



CASE STUDY: Differences in social behaviors and mortality among piglets housed in alternative lactational systems

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ABSTRACT

Farrowing crate alternatives allow greater sow locomotion and behavioral expression but may affect piglet welfare. This study compared productivity and piglet behavior in 3 lactational housing systems: a pen (PN, $n = 30$); a closed crate (CC, $n = 19$); and a hinged crate (OC, $n = 19$). Until piglets reached 2 wk of age, CC and OC were identical with sows fixed in a crate within a pen (CRT). After 2 wk, OC sows were released. At 27 d of age, 2 female and 2 male pigs per litter were observed separately in an exploratory behavior test and a different, but equivalent, set of 4 pigs were observed with an unfamiliar pig in a social test. In the social test, PN ($P < 0.001$) and CC ($P = 0.02$) pigs spent longer in nonaggressive touch than OC pigs. Housing also affected pig productivity. Prior to d 15, pig weight was 9% and daily gain was 7% greater in CRT than PN (both, $P < 0.001$). Concurrently, PN mortality (27%) was greater than CRT (13%; $P = 0.006$). However, from d 16 to weaning, pig weight ($P = 0.55$), gain ($P = 0.75$), and mortality ($P = 0.98$) did not differ between systems. Overall, housing had little effect on piglet behavior but affected productivity and welfare. Pigs from the PN treatment had decreased early growth and increased mortality, but pigs from OC and CC crates did not differ. In sum, although limited to the study farm, the findings of this investigation suggest that the OC crate appears to provide the best balance of the sow and piglet needs.

Key words: alternative housing, farrowing, piglet behavior, productivity, swine welfare

INTRODUCTION

Farrowing crates are the most common form of lactational sow housing in the United States and Europe (Johnson and Marchant-Forde, 2009; Pedersen et al., 2013). A desire to decrease preweaning mortality helped drive their adoption (McGlone and Morrow-Tesch, 1990; Johnson and Marchant-Forde, 2009), but their effectiveness at reducing mortality has been questioned (Phillips and Fraser,

1997; Weber et al., 2007; Kilbride et al., 2012). Most piglets die early in life (Hellbrügge et al., 2008) by getting trapped under the sow (Marchant et al., 2000; Edwards, 2002; Kilbride et al., 2012). Because trapping can result in injuries and suffocation, preweaning mortality is both a production and welfare challenge.

Farrowing crates create welfare challenges for the sow by limiting locomotion, social interactions, and the expression of natural behaviors such as nesting (Baxter et al., 2011). Alternative housing options include turn-around crates, hinged (swing-side) crates, and individual lactational pens (McGlone, 2010). In most pen housing, sows are typically provided sufficient space to move and substrate that encourages behavioral expression, but individual design specifics and management can influence a system's success. In a hinged crate system, the sow is initially crated, but when the piglets reach a designated age, the crate is opened providing the sow additional space. Because hinged crates allow some freedom of movement, they may provide better sow welfare than farrowing crates, but because they do not allow free movement during nest building (Jarvis et al., 2002) and substrate is not typically provided, hinged crates do not meet sow welfare needs as well as pens. Because most alternative lactational system research has been conducted in Europe, little is known about how North American management and genetics influence the success of various systems.

Lactational housing may also influence piglet behavior. Enriched environments may reduce neophobia (Beattie et al., 2000) and better prepare the piglet for the housing, dietary, and social stressors of weaning (Hillmann et al., 2003; Chaloupková et al., 2007; Oostindjer et al., 2010). However, relatively little research has addressed the influence of environmental complexity alone, without a social component, on piglet behavior (Kutzer et al., 2009; Martin et al., 2015).

The research objectives were to compare the effects of lactational housing systems—a closed crate; an opened, hinged crate; and a pen—on piglet productivity and welfare. We hypothesized that piglet mortality would be greatest in the pen system but that the surviving pigs would display less fearful and more social behavior than piglets from the other housing types and that outcomes

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from the opened crates would be intermediate between those from closed crates and pens.

MATERIALS AND METHODS

Animals and Housing

All procedures in this experiment were approved by the University of Pennsylvania's Institutional Animal Care and Use Committee. The experiment was conducted between June and September 2012 at the University of Pennsylvania's Swine Teaching and Research Center in Kennett Square, Pennsylvania (39.84°N).

The experiment initially included 70 PIC 1050 sows (PIC North America, Hendersonville, TN) that ranged in

parity from 1 to 5 (mean \pm SE: 2.78 ± 0.15) and their litters, but 2 sows and litters were removed because of illness. A sow and its litter was the experimental unit. The sows farrowed in cohorts in either a pen (PN; $n = 30$ sows and 392 piglets; Figure 1a and 1b) or crate (CRT; $n = 38$ sows and 492 piglets; Figure 1c and 1d) lactational housing system.

