# Assessment of SmartGuard® in a Commercial Setting

## Introduction

One of the largest factors of piglet pre-weaning mortality (PWM) is accidental crushing by sows when they lay down, the vast majority occurring in the first 5 days post-farrow. According to National Animal Health Monitoring System (NAHMS) data, approximately 52.1% [1] of all piglet mortality is attributed to this phenomenon. This constitutes a large opportunity to increase overall productivity in the farrowing stage of production. SmartGuard (SG) utilizes advanced acoustic engineering algorithms to detect a piglet in distress and prevent piglet mortality by sending an impulse to a SwineTech PigFit Wearable worn by the sow when a distress event is detected. SwineTech estimates that SmartGuard is capable of reducing 15-20% of the pre-weaning mortality, equivalent to 0.17-0.54 pigs per litter, depending on overall PWM and liveborn, thus increasing as much as 1 P/S/Y with the same number of liveborn.


## Abstract

SmartGuard is designed to improve newborn piglet welfare and the related reproductive performance by reducing PWM rates. Data was amassed from a commercial farrowing facility to help assess the efficacy of SmartGuard. In addition, 24 / 7 video surveillance was installed above each litter in the SmartGuard group to document behavior, reaction, crush mitigation efficacy as well as accuracy of data gathered. Mortality data was gathered from sow identification cards and grouped by lactation day. In order to retain data integrity, all litters identified as fall-backs were removed from both the SG and Control groups.


## Results and Discussion

Data from 143 (SG) and 167 (Control) litters indicated a day five piglet crush rate of 8.33% ± 0.59% (Control) compared to 5.83% ± 0.64% (SG) resulting in a reduction of 30.0%. Additionally, a difference was noted in overall mortality at day five, 10.23% ± 0.77% (Control) compared to 7.64% ± 0.79% (SG) indicating a **reduction in PWM of 25.3% at day five.**

Given the overall PWM through wean at this farrowing facility (16.3%) -- mortalities attributed to crushing through day five accounted for 47.5% - 54.7%, falling in line with the NAHMS study in terms of expected piglet crush mortalities.

**Figure 1.**
**Pigs laid on/litter by day of age.** When graphing mortalities attributed to layons per litter, grouped by farrowing day, it became apparent that the bulk of SmartGuard benefit could be achieved through day three of farrowing -- allowing the device(s) to be moved along to new farrowing rooms, increasing benefit per device.

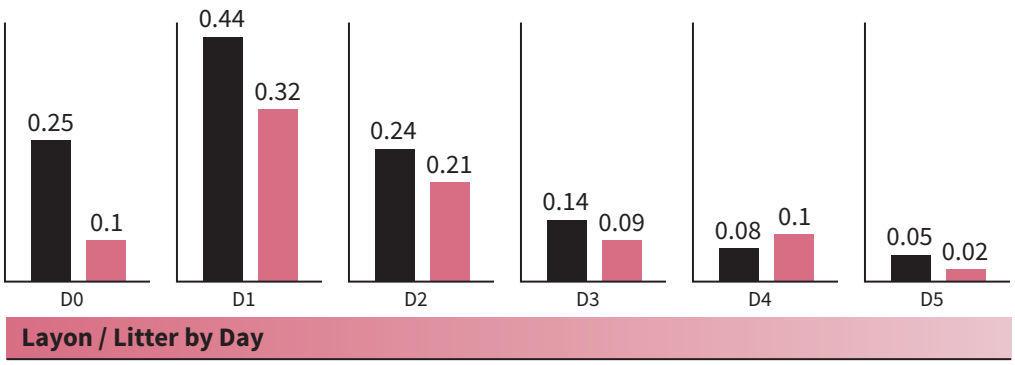
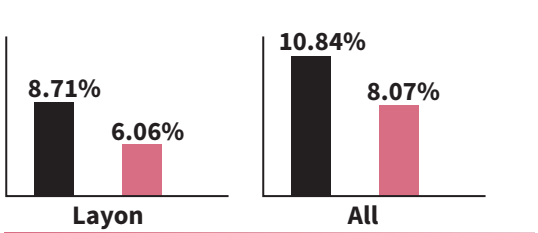


**Figure 2.**
**Percent mortality through Day 5.** Reviewing farrowing day five totals for all mortalities as well as mortalities specifically associated with crushing events, SmartGuard litters showed a difference. Piglets saved through layon mitigation remain viable and healthy and if saved within a critical time window results in a decrease of mortality from all causes at day five.




