

Association between number of piglets loss and total number of piglets born from commercial sows raised under an open-house system



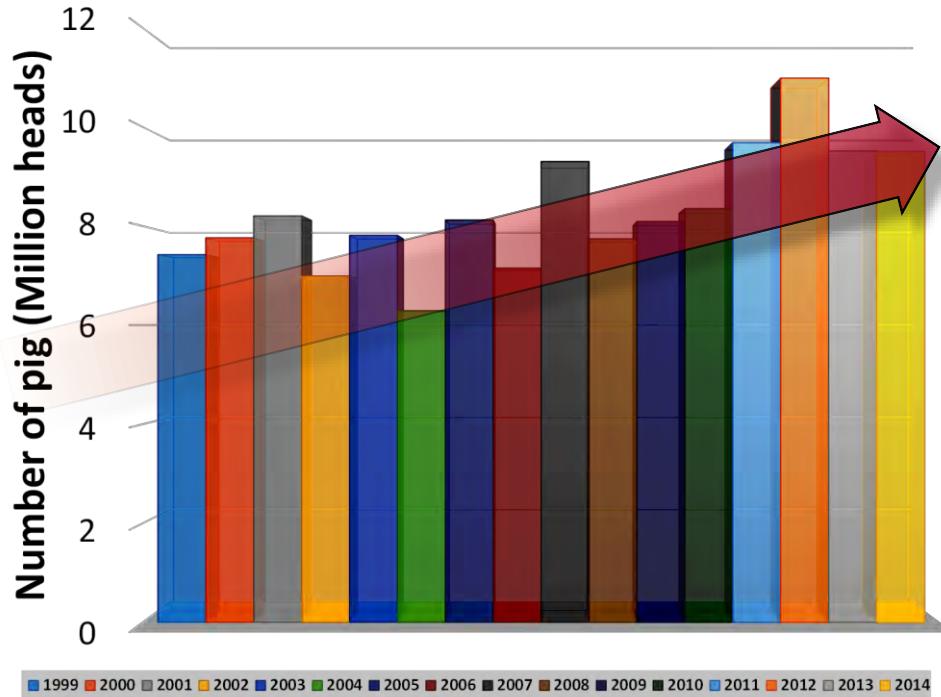
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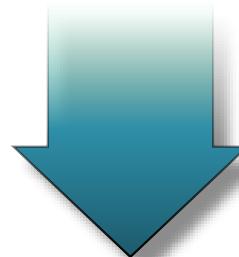
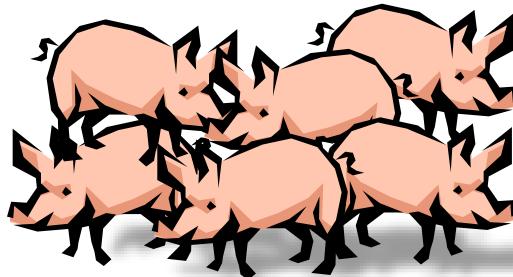
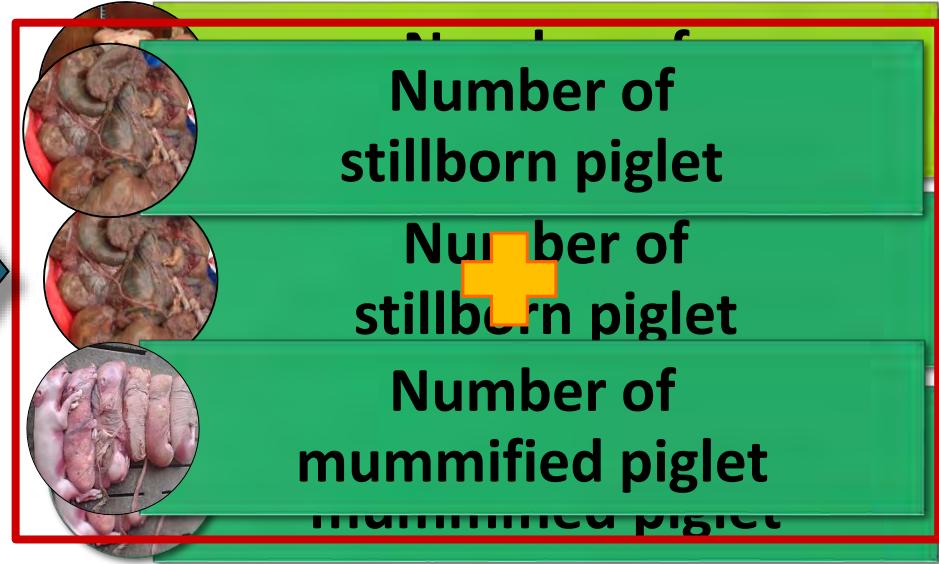
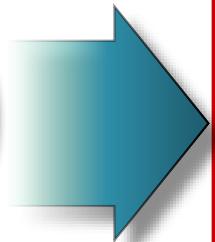
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Situation of swine production

