PRRS on other diseases. Data for the analysis was obtained from three sources: (1) swine health surveillance data collected from commercial U.S. pork producers by the USDA National Animal Health Monitoring System (NAHMS) during 2005 to 2006; (2) a survey of experts (full time clinical swine veterinarians) conducted in 2011 to ascertain their opinions on the incidence of PRRS infection and its impact pig production efficiency; and (3) 2005 to 2010 production records from a sample of commercial farms with known PRRS virus status.

Fifty-nine swine veterinary experts, selected by purposive sampling from the membership of the American Association of Swine Veterinarians, were surveyed to obtain subjective data on the incidence, severity, and cost of PRRS on U.S. swine farms. Estimates of productivity

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losses due to PRRS were derived from an analysis of farm production records collected from a convenience sample of U.S. commercial farms with known PRRS status. During 2011, monthly production data from 80 breeding herds was collected retrospectively for the period beginning January 1, 2005 and ending December 31, 2010. Data on growing pigs were obtained through a convenience sampling of groups of growing pigs where the PRRS status was known at both placement and marketing. Only those groups managed as all-in-all-out cohorts were included in the study. Study groups included both wean-to-finish production systems and only those multi-site production systems (having separate nursery and finisher sites) whereby group integrity was maintained between the sites. Performance data were obtained from 639 groups with a marketing close-out date between January 1, 2005 and December 31, 2010. The minimum data required in order for a group to be included in the study were wean-to-finish average daily gain (ADG), feed conversion rate (FCR), percent of pigs sold in the primary market (PMP), and mortality (MOR). Information on veterinary costs (pharmaceutical, immunization, and diagnostics testing costs) was also collected from groups when available.

Information in Table 1 shows the classification of breeding herds and growing pig herds. For the breeding herd the classifications are based on the classification system developed by the American Association of Swine Veterinarians (AASV) and the United States Department of Agricultural PRRS Coordinated Agricultural Program (PRRS-CAP). Breeding herd categories are BH-A, BH-B, BH-C and Bh-D. Growing herd categories are GP-A, GP-B, and GP-C. Descriptions of each category are provided in Table 1.

A partial budgeting approach was utilized to determine the cost of productivity losses due to the disease in the U.S. industry. To avoid the effect of farm-to-farm variation in prices, capital expenditures, and variable input costs, standard values were used in the budgeting model.

### Results and Discussion

The projected economic impact for the U.S. breeding herd is provided in Table 2. Impact on productivity is also provided in Table 2. Results are provided for the base (WO PRRS) which is a scenario without PRRS and the current level of PRRS disease (CURRENT) in the breeding herd. Productivity information shows that litters farrowed as a result of PRRS are projected to decline by 265,178 litters annually. There would be 8,299,457 fewer pigs weaned or 1.43 fewer pigs weaned per female per year. The annual economic impact was projected to be \$302,061 in breeding herds. This is \$52.19 per breeding female or \$2.36 per pig weaned.

The projected economic impact and productivity impact for the growing pig herd are provided in Table 3. Results are again provided for the base which is a scenario without PRRS and for the current level of PRRS in the growing pig herd. It is projected that there would be 9,931,250 fewer market pigs marketed. The total annual economic impact in the growing pig herd was \$361,855,958. This is \$62.52 per breeding female or \$.77 per 100 pounds live weight. This would be about \$2.08 per market hog given the average marketing weight of about 270 pounds.

Table 4 provides information for the pig production industry (breeding herd and growing pig herd). The annual economic impact was projected to be \$663,916,600 or \$114.71 per breeding female.

In addition to the cost of productivity losses due to PRRS, \$140.11 million in veterinary costs, \$191.86 million in biosecurity related costs, and \$145.82 million in other outbreak related costs per year were estimated in this study. The total attributed to PRRS for these additional costs was \$477.79 million annually.

