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Piglet Mortality in an Outdoor Farrowing Hut: What Contributes to their Demise Over the First 72-h After Parturition?

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Summary and Implications

Pre-weaning mortality has been estimated to cost the industry over $100 million/yr and is a serious animal well-being concern. The objective of this study were to determine behavior (nursing) and postures, (active and inactive) for piglets over the first 72-h after parturition when housed in an outdoor farrowing hut. No differences were found for nursing (P = 0.69), active (P = 0.52), inactive (P = 0.59) or unknown (P = 0.78) for piglets that were killed or not killed over the first 72-h after parturition. In conclusion there were no differences in the behavioral repertoire performed by outdoor loose housed piglets that resulted in their death by crushing over the first 72-h after parturition. Therefore, finding few behavioral differences between treatments may indicate that variation among sow behavior is a more significant cause of piglet rushing than variation among piglet behaviors.

Introduction

Allowing the sow increased mobility at the time of parturition may be detrimental for the well-being of her piglets, if for example the sow frequently alters her posture, is unresponsiveness to her piglets' distress or does not nurse. These factors could result in increased pre-weaning mortality and a lighter litter at weaning. It has been reported that during the first 72 h immediately following farrowing the majority of piglet deaths occur, with 50% attributed to crushing by the sow. The complex phenomenon of piglet mortality has been well researched, with 30 % of piglet losses attributable to a single factor and 70 % attributed to multiple factors. Pre-weaning crushing mortality has been estimated to cost the industry over $100 million / yr. Some work has described the sows' and piglets' behaviors 1 h prior to a piglet being crushed in an outdoor farrowing hut. For the sows, the authors reported that 62.5 % of sows which crushed a piglet moved from lying sternal to lying lateral, 25 % of the sows moved from lying lateral to lying sternal and 12.5 % of sows that killed a piglet transitioned from standing to lying lateral. To date, limited information is available on how the behavior of the piglet up to 72 h after birth may affect which piglets are crushed. The objective of this study were to determine behavior (nursing) and postures, (active and inactive) for piglets over the first 72-h after parturition when housed in an outdoor farrowing hut.

Materials and Methods

Animals and housing: Each farrowing paddock was 0.4 ha, separated by a single stranded electrical wire (12 A), which was at a height of 59 cm above the ground. Litters (PIC, USA) were housed in English-style farrowing huts (1.12 m height x 2.79 m width x 1.65 m depth). One door was situated to the left side of the farrowing hut (1.23 m height x 1.18 m width) and a ventilation window was positioned on the back wall (43 cm height x 1.19 m width). The ventilation window was occasionally closed at the discretion of the farrowing manager. This was achieved by placing a wooden board (51 cm height x 1.19 m width) over the open window. Closure rate was the same between all sows in and across pastures. All farrowing huts were orientated in the southerly direction. Short chopped wheat straw was used for bedding. Tall metal fenders (0.9 m height x 2.7 m width at the back of the hut and 0.7 m at the front x 1.60 m length) with a PVC roller (0.12 m height x 0.12 m width x 0.64 m length) were used. Fenders were attached after the sow had chosen her farrowing hut and prior to piglets being born. To decrease the amount of disruption that occurred to the litter, caretakers checked on the litter twice a day (0700 and 1500 hours). Research was conducted from July to September 2000 at the Sustainable Pork Farm™ situated in an area with a dry steppe climate producing mild winter temperatures near Lubbock, Texas, USA.

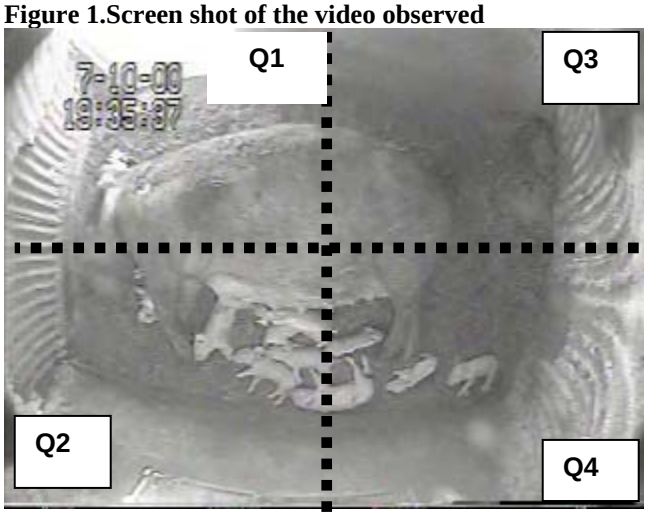
Treatments: Treatment one consisted of litters that lost one or more piglets over the first 72-h after parturition with a piglet being killed by the sow (**CR** = 4). Treatment two consisted of litters that did not lose any piglets over the first 72-h after parturition (**NC** = 4).

Camera set up: A plastic shed inside the central hub area of the farrowing pasture housed four time-lapse video recorders (VCR; Panasonic, Model AG-6540, Matsushita Co Ltd., Japan), which was set to record in 24 h mode, 2.5-frames/s. Each VCR contained an RS-232C interface adaptor (AG-IA671; Panasonic Matsushita Co Ltd., Japan). VCRs were connected to a video switcher (VS-81V Model 625120, Kramer Electronics Ltd., Israel) and this was

connected to one Panasonic black and white monitor so that camera angles and picture clarity could be checked daily.