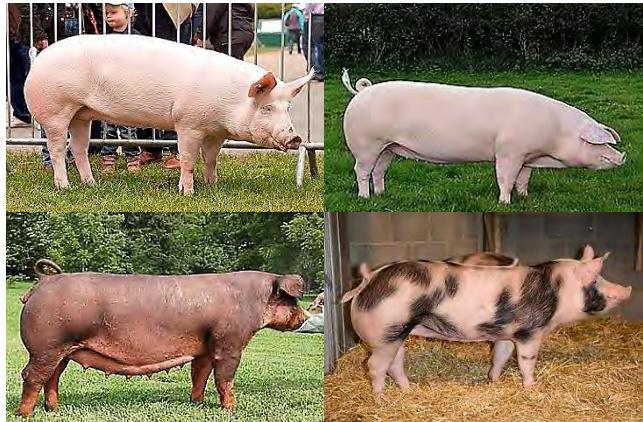


Number of piglet loss



Number of piglet loss

Factors affecting number of piglet loss



Litter size

Leenhouwers *et al.* (1999); Borges *et al.* (2005)



Genetic potential

Canario *et al.* (2006)



Farm management

Hoshino *et al.* (2009)

Objectives



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- To determine factors affecting loss of piglets in Landrace, Yorkshire and Duroc sows raised under an open-house system in Thailand

- To estimate the association between number of piglet loss and total number of piglets born in Landrace, Yorkshire and Duroc sows raised under an open-house system in Thailand

