The Economics of Mortality – With a Look at Decision Tools to Help Improve it

Lee Schulz, Economics, Iowa State University

Russ Euken, Extension and Outreach, Iowa State University

12th Leman China Swine Conference — Preconference Session October 2023 Science-driven solutions®



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Is the optimal level of mortality > 0%?

- Yes, marginal revenue (MR) of reducing mortality below a certain point is less than marginal cost (MC)
- $\circ \, \text{Cost-benefit analysis}$
 - (when considering strategies intended to reduce mortality)
 - Not a trivial task!

SURVIVARILIT

 Optimal mortality = cost of saving additional pigs is no longer offset by added revenues those pigs bring in



Does total cost invested in a pig when it dies represent the value of the pig?

 \circ No, ignores lost revenue

O EXTREME EXAMPLE (USA)

- May 2020: Weaned pig in cash market → \$6.85/head (\$1 \$13 range)
 NW_LS255
- October 2020: Market hog price → \$162/head (\$115 \$181 range)
 LM_HG201



Scielowa State University Estimated Livestock Returns https://www2.econ.iastate.edu/estimated-returns/

IMPROVING PIG Survivability

Improving Pig Survivability Podcast: PigX <u>https://piglivability.org/podcast</u> Ep 10: The Economics Behind the Swine Industry Drs. Derald Holtkamp and Lee Schulz

Do fixed costs matter?

- $\odot\,\text{No}$, fixed are fixed
- When a pig dies fixed costs are spread over fewer pigs, but total fixed costs have not changed
- Spreading fixed (building, equipment) and quasi-fixed (labor) costs over less units of output decreases economic efficiency
 - Efficiency of the pork industry relative to food industries outside the livestock sector
 - Efficiency of the pork industry relative to other livestock (e.g., beef) industries
 - Efficiency of one producer relative to other producers in the pork industry





Does mortality impact optimal marketing weight (or other XYX-type decisions)?

○ No, sunk costs are irrelevant to the decision-making process

Optimal marketing weight is when MC = MR (moving target)

- Optimal weights are lighter when feed \uparrow and hogs \downarrow compared to feed \downarrow and hogs \uparrow
- Often sell hogs at same weight regardless, or heavier trying to divide sunk costs by more pounds
 - If losing money on each additional pound, more gain is not going to solve the problem



Improving Pig Survivability Podcast: PigX <u>https://piglivability.org/podcast</u> Ep 10: The Economics Behind the Swine Industry Drs. Derald Holtkamp and Lee Schulz

Does mortality affect supply, demand, & prices?

$\,\circ\,$ It $\underline{\text{ALWAYS}}$ does but we don't recognize it

- PRRSV example
 - Without PRRSV, all else equal, there would be lower market pig prices
 - Pig producers would be more competitive than they already are
- It <u>SOMETIMES</u> does and we do recognize it
 - PEDV example

SURVIVABILIT

- Supply-impacting disease, not demand inhibiting
- During initial outbreak (2013-14), producer returns, on average, exceeded expectations
 - If no reduction in production, producers benefited by selling expected volumes at higher prices
 - If notable reduction in throughput, producers worse off because of lower net revenues

Improving Pig Survivability Podcast: PigX <u>https://piglivability.org/podcast</u>

Ep 10: The Economics Behind the Swine Industry Drs. Derald Holtkamp and Lee Schulz

Calculating wean to finish mortality cost

Mortality Cost = $f\begin{pmatrix} \% & Value of & Feed/Marketing \\ Mortality' finished pig' Cost Adjustment \end{pmatrix}$

- ✓ Includes opportunity cost, i.e., value had mortality not occurred
- ✓ Includes potential cost savings
 - Depends on prices and when death loss occurs
 - When pig dies late, cost savings is comparatively minor relative to lost opportunity cost



 Dhuyvetter, K.C., G.T. Tonsor, M.D. Tokach, S.S. Dritz, and J. DeRouchey. Swine Wean-to-Finish Cost-Return Budget. Kansas State University Agricultural Experiment Station and Cooperative Extension Service, MF2757. April 2014. <u>https://www.agmanager.info/sites/default/files/pdf/mf2757.pdf</u>

U.S. PIG DEATH LOSS



SURVIVABILITY



https://www2.econ.iastate.edu/estimated-returns/

What is the cost of obtaining an X percentage point improvement (6% \rightarrow 5%) in mortality?

It depends! The value also depends!

