Economic Analysis of PRRS Resistant Dam Line: Resistance or Performance ?

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Introduction

With recurring PRRS outbreaks, producers are wondering if disease resistant dam lines could be more profitable. Three dam lines were tested in a commercial farm in Quebec (Canada). The objective was to see how they would perform during an outbreak of PRRS. During the finishing phase (see Table 2), line A proved more disease resistant with a lower mortality rate (4.2% vs an average of 8.3% for the other two, for 19 lots of pigs). But results from the 6 lots of pigs for which performance data was available suggest that line A suffers from lower growth performance, especially compared to line C.

Table 2. Performances and Estimated Economic Impact in Finishing

Materials and Methods

Gilts from three different genetic dam lines were introduced in an empty 650-head commercial sow barn. To standardize the rearing period, gilts were raised together after nursery (25 kg). All gilts were PRRSv naïve; proximity (< 150 m) to an infected farm insured contamination before the first parity.

For the first three parities, performance and veterinary treatments were recorded on an individual basis. Diagnostic tests were also carried out to follow the evolution of the herd health status. Data covered 601 sows (203 for line A, 198 for line B and 200 for line C). Mortality rates and veterinary treatments were collected for 12,922 piglets and 8,536 pigs. Average daily gain and feed conversion ratios were only collected for six lots of pigs.

The economic analysis looked at the profitability of the sow and finishing units, using average prices for feed, pigs and piglets in 2015 in Quebec, as well as treatments prices used during the project. For the finishing unit, a sensitivity analysis on pig and feed prices was performed, according to 2 scenarios (low and high pathogenic PRRSv).

	Low pathog	genic PRRS	High pathogenic PRRS			
	Α	С	Α	С		
Mortality in finishing	2.6% ^a	4.0% ^b	6.7% ^a	16.4% ^b		
Feed conversion rate	2.69 ^a	2.55 ^b	2.82 ^a	2.71 ^b		
Average daily gain (g/day)	902 ^a	943 ^b	915 ^a	997 ^b		
Feed cost (CA\$/year)	1,457,178	1,360,149	1,327,469	1,101,643		
Fixed costs (\$CA/year)	343,342	328,630	307,852	272,228		
Total costs	2,755,522	2,641,450	2,739,784	2,516,904		
Total income	2,879,350	2,837,631	2,738,814	2,455,820		
Estimated margin	123,828	196,181	-969	-61,084		
Margin per hog sold	8.27	13.29	-0.07	-4.78		
ab Different letters within row indicate sid	nificance at P_{C} (05				

^{a,b} Different letters within row indicate significance at P< 0.05

When mortality is < 5% (low path PRRS), line C is more profitable than A (+CA\$5.0/pig) with lower feed and fixed costs. For a disease outbreak with a high mortality rate (high path PRRS), line A is more profitable (+CA\$4.7/pig), but sensitivity analysis shows line C becomes more profitable when feed prices are high and pig prices are low (see Figure 1).

Results

In maternity (see Table 1), line A and C proved statistically the most prolific, with an average of 11.07 piglets/weaned/parity and 10.29 piglets for line B. Line A also proved to be more resistant to disease requiring less treatments, both with antibiotics and anti-inflammatories. Line A had the highest margin per sow (CA\$685), with C a close second (CA\$683) and B in third place (CA\$607).

Table 1. Performances and Economic Impact in Maternity

	A	B	C			
Number of sows	600	600	600			
Piglets weaned per litter	11.07 ^a	10.29 ^b	11.07 ^a			
% treated with antibiotics	18.8% ^a	42.3% ^b	42.3% ^b			
% treated with anti-inflammatories	23.6% ^a	41.8% ^b	41.8% ^b			
Total treatment costs (CA\$/year)	1,034	2,143	2,191			
Total income (CA\$/year)	641,326	595,790	641,326			
Margin CA\$/year (income - treatment & feed costs)	411,020	364,375	409,863			
Margin per sow	685	683	607			
^{a,b} Different letters within row indicate significance at $P < 0.05$						
Acknow						

Figure 1. Most profitable line (A or C) according to feed and hog prices (high pathogenic PRRS scenario)

Feed	Hog price (CA\$/100 kg, index 100, carcass base)										
price											
CA\$/MT	100	110	120	130	140	150	160	170	180	190	200
300	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
310	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
320	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
330	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
340	С	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
350	С	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
360	С	С	Α	Α	Α	Α	Α	Α	Α	Α	Α
370	С	С	Α	Α	Α	Α	Α	Α	Α	Α	Α
380	С	С	С	Α	Α	Α	Α	Α	Α	Α	Α
390	С	С	С	Α	Α	Α	Α	Α	Α	Α	Α
400	С	С	С	С	Α	Α	Α	Α	Α	Α	Α
410	С	С	С	С	Α	Α	Α	Α	Α	Α	Α
420	С	С	С	С	Α	Α	Α	Α	Α	Α	Α
430	С	С	С	С	С	Α	Α	Α	Α	Α	Α
440	С	С	С	С	С	Α	Α	Α	Α	Α	Α
450	С	С	С	С	С	С	Α	Α	Α	Α	Α

Conclusion

The optimal choice between a dam line that is more resistant to

disease and another that offers superior growth performance will vary from one farm to another. Many factors need to be taken into account, like expected pig and feed prices, but also the disease risk threatening the farm and its magnitude (high/low mortality).

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