Four farrowing huts were positioned along the fence line at 45, 60, 75, and 90 m from the central hub. A 41 x 41 cm square was cut into the top center of each farrowing hut and a custom made protective 24 gauge galvanized steel camera hut was fixed onto the farrowing hut (Apex Sheet Metal, Lubbock, TX). The lid was hinged so that the camera could be easily adjusted from inside the camera hut unit. The camera hut unit (38.10 cm height x 40.64 cm width) contained filters on each side to allow air to circulate around the camera while preventing dust particles entering. A clear plexi glass tube (5.08 cm diameter by 8 cm length) was inserted into a pre-drilled hole at the base of the camera hut unit to protect the lens of the camera. This tube protruded into the farrowing hut and on either side of the camera one 12 V mini bayonet bulb was suspended from the ceiling of the hut unit This light source provided ample light for the camera to work at night but was minimal so that it did not interfere with the behavior of the litter. One black and white (Model WV-BP 332, Panasonic Matsushita Co Ltd., Japan) 12 V camera was positioned inside the camera hut unit with the lens directed into the farrowing hut. Each camera had a 1.8 to 3.6 mm variable focal lens (Computar Japan). Cameras were held in position by four steel rods welded inside the camera hut unit. Each hut had one Astron Model RS-4A (Astron Coop. Irvine, CA), 13.8 V transformer to provide power for the camera and light.

Figure 1.Screen shot of the video observed



Measures: One behavior (nursing), two postures (active and inactive) and one unknown category were recorded (Table 1). Data were collected by one experienced observer viewing videos recorded at 2.5 frames per second in Windows Media Player® with data entered into Microsoft Excel®.

Statistical Analysis: All behavioral data were expressed as percentages and were subjected to a square root arcsine transformation process to achieve a normalized distribution. Transformed data were analyzed using the PROC MIXED procedure in SAS® (SAS Inst. Inc., Cary, NC) software for parametric data. The experimental unit was the farrowing hut (containing one sow with her litter) within each block (defined below) with two groups: Eight C-22 litters were used for behavioral comparisons for piglets in a litter where the dam killed a piglet(s) (CR; n = 4) or did not kill a piglet (NC; n = 4) over the first 72-h after parturition. A block contained a sow from the same parity that farrowed in a similar time frame. Each block for sow parturition and sow behavior consisted of the same parity sow that was designated as either a NC or a CR sow. Class statement included sow (n = 8), block (n = 3), treatment (CR vs. NC) and day (1, 2 and 3). The model-included the parameter of interest and treatment, a random statement of block nested with treatment and a repeated measures statement of day nested within sow.

Results and Discussion

No differences were found for nursing ($P = 0.69$), active ($P = 0.52$), inactive ($P = 0.59$) or unknown ($P = 0.78$) for piglets that were killed or not killed over the first 72-h after parturition (Table 2). In conclusion there were no differences in the behavioral repertoire performed by outdoor loosed housed piglets that resulted in their death by crushing over the first 72-h after parturition. Therefore, finding few behavioral differences between treatments may indicate that variation among sow behavior is a more significant cause of piglet rushing than variation among piglet behaviors.

Table 1. Description of the piglet posture and behavior for PIC piglets for piglets that were killed or not killed inside the farrowing hut from July to September 2000

	Definition
Posture	
Active	Summation of walking defined as any action while the piglet was upright and moving and standing defined as assuming or maintaining an upright position on extended legs but remaining stationary).
Inactive	Summation of sitting defined as most of the piglet's body weight and the posterior of their body trunk were in contact and supported by the ground and lying (lateral and sternum) define d as side contacting the ground or underside contacting the ground).
Behavior	
Nursing	Nursing duration was a collection of four phases, including an initial massage phase, a phase when the piglets stopped massaging, true suckling (which lasts for about 14 s while milk is ejected), and a final massage phase, which is variable in length began when 80% of the piglets engaged in initial massage and ended when less than 80% of the litter was attached to the teats
Unknown	Default was recorded if the video was unclear to record a behavioral or postural class for the piglet(s). This could include times when a piglet(s) were outside of the hut, buried in the straw or hidden by the sow

Behaviors adapted from Hurnik et al., (1995)

Table 2. Behavioral and postural least squares means and standard errors over a 72-h period performed by PIC piglets wherein one or more piglets in a litter were crushed (CR; n = 4) or all piglets survived (NC; n = 4) inside the farrowing hut from July to September 2000

	Treatments		
Measure, %	**CR**	**NC**	***P*-values**
Postures			
Active	15.48 + 1.04	16.42 + 1.04	0.52
Inactive	55.37 + 2.60	53.24+ 2.60	0.59
Behavior			
Nursing	26.26 + 2.42	27.88 + 2.42	0.69
Unknown	2.89 + 0.54	2.46+ 0.54	0.78

Block nested within treatment was the error term used to test treatment effects