Dataset



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❑ Data records

- Animal ID, Birth date, Breed, Parity, Age
- Sow production

❑ Landrace, Yorkshire and Duroc

❑ 2,836 sows

❑ 11,924 litter records

❑ 2001 to 2013



**Number of
piglet loss
(LOSS)**

1	2	3	4	B	D	E	F	G	Q1	Q2	Q3	Q4	RE	RG	RD	RE	RF	RG	RD	RI	RI	PK	PL	PM	PN	RO	RP	PQ	PR	PS	PP	S1	S2	S3	S4	S5			
1	Anin	BS	Parity	Fd	Fm	Fy	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55												
2	1122	1	1	11	6	2006	22.9	26	26.2	25.2	24.4	25	25.2	25.1	25.4	24.3	25.5	23.6	22.6	22.4	21.8	24.7	24.4	25	25.2	26.3	26.6												
3	1122	1	2	7	6	2006	25.1	28.1	27.7	27	25.8	28.7	29.4	28.2	29.5	31.1	29.4	29.4	29.7	27.8	28.8	28	26.3	27.6	29.1	31.7	32.5												
4	1122	1	3	30	10	2006	27.2	27	25.7	25.6	24.4	24.6	24.5	26.6	26.6	26.9	25.9	27.4	28.4	26.7	27	26.2	26.2	28.2	29	28.4	27.9	28.4											
5	1122	1	4	3	3	2006	23.1	23.2	23.5	24.1	25.1	25.3	25.4	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5					
6	1122	1	5	17	1	2007	27.9	28.9	28.1	28.5	27.7	26.1	26.4	25	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4					
7	1122	1	6	8	1	2008	20.5	20.1	18.5	18	18.6	19.3	19.2	20.3	21.3	21.7	22.9	23.4	23.3	22.6	25.1	26.2	24.9	24.9	24.9	24.9	25.1	24.9	24.8	24.4	24.4	24.4							
8	1122	1	7	8	6	2008	24.1	25.3	27.9	27.7	25.3	25.6	29.1	30.1	29.8	27.9	28.2	26.6	30.7	32.9	32.4	32.2	32.7	32.5	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7	31.7					
9	1122	1	1	9	1	2008	26.2	25.4	24.4	25	25.2	25.4	25.4	24.3	25.6	23.6	22.6	22.4	21.6	24.7	24.4	25.2	26.3	26.4	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3						
10	1122	1	2	6	2008	26.1	25.9	28.2	28.1	25.1	27.1	27.2	27.8	27.8	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9	27.9						
11	1122	1	3	7	6	2008	25.5	25.1	25.1	25.7	25.7	25.9	26.3	26.1	27.4	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5						
12	1124	1	4	29	3	2007	24.1	23.9	23.3	23.9	23.6	24.2	24.3	23.9	23.2	23.3	22.7	22	21	20.4	19.8	19.6	18.4	19	20.1														
13	1124	1	5	30	8	2007	26.9	25.4	24	26.5	25.5	23.9	25.2	26.6	26.4	26.8	26.9	27.9	27.9	27.8	27.9	28.3	28.5	27.7	26.4	26.4	25												
14	1124	1	6	19	1	2008	21.1	20.6	21.1	22.2	22.3	22.1	22.1	21.7	21.2	21.3	20.5	20.1	18.5	18	18.6	19.3	19.3	20.4	21.3	21.7													
15	1124	1	7	16	6	2008	26.1	27	27.4	28.3	28.8	28.2	28.4	28.4	27.5	24.1	25.3	27.9	27.5	25.3	25.6	28.1	29.1	30.4	29.8	27.9	28.1	28.4	28.4	28.4	28.4	28.4	28.4	28.4					
16	1124	1	8	1	2008	24.8	24.6	25.6	25.5	25.5	25.6	25.6	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5						
17	1129	1	2	1	9	2012	26.1	26.9	24.4	25.1	24	28	28.1	27.7	27.1	25.9	27.6	28.6	28	28.4	28.5	29.9	29.9	30.2	27.8	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9	26.9					
18	1129	1	3	26	1	2013	22.2	23	24.4	24.5	23.6	23.1	23.9	24.7	24.8	24.8	24.3	21.9	22.2	23.5	23.5	23.5	25.3	25.3	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9	25.9					
19	1130	1	1	11	2	2012	24	24.3	25.6	26	25.8	24.6	24.6	24.5	24.5	24.7	22.8	21.6	21.3	21.2	23	22.2	21	20.5	20.4	22	23.2												
20	1130	1	2	2	7	2012	27.7	27.8	26.8	29.6	28.9	29.4	29.4	29.1	28.9	29.2	28.7	28.7	28.3	29.3	29.7	30.5	29.4	30	29.6	27.9	27.9	27.1											
21	1130	1	3	20	1	2012	27.1	27.1	27.1	27.1	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2	28.2					
22	1134	1	1	9	9	2008	26.4	27.5	27.7	27	27.4	27.8	27.8	27.9	28.5	27.4	26.1	27.3	26.7	27.4	27.3	26.4	27.6	27.6	28.4	28	28.8												
23	1134	1	2	2	2	2009	22.2	21.8	22.2	20.7	22.9	23	22	20.9	19.5	20.1	21.9	21.2	22.1	21.9	22.5	22.5	22.3	22.8	22.8	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3					
24	1134	1	3	28	6	2009	27.9	29.6	30.1	28.3	28.9	27.2	27.4	28.5	26.2	25.4	25.7	26	29.5	29.7	30.5	29.6	29.7	28.4	28.7														
25	1134	1	4	23	11	2009	27.2	27.6	27.1	27.1	27.3	26.6	27	27.6	26.7	25.9	29.4	29	28.4	28.3	28.5	27.3	25.7	26.7	27.5	28.6	28.1												
26	1134	1	5	28	6	2009	27.1	27.6	26.6	28.1	27.6	28.1	28.2	25.2	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1						
27	1136	1	1	3	8	2008	26.6	28.4	28.4	28.4	28.4	28.4	28.4	28.4	28.9	28.9	28.2	28.2	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1	28.1					
28	1136	1	2	27	12	2008	24.7	25.2	25.1	24.7	25.9	25.2	23.3	21.4	21.1	21.7	21.3	21.4	22.1	24.9	27.2	26.7	26.8	26.6	27.2	27.2	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8			
29	1136	1	3	21	5	2009	31.1	28.4	29.3	28.7	27.4	27.1	30.5	29.4	29.4	28.4	28.9	28.5	28.2	28.7	28.8	28.8	28.8	29	28.5	28.2	28.2	27.8	27.8	27.8	27.8	27.8	27.8	27.8	27.8				
30	1136	1	4	14	10	2009	26.7	27.7	27.6	28.1	28.8	28.4	27.9	28.5	28	27.2	27.8	28	28.7	28.9	29.1	28	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3	27.3						
31	1136	1	5	9	3	2008	23.1	24.3	23.6	23.9	25.2	24.7	24.1	25.7	26.4	25.3	24.2	24.5	23.9	23.1	23.2	23.1	23.2	23.1	24.2	24.5	25.6	25.6											
32	1137	1	6	11	2008	27.4	27.4	28.3	28.3	28.6	28.6	28.6	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7	28.7						
33	1137	1	2	12	1	2009	21.8	21.8	22.1	22.1	21	19.2	18.3	18.5	19.4	20.2	21.9	22.9	22.9	24.3	25.5	24.7	25.2	25.1	24.7	25.9													
34	1137	1	3	9	6	2009	28.4	27.8	28.	28.5	28.5	28.3	28.7	28.9	28.5	27.8	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5					
35	1137	1	4	31	10	2009	26.7	28.1	28.9	27.6	27.1	28.6	28.7	28.7	28.9	26.1	27.2	27.9	27.9	26.1	27.3	27.9	28.1	28.3	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8					
36	1137	1	5	26	3	2009	27.3	26.4	25.1	24.7	24.8	24.6	24	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4	23.4							
37	1137	1	6	20	8	2010	30.1	29.4	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1					
38	1137	1	7	15	1	2011	25.8	25.4	24.3	24.3	24.8	23.6	23.4	23.1	24.5	23.9	23.8	23.8																					