 $\circ\,$ The answer is different for each producer

Rarely do we observe both costs and benefits ex-ante

By knowing the benefit (or cost), one can back into indifference points to guide decision-making driven solutions®

• Help identify an optimal level of mortality

• Cost-benefit calculations for whether to use an intervention. Or, which one?





Search

https://porkgateway.org/resource/economic-assessment-of-mortality-in-wean-to-finish-production/

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Economic Assessment of Mortality in Wean to Finish Production

Introduction

Mortality reduces gross income but also changes the cost of pig production. Accurately projecting the impact of mortality on net income is important to determine if the marginal income of lower mortality is greater than the marginal cost of improving mortality. This fact sheet focuses on the potential economic benefit of improving mortality which builds on previous work (Crooks et al., 1993; Holtkamp, 2008; Dhuyvetter, 2014). This calculation is not a trivial task because the economic value of lowering mortalities depends on various prices and production efficiencies *ce-driven solutions*[®]

Objectives

- To provide a tutorial and decision aide to assess the economic opportunity of changing mortality rates on a wean to finish operation.
- To show how a sensitivity analysis around key variables is an important component of any economic analysis attempting to weigh the projected benefits of mortality-reducing strategies against their anticipated costs.

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AG DECISION MAKER

A pdf

https://www.extension.iastate.edu/agdm/livestock/html/b1-78.html

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Pig survivability project: Wean-to-finish mortality economic modeling

Assessing Economic Opportunity of Improving Mortality Rate in Wean-to-Finish Swine Production

If pig production is profitable, lowering the mortality rate improves net income. However, it can be difficult to determine what cost can be incurred to lower mortality rate and achieve a profit. The purpose of this fact sheet is not to determine the cost of mortality mitigation strategies but to help producers determine the income opportunity of improving mortality in their operation as compared to the potential cost of a strategy to lower mortality. Mortality reduction strategies and costs will most certainly vary among operations and situations.

A budget model is commonly used to project economic costs and returns and this fact sheet and accompanying spreadsheet use estimated budgets and sensitivity tables to highlight and compare het income changes due to changes in mortality rates. The main economic costs and returns of changing mortality are highlighted.

The main revenue factors that change with increased mortality are less revenue from market hog sales and the value of

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This project was supported by the National Pork Board and the Foundation for Food and Agriculture Research grant #18-147.



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Russ Euken extension livestock specialist 641-923-2856 View more from this author



Lee Schulz

extension economist 515-294-3356 View more from this author

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For more information, see AgDM File B1-78, Assessing Economic Opportunity of Improving Mortality Rate in Wean-to-Finish Swine Production.

Enter inputs in shaded cells.

Table 1. Production information

	Current operation	Improved mortality	Adjust sensitivity table increments
Wean-to-finish mortality (%)	6.0%	5.0%	1%
Average weight of dead pigs (lbs.)	150 lbs.	150 lbs.	
Est. feed use based on average weight of pigs at death	39%	39%	
Wean-to-finish feed efficiency	2.70 lbs.	2.70 lbs.	0.05
Weight in live (lbs.)	12 lbs.		
Weight out live (Ibs.)	284 lbs.		
Size of operation or group			
Number of pigs in	2,400 head		
Number of pigs marketed	2,256 head	2,280 head	
Income			
Market hog carcass price per cwt.	\$ 100.00 per cv	vt.	\$ 2.00
Manure value per head	\$ 6.00 per he	ad	
Variable costs		一个每日日	\$ 0.01
Weaned pig price per head	\$ 50.00 per he	ead	
Feed price per lb. wean-to-finish	\$ 0.15 per lb.		
Feed processing and delivery per ton	\$ 12.00 per to	n	
Labor cost per hour	\$ 16.00 per ho	iænce-driven sol	utions [®]
Labor hours per head	0.7 hours	per head	
Bedding cost per head	per he	ad	
Utilities cost per head	\$ 3.00 per he	ad	
Machinery, facility/equipment repairs cost per head	\$ 2.25 per he	ad	
Veterinary and health cost per head	\$ 5.00 per he	ad	
Marketing cost per head	\$ 1.00 per he	ad	
Other variable cost per head	per he	ad	
Interest rate on operating loan	5%		
Fixed costs			
Facilities, equipment ownership	\$ 9.50 per he	ad	
l axes and insurance	 1.70 per he 6 0.50 per he 	ad	
Other fixed cost	per he	au vad	

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For more information, see AgDM File B1-78, Assessing Economic Opportunity of Improving Mortality Rate in Wean-to-Finish Swine Production.