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**Table 1. Classification of breeding herds and growing pig herds for estimating the impact of PRRS virus.**

<b>Breeding Herd PRRS Category</b>	<b>Description</b>
BH-A	PRRS virus-free herd (AASV/PRRS-CAP category III or IV)
BH-B	Herd that had a PRRS outbreak within the last 12 months and was PRRS virus-free (AASV/PRRS-CAP category III or IV) before the outbreak
BH-C	PRRS virus-infected herd (AASV/PRRS-CAP category I or II) that has not had a PRRS outbreak for at least 12 months
BH-D	Herd that had a PRRS outbreak within the last 12 months and was PRRS virus-infected (AASV/PRRS-CAP category I or II) before the outbreak
<b>Growing Pig PRRS Category</b>	<b>Description</b>
GP-A	PRRS negative at weaning and remained negative until marketing
GP-B	PRRS negative at weaning but became infected sometime prior to marketing
GP-C	PRRS positive at weaning and remained positive throughout the growing period

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**Table 2. Productivity and economic impact of PRRS virus in the breeding herd.**

<b>BREEDNG HERD</b>	<b>WO PRRS</b>	<b>CURRENT</b>
<b>Productivity Impact</b>		
Breeding female inventory	5,788,000	5,788,000
<i>Difference</i>		0
Litters farrowed (litters/year)	12,658,607	12,393,428
<i>Difference</i>		-265,178
Pigs born alive (pigs/year)	141,538,890	133,676,522
<i>Difference</i>		-7,862,368
Pigs weaned (pigs/year)	123,727,558	115,428,101
<i>Difference</i>		-8,299,457
Pigs weaned/female/year	21.38	19.94
<i>Difference</i>		-1.43
<b>Economic Impact (Annual)</b>		
Total revenue (\$/year)	\$4,478,438	\$4,177,722,775
<i>Difference</i>		-\$300,384,664
Total fixed costs (\$/year)	\$1,503,328,961	\$1,510,525,063
<i>Difference</i>		\$7,196,102
Total variable costs (\$/year)	\$2,533,049,882	\$2,527,529,759
<i>Difference</i>		-\$5,520,124
Total costs (\$/year)	\$4,036,378,843	\$4,038,054,822
<i>Difference</i>		\$1,675,979
<b>Net (\$/year)</b>	\$441,728,595	\$139,667,953
<b>Total annual cost of PRRS in U.S. breeding herds</b>		<b>-\$302,060,642</b>
<b>Economic Impact (per breeding female)</b>		
Total revenue (\$/breeding female)	\$773.69	\$721.79
<i>Difference</i>		-\$51.90
Total fixed costs (\$/breeding female)	\$259.73	\$260.98
<i>Difference</i>		\$1.24
Total variable costs (\$/breeding female)	\$437.64	\$436.68
<i>Difference</i>		-\$0.95
Total costs (\$/breeding female)	\$697.37	\$697.66
<i>Difference</i>		\$0.29
<b>Net (\$/breeding female)</b>	\$76.32	\$24.13
<b>Annual cost of PRRS in U.S. breeding herds (\$/breeding female)</b>		<b>-\$52.19</b>
<b>Economic Impact (per pig weaned)</b>		
Total revenue (\$/pig weaned)	\$36.19	\$36.19
<i>Difference</i>		\$0.00
Total fixed costs (\$/pig weaned)	\$12.15	\$13.09
<i>Difference</i>		\$0.94
Total variable costs (\$/pig weaned)	\$20.47	\$21.90
<i>Difference</i>		\$1.42
Total costs (\$/pig weaned)	\$32.62	\$34.98
<i>Difference</i>		\$2.36
<b>Net (\$/pig weaned)</b>	\$3.57	\$1.21
<b>Annual cost of PRRS in U.S. breeding herds (\$/pig weaned)</b>		<b>-\$2.36</b>

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**Table 3. Productivity and economic impact of PRRS virus in the growing pig herd.**