Farm management



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Open-house system



16% to 18% CP

Individual pen

Farrowing pen





Statistical models



Mixed linear model

$$\mathbf{y} = \mathbf{X}\mathbf{b} + \mathbf{Z}\mathbf{u} + \mathbf{e}$$

Fixed effects

- ◆ Farrowing year-season
- ◆ Breed group
- ◆ Parity
- ◆ Number of total piglet born
- ◆ Farrowing age
- ◆ Interaction between temperature and humidity

Random effects

- ◆ Animal
- ◆ Residual



Simple linear regression model

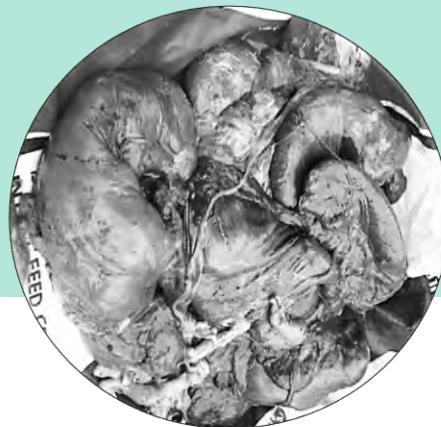
$$\mathbf{y} = \mathbf{b}_0 + \mathbf{b}_1 \mathbf{X}_1 + \mathbf{e}$$

Dependent variable : Number of piglet loss (LOSS)