Enter inputs in shaded cells.

Table 2. Partial budget for changes, compared to 0% mortality

		Per head			Per group (2,400 head)				id)						
	Cu	Current Improved		Current Improved			proved	Effect of 1% mortality change							
Revenue change	6.0	0%	9	5	5.0%		6.	0%		5.0%	Per	head	Per g	group (2,400 head)	
Less market hogs	\$	(12.61)		\$	(10.51)		\$	(30,263)	\$	(25,219)					
Less manure	\$	(0.22)		\$	(0.18)		\$	(530)	\$	(441)					
Total revenue change	\$	(12.83)		\$ <	(10.69)	16101	\$	(30,793)	\$	(25,661)	\$	2.14	\$	5,132	
Cost change			(n				1 V								
Feed cost	\$	4.05		\$	3.38		\$	9,723	\$	8, 103					
Feed processing and delivery	\$	0.16		\$	0.14		\$	389	\$	324					
Total feed	\$	4.21		\$	3.51		\$	10,112	\$	8,427	\$	(0.70)	\$	(1,685)	
Veterinary and health	\$	-	$\langle / / \rangle$	\$	\ -]	11	\$	-	\$	-					
Marketing	\$	0.06		\$	0.05		\$	144	\$	120					
Net income change	\$	(8.56)	Scienc	\$	dri (7.13)	solut	ions (R(20,537)	\$	(17,114)	\$	1.43	\$	3,423	

Table 3. Full budget for modeling

	Per	head	Per group (2,400 head)				
Total Costs	\$ 210.13	\$	208.70	\$	504,314	\$	500,891
Income Over Variable Costs	\$ 30.65	\$	29.94	\$	73,558	\$	71,849
Income Over Total Costs	\$ 6.03	\$	7.46	\$	14,470	\$	17,893

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Quick links

Using the assumptions in this example

- 1% Mortality = \$1.43 per pig or \$143 lost for every pig that dies
- 2,400 head x 1% = 24 pigsence-driven solutions®
- \$3,423 per operation / 24 pigs = \$143 per pig lost

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Enter inputs in shaded cells.

Table 4. Sensitivity analyses of net income per head									
Carcass price/cwt.									
Net income pe	er head	\$96.00	\$98.00	\$100.00	\$102.00	\$104.00			
	4.00%	+\$1	.38 +\$1.	43 +\$1	47				
	5.00%		\$3.46	\$7.46	\$11.45				
Mortality %	6.00%	Science	\$2.08	\$6.03	\$9.98				
	7.00%			ノ					
	8.00%		-\$3.	95 +\$	3.95				

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\$96.00

For more information, see AgDM File B1-78, Assessing Economic Opportunity of Improving Mortality Rate in Wean-to-Finish Swine Production.

\$98.00

Enter inputs in shaded cells.

\$20.00 At \$96/cwt Net income per head \$15.00 hog prices <u>Mortality %</u> ≤ 4% \$10.00 mortality is -4.00%profitable \$5.00 itions[®] -6.00%\$0.00 \$5.00 \$10.00

\$100.00

\$102.00

\$104.00

Net income per head by carcass price per cwt.

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For more information, see AgDM File B1-78, Assessing Economic Opportunity of Improving Mortality Rate in Wean-to-Finish Swine Production.

Enter inputs in shaded cells.

Table 4. Sensitivity analyses of net income per head										
Feed price per lb.										
Net income pe	er head	\$0.13	\$0.14	\$0.15	\$0.16	\$0.17				
	4.00%	+\$1.	47 +\$1.	43 +\$1	L.38					
	5.00%		\$14.57	\$7.46	\$0.34					
Mortality %	6.00%	Scienc	\$13.10	\$6.03	-\$1.04					
	7.00%									
	8.00%		+\$7.0	07 -\$`	7.07					

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Enter inputs in shaded cells.



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Enter inputs in shaded cells.

Table 4. Sensitivity analyses of net income per head										
Feed efficiency (lb. feed per lb. gain)										
Net income pe	Net income per head 2.60 2.65 2.70 2.75 2.80									
	4.00%	+\$1	.44 +\$1.	43 +\$1	.41					
	5.00%		\$9.51	\$7.46	\$5.40					
Mortality %	6.00%	Science	\$8.07 \$8	\$6.03	\$3.99					
	7.00%			ノ						
	8.00%		+\$2.0)4 -\$2	2.04					

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Enter inputs in shaded cells.



