

SWINE HEALTH

Title: Assessment of the Economic Impact of Porcine Reproductive and Respiratory Syndrome Virus on U.S. Pork Producer - **NPB #10-158**

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SCIENTIFIC ABSTRACT

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 of the study was to conduct an economic analysis of PRRS virus elimination from a herd. Similar to the 2005 cost of PRRS study, a budgeting approach was utilized to determine the cost of productivity losses attributed to the disease. This approach had the advantage of producing results that were directly comparable to the 2005 cost estimate.

The economic impact of productivity losses attributed to PRRS was estimated separately for the U.S. breeding herd and the growing pig herd. The primary source for estimates of productivity losses due to PRRS was a survey of production performance records from a sample of U.S. commercial farms with known PRRS status. Breeding herds were categorized according to their PRRS status and whether they experienced a PRRS outbreak in the previous 12 months. Herds categorized as BH-A were PRRS virus-free. BH-B herds had experienced a PRRS outbreak within the last 12 months, but were PRRS virus-free before the outbreak. BH-C herds PRRS virus-infected, but had not experienced a PRRS outbreak for at least 12 months. BH-D herds had experienced a PRRS outbreak within the last 12 months and were PRRS virus-infected before the outbreak. The PRRS category assigned to a breeding herd may change over time. Groups of growing pig were placed into three categories defined by their PRRS status at placement and marketing. GP-A groups were PRRS negative at weaning and remained negative until marketing, GP-B: groups were PRRS negative at weaning, but became

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infected sometime prior to marketing. GP-C groups were PRRS positive at weaning and remained positive throughout the growing period.

Monthly production measures from the survey of production performance records in the breeding herd were analyzed using linear mixed models. PRRS category, month, and year were used as fixed effects. Farm and production system were included as random effects in models to account for the correlated structure of monthly data within each farm and production system. Each of the productivity measures in the growing pig data were also analyzed using linear mixed models and farm and production system were included as random effects to account for the correlated structure of group closeout data within each farm and production system. The least squares mean estimates of the productivity measures from the statistical analysis of the production records survey were used in the budgeting model. The estimates were made for each PRRS category in the breeding herd (BH-A, B, C, and D) and growing pig herd (GP-A, B, and C).

Other costs evaluated included veterinary expenditures, costs related to enhanced biosecurity, and costs related to management changes implemented to reduce the impact of PRRS. The data for the analysis was obtained from three 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 pig production efficiency; and (3) a survey of production records recorded during the period 2005 to 2010 from commercial farms with known PRRS virus status.

The total cost of PRRS in the U.S. pork industry due to the combined losses in productivity in the breeding and growing pig herds was estimated to be \$664 million annually. Compared to the \$560 million annual cost estimated in 2005, this represents an increase of approximately \$104 million dollars annually. The 2011 study differed most significantly from the 2005 study in the allocation of losses between the breeding and the growing pig herd. Specifically, losses in the breeding herd accounted for 12% of the total cost of PRRS in the 2005 study compared to 45% in the current analysis. Differences between the 2005 and the 2011 studies may be attributed to changes in the prevalence of PRRS virus and incidence of outbreaks, production and animal health management practices, inflation and other pathogens that have emerged since 2005 such as porcine circovirus type 2 (PCV2). The total additional costs attributed to PRRS for veterinary, biosecurity and other outbreak related costs were \$477.79 million annually.

A net present value (NPV) analysis was performed to evaluate PRRS virus elimination from individual herds. The NPV analysis conducted for this study is the first analysis of which the authors are aware that accounts for the more severe negative production and economic consequences of a PRRS outbreak when a PRRS virus-free herd is reinfected relative to the consequences had the herd remained PRRS virus-infected. Two approaches to eliminating PRRS virus from a herd were evaluated; (1) complete depopulation and repopulation (CDR) of the herd with PRRS virus-free breeding animals and (2) herd closure and rollover (HCR). When HCR was the method of elimination the time breeding herds need to remain negative to break even on the cost of elimination ranged from 4 to 26 months. When CDR was the method of elimination, the minimum time to break even ranged from 18 to 83 months.