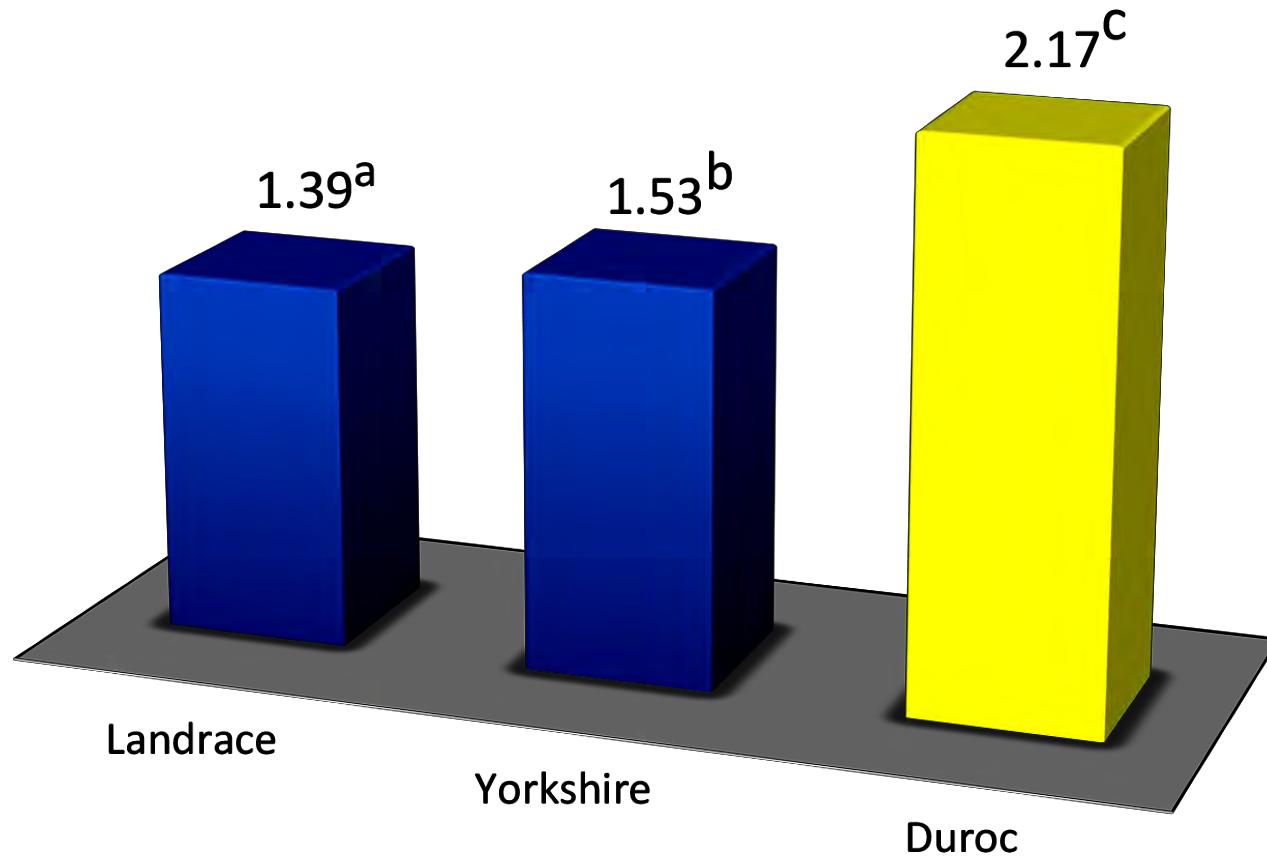
Independent variable : Number of total piglet born (NTB)