Calculating Breed to Wean Mortality Cost

Mortality Cost

- = f $\begin{pmatrix} \% \text{ Sow} \\ \text{Mortality} \end{pmatrix}$, $\begin{pmatrix} \text{Value of} \\ \text{Pigs Not} \\ \text{Farrowed} \end{pmatrix}$, $\begin{pmatrix} \text{Lost Cull} \\ \text{Sow Value} \end{pmatrix}$, $\begin{pmatrix} \text{Increased} \\ \text{Replacement} \\ \text{Cost} \end{pmatrix}$, $\begin{pmatrix} \text{Pre} \text{Wean} \\ \text{Mortality} \end{pmatrix}$
 - ✓ Includes opportunity cost, i.e., value had mortality not occurred
 - ✓ Lots of assumptions (parameters) needed
 - Science-driven solutions[®]
 E.g., When the sow dies affects if pig value is lost
 - $\,\circ\,$ Mortality that occurs after breeding and before farrowing loss of litter and pig value



ANNUAL SOW DEATH RATE



ANNUAL PRE-WEAN MORTALITY



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https://www.extension.iastate.edu/agdm/livestock/html/b1-79.html

SOURCES OUTLOOK

pdf 📝 Pig survivability project: Breed-to-Wean mortality economic modeling

Assessing Economic Opportunity of Improving Mortality Rate in Breed-to-Wean Swine Production

One of the challenges facing many sow farms is high death loss. The Pig Computerized Health and Management Program, or PigCHAMP, is a database that includes information from nearly 300 farms. PigCHAMP's website provides publicly accessible benchmark summaries which have shown an increase in sow mortality rate from 8.12% in 2012 to 14.86% in 2021.¹ In 2021, the upper 10 percentile of herds for sow mortality had an average death rate of 21.30%. On the other hand, the lower 10 percentile for sow mortality had a death rate of 7.30%. These values clearly illustrate the extremes that can be seen on individual farms for sow mortality and the potential to improve.

Improving sow mortality, and pre-wean mortality which is a secondary focus of this analysis, results in greater efficiency and producing more pigs, which can increase potential profits. In most, if not all cases, there will be some cost associated with reducing mortality rate, so producers need to weigh the costs against the potential economic benefits. Individual farms may have different methods to reduce mortality and the costs will also vary. For example, costs could include additional labor, health and management interventions, or facility improvements depending on the causes of mortality. This analysis focuses on the benefit of improving mortality on an individual operation. By knowing the benefit, one can back into indifference points to guide decision-making and help identify an optimal level of mortality for an operation at a particular point in time.

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Russ Euken

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extension livestock specialist 641-923-2856 View more from this author



Lee Schulz

extension economist 515-294-3356 View more from this author

Pig Survivability Project - Breed-to-wean mortality economic modeling

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For more information, see AgDM File B1-79, Assessing Economic Opportunity of Improving Mortality Rate in Breed-to-Wean Swine Production.	Quick links
Enter inputs in shaded cells.	Table 1
This spreadsheet is designed to aid in estimating the economic opportunity for reducing mortalities in breed-to-wean production.	Table 2
A current or baseline mortality rate can be compared to an improved mortality rate on an annual per sow or per operation basis.	Table 3
Sensitivity tables that show net income per head over a range of mortality rates and pig prices, feed costs, and feed efficiencies are in Table 4.	Table 4

Table 1. Production, price, and cost inputs

Mortality inputs	Current	Imp	roved mortality	Adjust s	ensitivity table incre	ments
Total sow mortality (%)	14.0%		13.0%		1.0%	
Sow mortalities that occur from farrowing to breed (%)	7.0%		7.0%		1.0%	
Pre-wean pig mortality	15.0%	The second	15.0%	14.91%	1.0%	
				Note: Using the pre-wea	an mortality% shown above	as the input negates the econor
Production inputs		学要中担		effect of pre-wean morta	ality between the current and	l improved scenario.
Litters per mated female per year	2.200		2.2140			
Pigs born alive per litter	13.50		13.50			
Pigs per mated sow per year w/o pre-wean mortality	29.70		29.89			
Pigs per mated sow per year with pre-wean mortality	25.25 /	nce-driven s <mark>ol</mark>	<i>utions</i> 25.41			
Number of sows	2,500		2,500			
Sow cull rate	45.0%		45.0%			
Sow replacement rate	59%		58%			
Cull sow weight	450 lk	DS.				
Price inputs						
Weaned pig price	\$ 50.00 p	er head			\$ 2.00	
Cull sow price	\$ 69.00 p	er cwt.			\$ 2.00	
Cost of developed replacement gilt ready to breed	\$ 375.00 p	er head			\$ 10.00	

Pig Survivability Project - Breed-to-wean mortality economic modeling

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Sensitivity tables that show net income per head over a range of mortality rates and pig prices, feed costs, and feed efficiencies are in Table 4.

