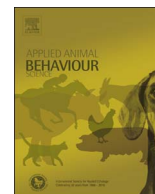




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## Behaviour of gilts before and at parturition after intensified human-animal contact, training to be driven, or exposure to a farrowing pen

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## ABSTRACT

During rearing and until first insemination, housing conditions of gilts are relatively constant and the few human-animal interactions negative. Around first parturition, however, gilts experience intensified contact with stockpersons and are subjected to new management procedures such as being driven individually and exposed to an unknown housing system that includes separation from the peers, the farrowing pen. In the present study, we investigated whether pre-exposure to these procedures during rearing has positive effects on indicators of calmness and maternal behaviour in the farrowing pen.

In Experiment 1, gilts were subjected to intensified human-animal contact during rearing ( $n = 18$ ), during pregnancy ( $n = 9$ ) or not at all (control:  $n = 24$ ). In Experiment 2, trained gilts ( $n = 18$ ) were driven singly through a passageway three times, 4 weeks, 3 weeks and 2 weeks before expected parturition, whereas untrained gilts ( $n = 23$ ) were not. In Experiment 3, twelve gilts were individually introduced to a training farrowing pen for 24 h about four weeks before parturition, whereas nine control gilts could not gain experience in this environment before farrowing.

In all three experiments, lying behaviour and comfort behaviour as indicators for calmness as well as nest-building behaviour and interactions with piglets as indicators of maternal quality were observed. Observations took place by video at first farrowing, both during the first 24 h after they had entered the farrowing pen and from 1 h before parturition until 1 h after completed parturition.

Around parturition, the proportion of lying in lateral recumbency when lying decreased from control gilts to gilts with intensified human contact during rearing and gilts with intensified human contact during pregnancy. It was smaller in gilts exposed to the farrowing pen before parturition compared to control gilts, and did not differ between gilts trained to be driven and control gilts. Gilts habituated to the farrowing pen displayed more nest-building behaviour and more interactions towards their piglets in comparison with control gilts. These behaviours were not influenced significantly by intensified human-animal contact or a training to be driven (experiments 1 and 2).

In conclusion, the treatments had rather little effect on calmness and maternal behaviour of the sows. Early exposure to the farrowing pens seems to be the most promising treatment to be further studied, with potential effects on the frequency of nest-building behaviour and interactions with piglets.

### 1. Introduction

In modern farming practice, housing conditions of gilts are typically constant over longer periods during rearing. After weaning, they move through a maximum of three housing systems (weaner, fattening, and gilt phases). Within these phases group compositions is stable but some mixing with unfamiliar animals may occur at the beginning of these phases. Moreover, human-animal interactions are at a very low level

until insemination. Before first parturition, however, gilts are subjected to new management procedures associated with intensified contact with stockpersons. They have to leave the group pen in which they were reared for several months, are driven singly through unknown passageways, are separated from their group members, inseminated, and introduced singly to a new housing environment, the farrowing pen. These changes are likely to be stressful for the animals. In the present study we investigated, therefore, whether pre-exposure of gilts to these

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procedures, prior to first parturition, has positive effects on their behaviour during their first parturition and performance.

Several studies with piglets have shown that gentle contact with humans during rearing has positive effects on the human-animal relationship. Brajon et al. (2015), for example, investigated the effect of interactions with humans in weaned piglets and found that gently handled piglets spent more time in contact with the handler than negatively handled piglets. Similarly, Tallet et al. (2014) reported that piglets who were scratched and stroked after weaning approached the handler sooner in a test situation than the control piglets. In a study with gilts, repeated human-animal interactions during rearing improved growth performance when measured at 3 months of age (Poletto et al., 2010). Early positive handling was also found to influence the behaviour of gilts during their first lactation. English et al. (1999) touched gilts gently with the hand and talked to them from 7 days before introduction to the farrowing pen until 2 days after farrowing and observed that handled gilts made fewer savaging attempts on newborn piglets than unhandled control gilts. Furthermore, the numbers of stillbirths and of live-birth losses were marginally lower in the treatment group. Finally, Andersen et al. (2006) observed that sows fed nuts, were gently touched, and talked to in late pregnancy tended to rest more during the last 8 h before farrowing, but did not differ in the number of posture changes after farrowing compared to control sows with minimal handling.

With regard to training to be driven, studies with fattening pigs moved in groups have shown positive effects of pre-exposure. For example, Abbott et al. (1997) moved finishing pigs three times at weekly intervals in the month before slaughter and reported that this treatment improved their willingness to move. Similarly, Goumon et al. (2013) allowed finishing pigs to leave their home pen and explore a ramp. Later, in a simulated loading situation, trained pigs were less reluctant to move and required less handling when moved to the ramp than untrained pigs. Finally, Lewis et al. (2008) exposed finishing pigs to unknown passageways and ramps daily for one week and found that these animals had reduced heart rates during a later drive compared with naïve untrained pigs. Moreover, handling ease and handling time were improved for the trained pigs. Given these results, it is of interest to know whether training to be driven individually has positive effects on gilts' behaviour during later drives, too.