Results and discussion



Effect of breed groups on LOSS

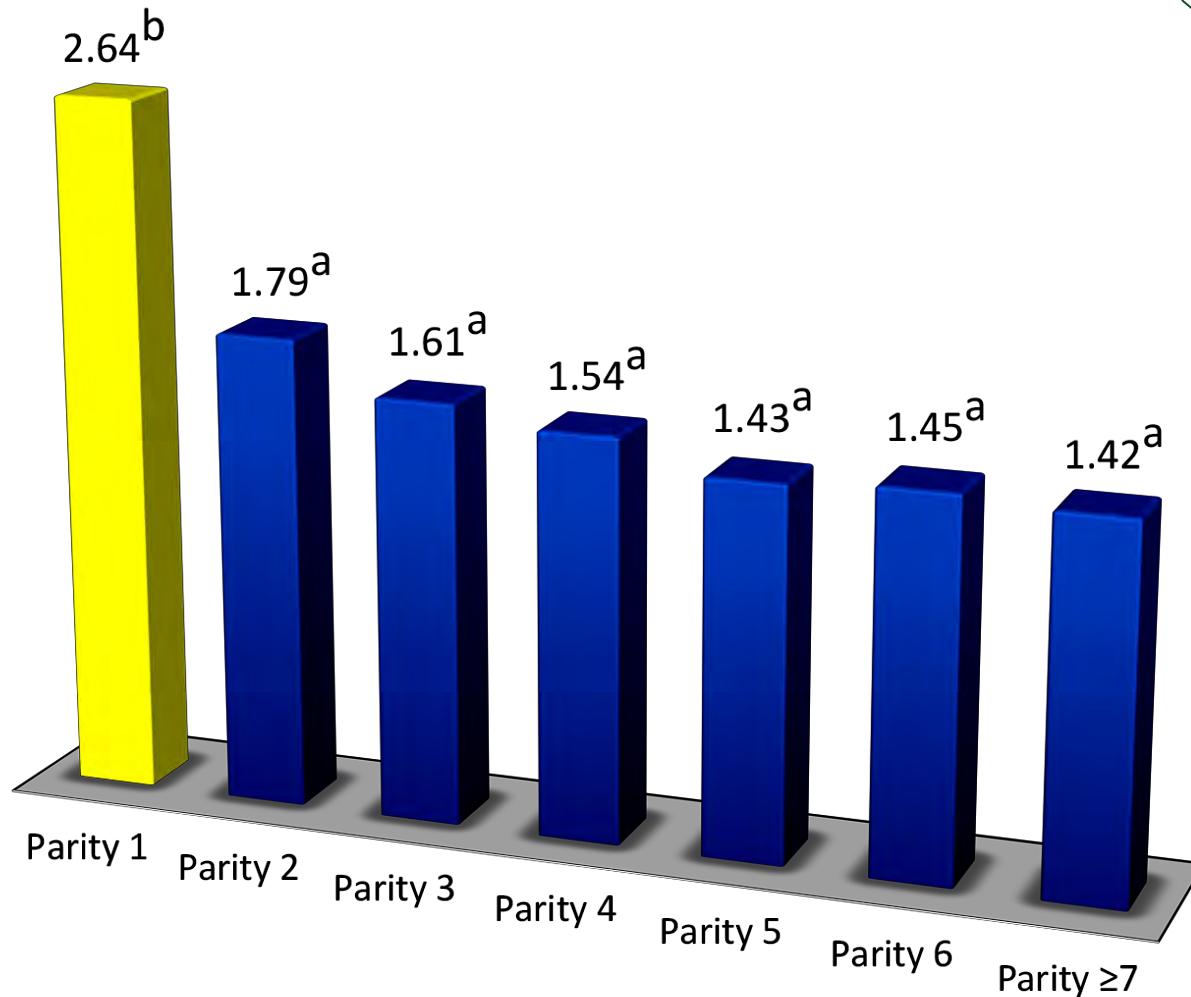




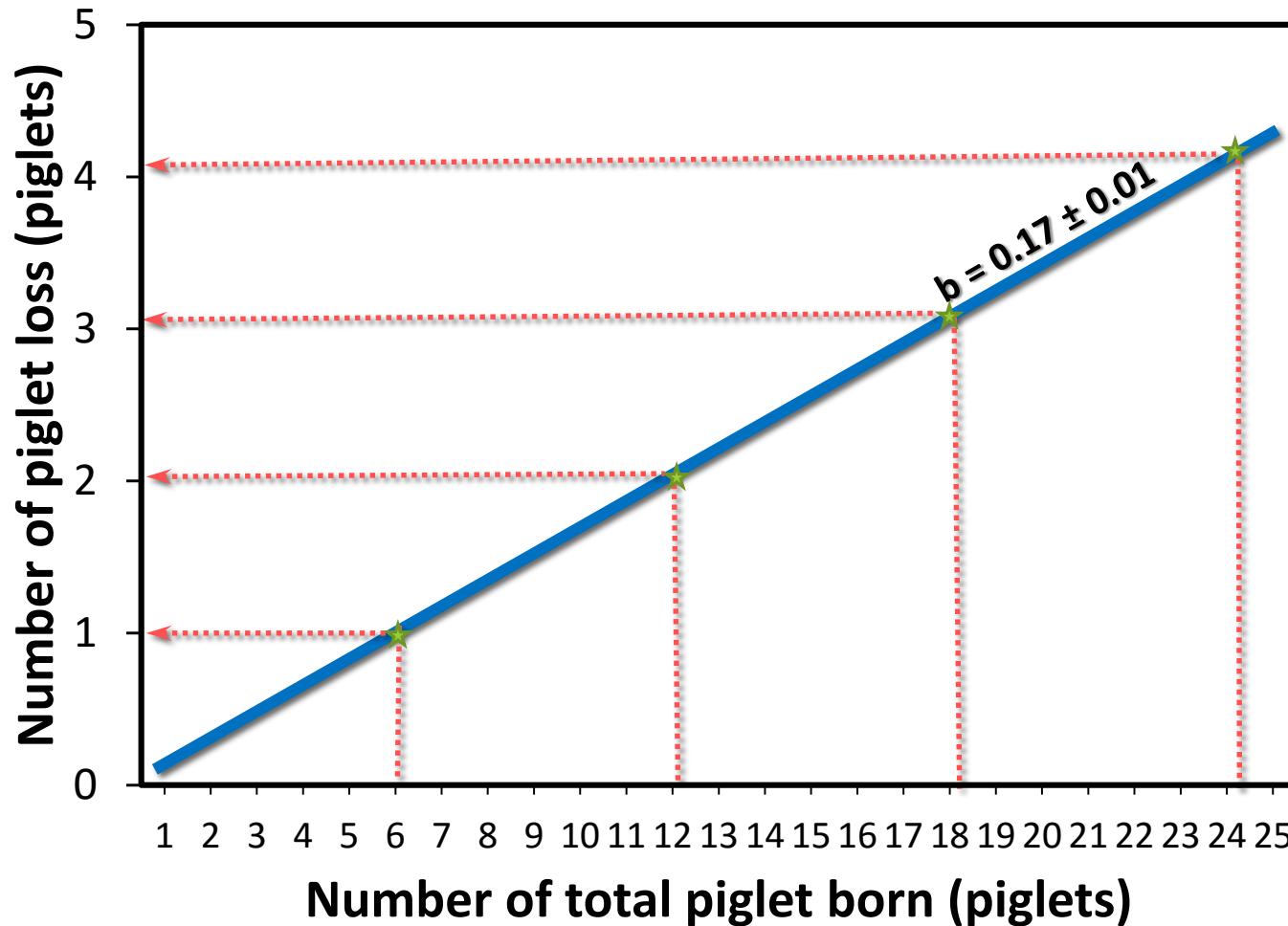
Effect of parity on LOSS



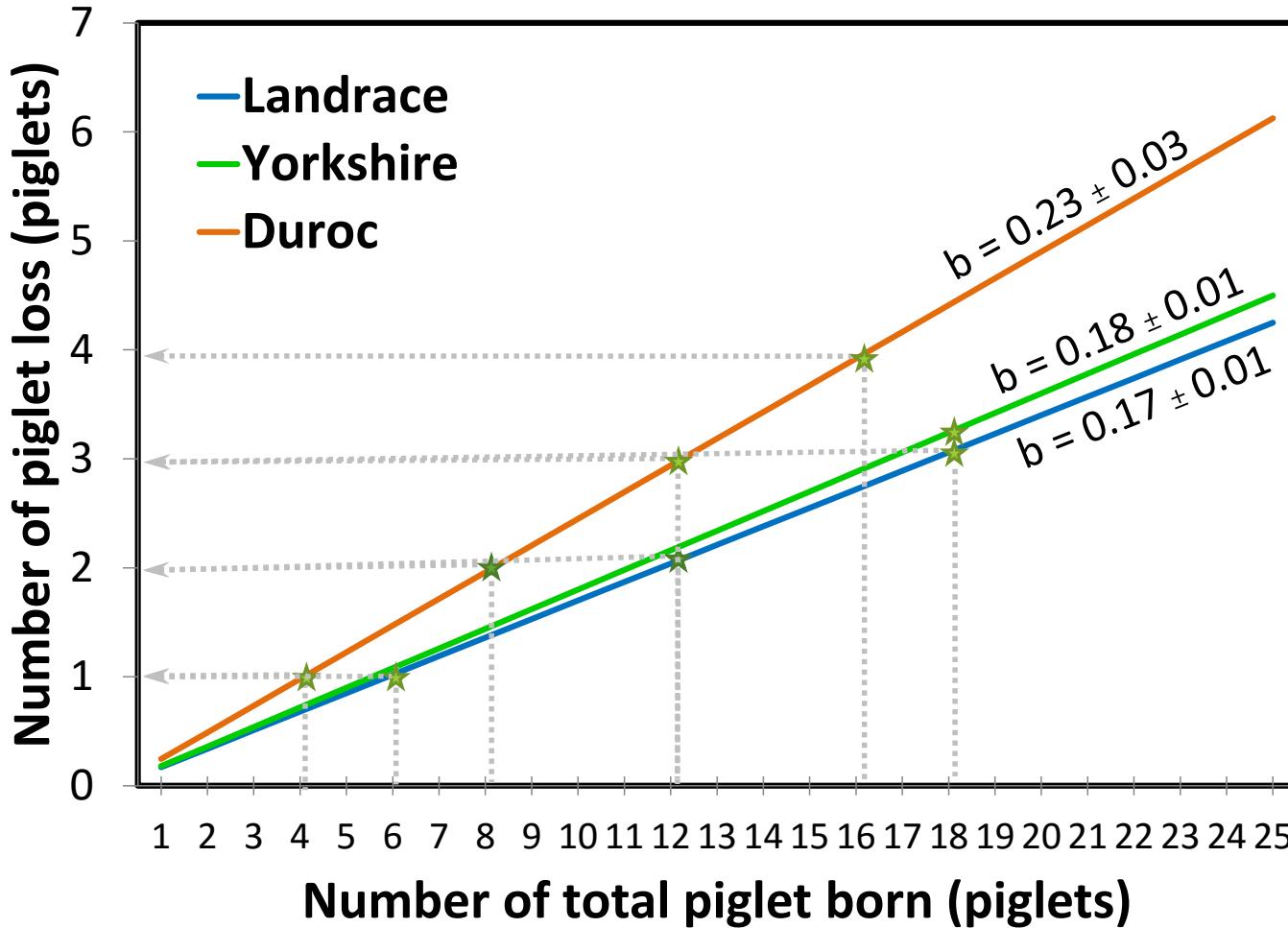
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Association between LOSS and NTB in all breed groups



Association between LOSS and NTB in different breeds



Conclusion and Implication



Conclusions



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- ◆ Variation of LOSS was influenced by farrowing year-season, breed group, parity and number of total piglet born
- ◆ Landrace and Yorkshire sows had lower LOSS than Duroc sows
- ◆ Positive association between LOSS and NTB was found in all breeds



Implication

- ◆ Piglet losses would increase by 1 piglet lost for every 6 piglets born in Landrace and Yorkshire sows, and by 1 piglet lost for every 4 piglets born in Duroc sows

Acknowledgement



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Commercial swine farm



Thai Meteorological Department



Kasetsart University



University of Florida



Tropical Animal Genetic Unit



Thank you for your attention