Is Maternal Fear Associated with Piglet Survival in Loose Farrowing Systems?

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Due to concerns on food safety, environment and animal welfare, demand from consumers for natural and organic meat has increased dramatically. In swine production, both natural and organic pork are required to be produced by alternative systems to confinement housing. One of the alternative housing systems is loose farrowing systems. Advantages to loose farrowing systems include allowing sows perform natural behavior, increased feed intake and milk production, which in turn may increase piglet weight at weaning. The major challenge to loose farrowing systems is higher piglet mortality, which is not only a welfare issue, but a major economic dilemma in alternative swine production.

Piglet mortality in loose farrowing systems is reported in the range of 20-33%, about two-fold of piglet mortality in confinement farrowing crates. Piglet survival largely depends on piglet vitality and maternal care of mother sows, especially when sows are not confined. As our understanding on piglet vitality and maternal care is limited, the problem of piglet death remains. Recently, people have become aware of emotional states in farm animals. Fear is an emotional state that is induced by the perception of actual or potential danger. It threatens well-being, growth, and reproductive performance of an animal by imposing chronic stress. Studies on swine indicated that mother fear was associated with maternal behavior and piglet vitality at birth. As only limited data are available, relationship between maternal fear and piglet survival is not clear. To investigate whether maternal fear plays a role in piglet survival in loose farrowing systems, a study supported by the Graduate School of the University of Minnesota was conducted at the WCROC in Morris. The objectives of the study were:

1. To determine individual variation in fearfulness of breeding sows.
2. To evaluate effect of maternal fear on piglet survival
3. To assess effect of sow fear on maternal behavior and piglet vitality.

Behavioral tests (human approach and novel object approach test) were used to determine fear response for each individual sows. Based on fear responses, sows were categorized into less fearful, neutral, and fearful groups (Table 1). At farrowing, sow behavior, litter size, and birth weight of piglets were recorded. From birth to weaning, growth rate and mortality of piglets were monitored. Piglet vitality was assessed by birth weight and growth rate. The results (Table 2) indicated that that less fearful sows tended to have larger live litter size at birth (11.4 vs. 10.6 pigs/litter) and lower piglet mortality (15% vs. 21%) than fearful sows. As a result, less fearful sows weaned larger litters than fearful sows (9.9 vs. 8.3 pigs/litter; $P < 0.05$). Data on sow behavior are still in progress of analysis, which may further reveal how maternal fear affects sow behavior and piglet survival. Since less fearful sows weaned larger litters, selecting less fearful sows may increase the number of piglets weaned, especially in loose farrowing systems.

Table 1. Fear score of breeding sows

	Less fearful	Neutral	Fearful
Number of sows	31	28	32
Mean parity	2.7	3.1	2.8
Fear score			
A	29	88	172
B	123	155	179
C	28	19	2
D	57	82	105

A = Latency of entering the circle of 20" with the person in human approach test (s)
B = Latency of contacting the person in human approach test (s)
C = Duration in the circle of 20" (s)
D = Latency of contacting the object in novel object test (s)

Table 2. Effect of maternal fear on piglet mortality on a bedded, group farrowing system

	Sow Category		
	Less fearful	Neutral	Fearful
# of litters	31	28	32
Litter size, pigs/litter			
Born alive	11.4	10.9	10.6
Stillborn	0.6	0.7	0.8
Total dead	1.8	2.2	2.3
Weaned[1]	9.9[a]	9.2[ab]	8.3[b]
Mortality, %	14.9	17.2	21.0
Piglet growth			
Birth weight, lb/pig	3.8	3.6	3.7
Daily Gain (birth to weaning), lb/d	0.57	0.57	0.58

[1]Means without a common superscript within a row differ ($P < 0.05$)