<b>GROWING PIG HERD</b>	<b>WO PRRS</b>	<b>CURRENT</b>
<b>Productivity Impact</b>		
Pigs marketed (pigs/year)	119,401,146	109,469,896
<i>Difference</i>		-9,931,250
Live weight marketed in category (lbs/year)	31,461,977,512	28,746,221,079
<i>Difference</i>		-3,215,756,432
Carcass weight marketed in category (lbs/year)	23,596,483,134	21,184,665,809
<i>Difference</i>		-2,411,817,324
<b>Economic Impact (Total)</b>		
Total revenue (\$/year)	\$16,067,034,807	\$14,451,784,609
<i>Difference</i>		-\$1,615,250,199
Total weaned pig costs (\$/year)	\$4,599,206,623	\$4,298,821,959
<i>Difference</i>		-\$300,384,664
Total fixed costs (\$/year)	\$1,468,541,544	\$1,372,627,750
<i>Difference</i>		-\$95,913,794
Total variable costs (\$/year)	\$8,599,832,491	\$7,742,736,709
<i>Difference</i>		-857,095,783
Total costs (\$/year)	\$14,667,580,658	\$13,414,186,417
<i>Difference</i>		-\$1,253,394,241
<b>Net (\$/year)</b>	\$1,399,454,149	\$1,037,598,191
<b>Total annual cost of PRRS in U.S. growing pig herds</b>		<b>-\$361,855,958</b>
<b>Economic Impact (per breeding female)</b>		
Total revenue (\$/breeding female)	\$2,775.92	\$2,496.85
<i>Difference</i>		-\$279.07
Total weaned pig costs (\$/breeding female)	\$794.61	\$742.71
<i>Difference</i>		-\$51.90
Total fixed costs (\$/breeding female)	\$253.72	\$237.15
<i>Difference</i>		-\$16.57
Total variable costs (\$/breeding female)	\$1,485.80	\$1,337.72
<i>Difference</i>		-\$148.08
Total costs (\$/breeding female)	\$2,534.14	\$2,317.59
<i>Difference</i>		-\$216.55
<b>Net (\$/breeding female)</b>	\$241.79	\$179.27
<b>Annual cost of PRRS in U.S. growing pig herds (\$/breeding female)</b>		<b>-\$62.52</b>
<b>Economic Impact (per cwt live weight)</b>		
Total revenue (\$/cwt live wt)	\$51.07	\$51.16
<i>Difference</i>		\$0.10
Total weaned pig costs (\$/cwt live wt)	\$14.62	\$15.22
<i>Difference</i>		\$0.60
Total fixed costs (\$/cwt live wt)	\$4.67	\$4.86
<i>Difference</i>		\$0.19
Total variable costs (\$/cwt live wt)	\$27.33	\$27.41
<i>Difference</i>		\$0.08
Total costs (/cwt live wt)	\$46.62	\$47.49
<i>Difference</i>		\$0.87
<b>Net (\$/cwt live wt)</b>	\$4.45	\$3.67
<b>Annual cost of PRRS in U.S. growing pig herds (\$/cwt live wt)</b>		<b>-\$0.77</b>

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**Table 4. Economic impact of PRRS virus in the breeding and growing pig herds combined.**

<b>BREEDNG AND GROWING PIG HERDS COMBINED</b>	<b>WO PRRS</b>	<b>CURRENT</b>
<i>Economic Impact (Total)</i>		
Total revenue (\$/year)	\$20,545,142,246	\$18,629,507,383
<i>Difference</i>		-\$1,915,634,862
Total weaned pig costs (\$/year)	\$4,599,206,623	\$4,298,821,959
<i>Difference</i>		-\$300,384,664
Total fixed costs (\$/year)	\$2,971,870,505	\$2,883,152,813
<i>Difference</i>		\$88,717,692
Total variable costs (\$/year)	\$11,132,882,374	\$10,270,266,467
<i>Difference</i>		\$862,615,906
Total costs (\$/year)	\$18,703,959,501	\$17,452,241,239
<i>Difference</i>		-\$1,251,718,262
<b>Net (\$/year)</b>	<b>\$1,841,182,745</b>	<b>\$1,177,266,144</b>
<b>Total annual cost of PRRS in U.S.</b>		<b>-\$663,916,600</b>
<i>Total cost of PRRS in U.S. (\$/day)</i>		-\$818,950
<i>Economic Impact (Per breeding female)</i>		
Total revenue (\$/breeding female)	\$3,549.61	\$3,218.64
<i>Difference</i>		-\$330.97
Total weaned pig costs (\$/breeding female)	\$794.61	\$742.71
<i>Difference</i>		-\$51.90
Total fixed costs (\$/breeding female)	\$513.45	\$498.13
<i>Difference</i>		-\$15.33
Total variable costs (\$/breeding female)	\$1,923.44	\$1,774.41
<i>Difference</i>		-\$149.04
<b>Net (\$/breeding female)</b>	<b>\$318.10</b>	<b>\$203.40</b>
<b>Total annual cost of PRRS in U.S.</b>		<b>\$114.71</b>