

## Stochastic partial budgeting of intervention strategies used to control outbreaks of porcine reproductive and respiratory syndrome in Canadian sow herds

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Quantitative investigations of different PRRS intervention strategies are scarce. The objective of this project was to: (i) describe intervention strategies, (ii) determine duration of outbreaks and assess production parameters during and after outbreaks, and (iii) evaluate economic efficiency of intervention strategies using stochastic partial budgeting model.

Veterinarians in Ontario and Quebec (Canada) voluntarily provided computer records from sow farms that experienced PRRS outbreaks between 01/2004 and 2008, and to fill a questionnaire providing demographic, diagnostic, and intervention data. Diagnosis of field type of PRRS during outbreak was one of five inclusion criteria. Major intervention categories were predefined in consultation with practitioners. Computer records were extracted and collapsed to weekly averages or counts, as appropriate. Temporal multivariate scan statistics (SatScan 7.0) was used to determine onset and duration of outbreaks. Weekly data were then summarized to three periods for each farm: (i) 6-months pre-outbreak, (ii) outbreak, (iii) 6 months post-outbreak. Proportional change in number of pigs weaned was calculated for each period, relative to pre-outbreak level. Cost of intervention was calculated. Best fitting distributions were determined within each intervention category and stochastic partial budgeting model was constructed (@Risk). Proportion of sows that farrow per week and average number of pigs weaned per litter were estimated using random intercept linear model; intercept and residual standard deviation were also used in the economic model. Scenario evaluated was based on fixed herd size of 1000 sows, 36\$CND for a weaned pig, and 32 weeks after the start of outbreak

Six categories of interventions were used in this study: (1) No intervention (NI), (2) Early homologous exposure, (3) Late homologous exposure (LHE), (4) Homologous exposure and tilmicosin (Pulmotil), (5) Commercial vaccine, and (6) Tilmicosin (Pulmotil) only (TO); however only three (1,3,6) were used for economical simulation using NI strategy as a baseline. Overall, 15 different products or substances and several management procedures were used in different combinations. Mean duration of outbreaks was 14.4 weeks.

The NI strategy resulted in highest reduction in weaned pig production during and after outbreak, followed by LHE and TO. The highest reduction in revenue was in NI group (Mean=-79,900\$; 90%PI -157,000-29,100). The highest cost of intervention was in TO (Mean=12,300\$; 90%PI 5,300:22,000). The LHE and TO were expected to have higher revenue than NI strategy with 65% and 88% probability, respectively. TO group yielded higher "profit net of intervention cost" and revenue change, whereas LHE yielded higher benefit/cost, primarily due to considerably lower initial cost of strategy. Alternative approaches (particularly TO) seem to yield better economic parameters most of time but are not free of financial risk for producers. Viral infections of swine deserve to be evaluated from the veterinary public health perspective.