Additional inputs for complete budget

Other income

Manure credit

Variable inputs and costs

Feed cost

Feed processing and delivery cost

Pounds of feed

Labor cost

Labor hours

Veterinary and health cost

Semen cost, genetic fee

Marketing and professional fees

Utilities and fuel cost

Machinery, facility and equipment repairs

Other variable costs

Fixed costs

Machinery, facilities, and general overhead

Taxes and insurance

Legal and accounting

Other fixed costs

\$ 10.00	per sow per year
\$ 0.15	per lb.
\$ 18.00	per ton
2,350	lbs.
\$ 16.00	per hour
7.00	per sow per year
\$ 40.00	per sow per year
\$ 30.00	per sow per year
\$ 5-4.00	per sow per year olutions ®
\$ 25.00	per sow per year
\$ 22.00	per sow per year
\$ 10.00	per sow per year

Quick links

Table 1

Table 2

Table 3

Table 4

\$ 170.00	per sow per year
\$ 10.00	per sow per year
\$ 11.00	per sow per year
	per sow per year

Pig Survivability Project - Breed-to-wean mortality economic modeling Ag Decision Maker -- Iowa State University Extension and Outreach For more information, see AgDM File B1-79, Assessing Economic Opportunity of Improving Mortality Rate in Breed-to-Wean Swine Production. Quick links Enter inputs in shaded cells. Table 1 This spreadsheet is designed to aid in estimating the economic opportunity for reducing mortalities in breed-to-wean production. Table 1 A current or baseline mortality rate can be compared to an improved mortality rate on an annual per sow or per operation basis. Table 3 Sensitivity tables that show net income per head over a range of mortality rates and pig prices, feed costs, and feed efficiencies are in Table 4. Table 4

Table 2. Partial budget for marginal change			Compared to 0% mortality									
			Per sow pe	r yea	r	Per 2500 sow operation per year						
Sow mortality economic impact		Curr	ent	Im	proved	С	urrent	Im	proved			
Revenue change		14% ai	nd 7%	13%	and 7%	14%	and 7%	13%	and 7%			
Pig value (without pre-wean mortality impact)	\square	\$	(66.22)	\$	(56.76)	\$	(165,540)	\$	(141,892)			
Cull sow income			(43.47)	\$	(40.37)	\$	(108,675)	\$	(100,913)			
Cost change				1								
Replacement gilts cost	\square	\$	52.50	\$	48.75	\$	131,250	\$	121,875			
Net income change due to sow mortality	Scier	nce-drive	(162.19)	15 ^{\$}	(145.87)	\$	(405,465)	\$	(364,679)			
Pre-wean mortality impact		Compa	ared to 0%	pre-v	vean mortali	ty						
Pig value		\$	(222.75)	\$	(224.17)	\$	(556,875)	\$	(560,422)			
Net of sow and pre-wean mortality		\$	(384.94)	\$	(370.04)	\$	(962,340)	\$	(925,102)			

Pig Survivability Project - Breed-to-wean mortality economic modeling	
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Table 2. Partial budget for margin	nal changes	Improv	ved morta	lity rate c	ompared to current rate	
		Effect	of 1% chan	ge in tota	I sow mortality and	
Sow mortality economic impact		0% cha	nge in sov	v mortaliti	es during gestation	
Revenue change		Per so	w/year	Per 2500	sow operation / year	
Pig value (w/o pre-wean mortality impact)	11.5 5	\$	9.46	\$	23,648.63	
Cull sow income		\$	3.11	\$	7,762.50	
Cost change						
Replacement gilts cost	T S	\$	(3.75)	\$	(9,375.00)	
Net income change due to sow mortality		\$	16.31	\$	40,786.13	
Pre-wean mortality impact	Science-dri	Æffect o	of 0% chan	ge in pre	-wean pig mortality	
Pig value		\$	(1.42)	\$	(3,547.29)	
Net of sow and pre-wean mortality		\$	14.90	\$	37,238.83	

