

# MODELING EFFECTIVENESS OF HERD LEVEL SUISENG® VACCINATION AGAINST NEONATAL DIARRHEA CAUSED BY ENTEROTOXIGENIC *E. COLI* IN THAI INTENSIVE PIG FARMING

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## INTRODUCTION

Colibacillosis is a common disease of piglets occurring both chronically and sporadically. Often attributed to strains of *E.coli*, this disease has become an economic burden for swine entrepreneurs.<sup>1</sup> There is an undeniable concern over long-term treatments with broad spectrum antibiotics aimed to prevent *E.coli* infection in piglets. Not only does it increase the risk of selecting for antibiotic resistance, but it can also devastate the development of normal gut flora leading to digestive disorders during the weaning period.<sup>2</sup> To date, a vaccine has been created containing specific fimbrial antigens, specially F4 (K88), F5 (K99), F6 (987P), heat-labile *E.coli* enterotoxin (LT) and Clostridium perfringens type C β toxin, which successfully protects against the disease. Sows were vaccinated prior to farrowing, thereby transferring passive immunity to their offspring through colostrum.<sup>3</sup> Reports on priority results to improve piglet production have been obtained.<sup>4</sup> Therefore, changes in piglet performance and reduction of economic losses resulting from SUISENG® were evaluated in Thai commercial facilities.

## MATERIALS AND METHODS

In July 2017, this study was conducted following a randomized and semi-blinded design in a farrow-to-wean pig herd with colibacillosis, located in Suphan Buri Province, Thailand. Two consecutive batches of 26 sows were divided into two groups (Table 1). Vaccinated sows were monitored for local reaction effects until two days after vaccination. Overall, piglets were analyzed using a statistical program for group comparisons. The benefit of a vaccine investment and the cost of the vaccination were recorded throughout this experiment to measure ROI.

**Table 1.** Study design of SUISENG® efficacy and safety.

Batch	Group	No. of sows	Vaccinations	
			1 <sup>st</sup> dose	2 <sup>nd</sup> dose
1	A	13	SUISENG® (2 ml,IM) 0.9% NaCl (2 ml,IM)	SUISENG® (2 ml,IM) 0.9% NaCl (2 ml,IM)
	Control (A1)	13		
2	B	13	SUISENG® (2 ml,IM) 0.9% NaCl (2 ml,IM)	SUISENG® (2 ml,IM) 0.9% NaCl (2 ml,IM)
	Control (B1)	13		

**Note:** Sows were vaccinated with two 2-ml doses at 6 and 3 weeks before farrowing, according to the manufacturer's recommendations.

## RESULTS

None of the vaccinated sows from any batch showed adverse effects on their performance (Table 2). Piglet production was improved as a result of an increase of 0.77 and 0.92 of total pigs weaned per litter, and increased average daily gains (ADG) of up to 0.48 and 14.77 g per day were observed in Group A and B. SUISENG® vaccination of both groups improved farm performance and ROI increased 123.03% (Group A) and

297.78% (Group B) for herds, as described in Table 3.

**Table 2.** Clinical analysis of SUISENG® safety.

Clinical sign after vaccination	Batch 1		Batch 2	
	A	A1	B	B1
Number of sows (n)	13	13	13	13
Local reactions (%)	0	0	0	0
Pyrexia (%)	0	0	0	0
Abdominal breathing (%)	0	0	0	0
Vomiting (%)	0	0	0	0
Mortality rate (%)	0	0	0	0
Feed intake during the clinical observation (kg)	2.23 <sup>a</sup>	2.20 <sup>a</sup>	2.24 <sup>a</sup>	2.21 <sup>a</sup>

**Note:** \*Treatments with the same suffix letters were not significantly different ( $P > 0.05$ ).

**Table 3.** Overview of performance parameters of lactating piglets from vaccinated sows receiving SUISENG® (A and B) and a boost with NSS (A1 and B1).

Clinical sign	Batch 1		Batch 2			
	A	A1****	%Diff	B1	B1****	%Diff
Average pig born alive/litter	10.38 <sup>a</sup>	10.23 <sup>a</sup>	+1.45	9 <sup>b</sup>	8.31 <sup>a</sup>	+7.67
Average pigs weaned/litter	10.38 <sup>a</sup>	9.62 <sup>a</sup>	+7.32	9 <sup>b</sup>	8.08 <sup>a</sup>	+10.22
Average piglets birth weight (kg)	1.55 <sup>a</sup>	1.49 <sup>a</sup>	+3.87	1.43 <sup>b</sup>	1.34 <sup>a</sup>	+6.29
Average 21-day pig weight (kg)*	5.97 <sup>a</sup>	5.92 <sup>a</sup>	+0.84	6.19 <sup>b</sup>	5.79 <sup>a</sup>	+6.46
Piglet wit diarrhea (%)	2.96 <sup>a</sup>	7.52 <sup>b</sup>	-60.64	0 <sup>b</sup>	11.11 <sup>b</sup>	-100
Mortality linked to <i>E. coli</i> infection (%)	0 <sup>a</sup>	6.02 <sup>b</sup>	-100	0 <sup>b</sup>	2.78 <sup>a</sup>	-100
Average ADG (g per day)	21.48 <sup>a</sup>	210.95 <sup>a</sup>	-0.22	226.67 <sup>a</sup>	221.90 <sup>a</sup>	+6.52
ROI (%)**	<b>123.03</b>			<b>297.78</b>		

**Note:**\*Pig weaned at 21 days of age \*\*Cost of vaccination and estimated average cost of piglet production should be recorded to access ROI. \*\*\*a, b Consecutive values for a parameter with different superscripts differ significantly ( $p < 0.05$ ). \*\*\*\*All piglets were medicated each day after a clinical manifestation (Group A1, B1 and some pigs in A).

## DISCUSSION AND CONCLUSIONS

This comparative study highlights that piglets from sows vaccinated with Suiseng® have a better health status and more consistent ADG; SUISENG® can also protect the offspring against *E.coli* infection throughout the lactating phase vs. the unvaccinated group. Consequently, achieving good herd levels through vaccination plans for sows is the first step to prevent neonatal diarrhea.

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