It is possible to predict the number of piglets SmartGuard technology can save by lactation day 5 by applying the control mortality rate indicated in **Figure 1** to the SG total piglet count and subtracting out the number of total dead piglets within the SG group. This calculation can be completed through the following equation:

piglets_saved-per-litter = (Control_mort * (SG_born + SG_net-foster) - SG_total-dead) / SG_litter-total
piglets_saved-per-litter = 51.22 / 135 = **0.379**

In this assessment SmartGuard technology saved **0.38 piglets per litter by lactation day five.**

The following matrix will enable you to predict an expected increase in piglets weaned per litter. Green represents an estimated 1 year return on investment, yellow 1.5 years, and red is 2 years or more.

| **Mortality** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20.00% | 0.42 | 0.43 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 | 0.50 | 0.50 | 0.51 | 0.52 | 0.53 | 0.54 |
| 19.50% | 0.41 | 0.42 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.47 | 0.48 | 0.49 | 0.50 | 0.51 | 0.52 | 0.53 |
| 19.00% | 0.40 | 0.41 | 0.41 | 0.42 | 0.43 | 0.44 | 0.45 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 | 0.50 | 0.50 | 0.51 |
| 18.50% | 0.39 | 0.40 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.48 | 0.49 | 0.50 |
| 18.00% | 0.38 | 0.38 | 0.39 | 0.40 | 0.41 | 0.42 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.46 | 0.47 | 0.48 | 0.49 |
| 17.50% | 0.37 | 0.37 | 0.38 | 0.39 | 0.40 | 0.41 | 0.41 | 0.42 | 0.43 | 0.44 | 0.44 | 0.45 | 0.46 | 0.47 | 0.47 |
| 17.00% | 0.36 | 0.36 | 0.37 | 0.38 | 0.39 | 0.39 | 0.40 | 0.41 | 0.42 | 0.42 | 0.43 | 0.44 | 0.45 | 0.45 | 0.46 |
| 16.50% | 0.35 | 0.35 | 0.36 | 0.37 | 0.38 | 0.38 | 0.39 | 0.40 | 0.40 | 0.41 | 0.42 | 0.43 | 0.43 | 0.44 | 0.45 |
| 16.00% | 0.34 | 0.34 | 0.35 | 0.36 | 0.37 | 0.37 | 0.38 | 0.39 | 0.39 | 0.40 | 0.41 | 0.41 | 0.42 | 0.43 | 0.44 |
| 15.50% | 0.33 | 0.33 | 0.34 | 0.35 | 0.35 | 0.36 | 0.37 | 0.37 | 0.38 | 0.39 | 0.39 | 0.40 | 0.41 | 0.42 | 0.42 |
| 15.00% | 0.32 | 0.32 | 0.33 | 0.34 | 0.34 | 0.35 | 0.36 | 0.36 | 0.37 | 0.38 | 0.38 | 0.39 | 0.40 | 0.40 | 0.41 |
| 14.50% | 0.31 | 0.31 | 0.32 | 0.33 | 0.33 | 0.34 | 0.34 | 0.35 | 0.36 | 0.36 | 0.37 | 0.38 | 0.38 | 0.39 | 0.40 |
| 14.00% | 0.30 | 0.30 | 0.31 | 0.31 | 0.32 | 0.33 | 0.33 | 0.34 | 0.35 | 0.35 | 0.36 | 0.36 | 0.37 | 0.38 | 0.38 |
| 13.50% | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.32 | 0.32 | 0.33 | 0.33 | 0.34 | 0.35 | 0.35 | 0.36 | 0.36 | 0.37 |
| 13.00% | 0.28 | 0.28 | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.32 | 0.32 | 0.33 | 0.33 | 0.34 | 0.34 | 0.35 | 0.36 |
| 12.50% | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.32 | 0.32 | 0.33 | 0.33 | 0.34 | 0.34 |
| 12.00% | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.31 | 0.32 | 0.32 | 0.33 |
| 11.50% | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 | 0.30 | 0.30 | 0.31 | 0.31 | 0.32 |
| 11.00% | 0.23 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 | 0.30 | 0.30 |
| 10.50% | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 | 0.28 | 0.29 | 0.29 |
| 10.00% | 0.21 | 0.22 | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 0.25 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 |
| 9.50% | 0.20 | 0.21 | 0.21 | 0.22 | 0.22 | 0.22 | 0.23 | 0.23 | 0.24 | 0.24 | 0.25 | 0.25 | 0.25 | 0.26 | 0.26 |
| 9.00% | 0.19 | 0.20 | 0.20 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.25 | 0.25 |
| 8.50% | 0.18 | 0.19 | 0.19 | 0.19 | 0.20 | 0.20 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.22 | 0.23 | 0.23 | 0.24 |
| 8.00% | 0.17 | 0.18 | 0.18 | 0.18 | 0.19 | 0.19 | 0.19 | 0.20 | 0.20 | 0.20 | 0.21 | 0.21 | 0.22 | 0.22 | 0.22 |
| **Litter Size** | 12.00 | 12.25 | 12.50 | 12.75 | 13.00 | 13.25 | 13.50 | 13.75 | 14.00 | 14.25 | 14.50 | 14.75 | 15.00 | 15.25 | 15.50 |

## References


• Lay Jr, D. C. "Management tips to reduce pre-weaning mortality." *Forty-sixth Annual North Carolina Pork Conference. 2002.*



**Disclaimer:** Estimates only. No guarantee of performance.