1% mortality = \$14.90 per sow or \$1,490 for every sow that dies

2,500 sows x 1% = 25 sows

\$37,238.83 per operation / 25 sows = \$1,490 per sow lost

Pig Survivability Project - Breed-to-wean mortality economic modeling	
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Table 3. Enterprise budget for bottom line changes

Current: 14% sow mortality, 15% pre-wean pig mortality, 14.91% pre-wean pig in the solution of	ality mortality	Per sow p	per y	ear	Per pig produ	lce	d per year
Revenue		Current		mproved	Current		Improved
Gross Income	\$	1,411.98	\$	1,423.12	\$ 55.93	\$	56.02
Total Variable Costs	\$	834.75	\$	831.00	\$ 33.07	\$	32.71
Total Fixed Costs	Scien ^{\$} e-	driven 191,00 in	\$ \$ ®	191.00	\$ 7.57	\$	7.52
Total Costs	\$	1,025.75	\$	1,022.00	\$ 40.63	\$	40.23
Income Over Variable Costs	\$	577.23	\$	592.12	\$ 22.86	\$	23.31
Income Over Total Costs	\$	386.23	\$	401.12	\$ 15.30	\$	15.79





Pig Survivability Project - Breed-to-wean mortality economic modeling							
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Table 4. Sensitivity tables for annual net income per sow									
		Weaned pig price							
		\$46.00	\$48.00	\$50.00	\$52.00	\$54.00			
	12.00%	+\$14.	57 +\$14.	90 +\$15.	22				
Percent total	13.00%		\$350.31	\$401.12	\$451.93				
Sow mortality	14.00%	Science-driv	\$335.74	\$386.23	\$436.72				
	15.00%			ノく					
	16.00%		-\$50.	<mark>49 +</mark> \$	50.49				

Pig Survivability Project - Breed-to-wean mortality economic modeling							
Ag Decision Maker Iowa State University Extension and Outreach							
For more information, see AgDM File B1-79, Assessing Economic Opportunity of Improving Mortality Rate in Breed-to-Wean Swine Production.	Quick links						
Enter inputs in shaded cells.	Table 1						
This spreadsheet is designed to aid in estimating the economic opportunity for reducing mortalities in breed-to-wean production.	Table 2						
A current or baseline mortality rate can be compared to an improved mortality rate on an annual per sow or per operation basis.	Table 3						
Sensitivity tables that show net income per head over a range of mortality rates and pig prices, feed costs, and feed efficiencies are in Table 4.	Table 4						

Table 4. Sens	itivity tables	for ann	ual net ir	ncome p	er sow			
			C	ull Sow Pr	ice			
		\$65.00	\$67.00	\$69.00	\$71.00	\$73.00		
	12.00%	+\$14.8	31 +\$14.9	90 +\$14.9)9			
Percent total	13.00%		\$396.98	\$401.12	\$405.26			
Sow mortality	14.00%	% Science-drive \$382.18 \$386.23 \$390.28						
	15.00%			ノく				
	16.00%		-\$4.0	5 +\$	4.05			

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Table 4. Sens	sitivity tables	s for ann	ual net i	ncome p	er sow				
		Replacement price							
	,	\$355.00	\$365.00	\$375.00	\$385.00	\$395.00			
	12.00%	+\$14.	80 +\$14.	90 +\$15.	00				
Percent total	13.00%		\$406.92	\$401.12	\$395.32				
Sow mortality	14.00%	Science-drive	\$392.13	\$386.23	\$380.33				
	15.00%			ノヘ					
	16.00%		+\$5.	90 - 9	\$5.90				

Pig Survivability Project - Breed-to-wean mortality economic modeling							
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Table 4. Sensitivity tables for annual net income per sow									
		Weaned pig price							
		\$46.00	\$48.00	\$50.00	\$52.00	\$54.00			
	13.00%	+\$14.	26 +\$14.	85 +\$15.	44				
Pre-wean	14.00%		\$349.99	\$401.08	\$452.16				
mortality	15.00%	Science-driv	\$335.74	\$386.23	\$436.72				
	16.00%			ノヘ					
	17.00%		-\$50.	49 +\$	50.49				



Improving Pig Survivability https://piglivability.org







Welcome to the Improving Pig Survivability project.







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