Two identical 12.2×9.1 m PN rooms were used. Each room contained 5 pens on either side of a center alleyway for a total of 10 pens. The PN was 7.07 m^2 and based on the FAT2 pen lactational system (Weber and Schick, 1996). It was divided into a dunging area with metal grate and slatted concrete flooring (2.21×1.02 m), a lying area with solid concrete flooring that was lightly bedded with

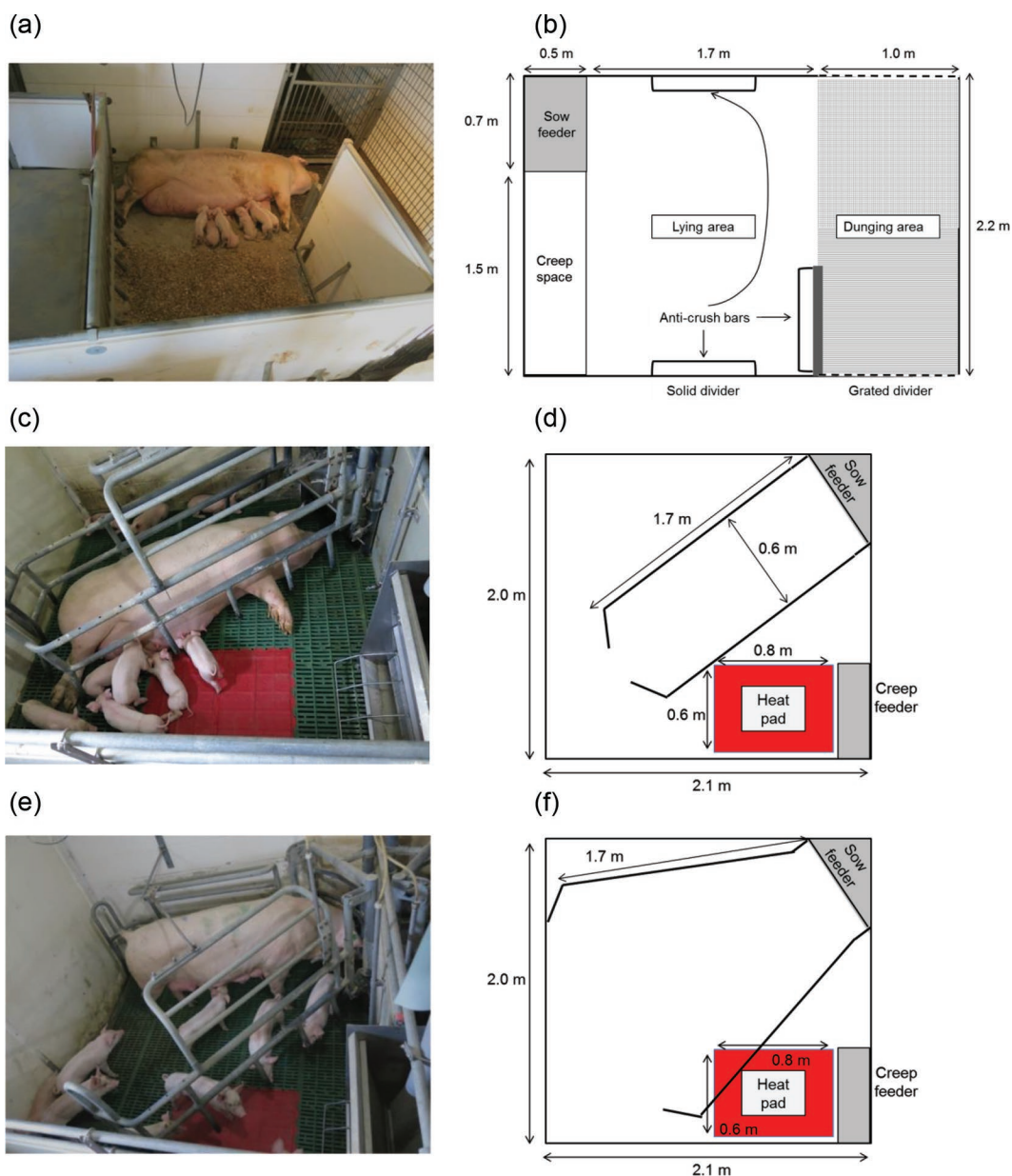


Figure 1. The lactational housing systems. (a, b) PN; (c, d) both CRT treatments from d 0 to 15 and CC after d 15; and (e, f) OC from 16 d to weaning. PN = pen; CRT = crate within a pen; CC = closed crate; OC = open crate. Color version available online.

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