When gilts are introduced to a farrowing pen for the first time, they not only have to cope with a new housing condition and being separated from the group, but also with the physiological changes associated with parturition. From a production point of view, it is thus of interest to reduce the number of challenges the animals face at that moment, and habituating gilts to the farrowing environment could be a promising option. In a study with dairy heifers, Gyax et al. (2015) exposed the animals individually to the calving pen 4 weeks before parturition. They found that the additional time the animals spent in the calving pen affected lying behaviour during parturition and concluded that prior exposure to the calving pen had a calming effect. With gilts, the influence of exposure to a farrowing pen before first parturition has not been investigated yet. In the present study, therefore, the behaviour of gilts introduced individually to a training pen about four weeks before the calculated parturition date and staying there for a period of 24 h was compared to that of inexperienced control gilts.

Besides early handling, the coping strategy of piglets was found to have an effect on their behaviour and the human-animal relationship. In a seminal study, Hessing et al. (1993) subjected piglets to a backtest at an age of 1–2 weeks. Based on their behaviour during the test, piglets were classified as resistant, non-resistant, or intermediate. Piglet behaviour shown in this test was related to aggressive behaviour in social confrontation tests: piglets classified as resistant were mostly the aggressive individuals, whereas non-resistant piglets were mostly the non-aggressive ones. Reimert et al. (2014) investigated the response of piglets differing in their backtest reaction in a human-approach-test conducted at the age of 7 weeks and reported that piglets classified as

high-resisting spent more time near to the test person than low-resisting piglets. With regard to sows, higher levels of fear of humans, assessed by means of a novel object test and a voluntary human-approach-test at 8 weeks of age, were found to be associated with longer durations of farrowing, larger variation in inter-birth intervals, and a higher number of piglets dying without milk in their stomachs (Janczak et al., 2003). Given the results of these studies, we investigated whether gilts' behaviour during a backtest carried out at an early age is related to their behaviour when transferred to the farrowing pen for the first time.

Restlessness in the farrowing pen may affect gilts' performance. Wechsler and Hegglin (1997) found that individual differences in the quality of sow behaviour, including the rate of lying down events, were related to the occurrence of crushing. Similarly, Lensink et al. (2009) reported that sows with a higher frequency of posture changes after farrowing tended to have more piglets crushed. With regard to fear of humans, sows that crushed at least one piglet showed a higher withdrawal response to human presence than sows that did not show any crushing (Lensink et al., 2009).

The present study aimed to test whether pre-exposure of gilts to human-animal interactions, training to be driven, and early exposure to the farrowing pen have positive effects on indicators of calmness (lying in lateral recumbency, frequency of lying down events) and maternal behaviour (nest-building behaviour, interactions with piglets) in the farrowing pen. Moreover, effects on the human-animal relationship immediately after weaning of the piglets on gilts' behaviour when driven through passageways after weaning, and on performance were examined. In three experiments with independent samples of gilts, housed on four farms, intensity of human-animal contact during rearing and during pregnancy, training to be driven, and previous experience with a farrowing pen was varied between experimental animals. Moreover, a backtest was carried out when the gilts were on average 11 days old to account for differences in their coping strategies.

## 2. Material and methods

### 2.1. Housing conditions of gilts

The experiment with intensified human-animal contact was conducted on two experimental farms (A: Agroscope, Tänikon and B: Strickhof, Lindau-Eschikon, Switzerland), the experiment involving training to be driven on two commercial farms (C, D), and the experiment with exposure to the farrowing pen was again conducted at the experimental farm of Agroscope (A). We used more than one farm for the treatments where this was feasible in order to increase external validity. If we still found an effect of our treatments in spite of the varying circumstances on the farms, this would indicate a strong and consistent effect.

On farm A, piglets (i.e. future gilts) were housed with the sow in the farrowing pen for 30 days (range 21–40 days). They were then raised in Koomann's pens (outdoor climate with straw bedding and lying boxes) together with finishing pigs first. Later, gilts were raised in groups of approx. five animals in pens with littered concrete floors. From 11 weeks of age to first farrowing, they were kept in groups of four to eight in pens with an area of 1.6 m<sup>2</sup> per animal. The floor was made of solid concrete and littered with straw. In addition, gilts had permanent access to a roofed outdoor yard with an area of 1.7 m<sup>2</sup> per gilt. Farrowing pens were designed as loose farrowing pens with concrete floor in the lying (3.5 m<sup>2</sup>) and piglet area (0.9 m<sup>2</sup>) and slatted floor in the defecation area (2.6 m<sup>2</sup>). Straw and sawdust were provided twice a day in the lying area. On farm B, piglets were housed with the sow in the farrowing pen for 28.3 days (25–40 days). After weaning, piglets were raised in large groups with an outdoor run and littered concrete flooring. From the age of 30 weeks until first farrowing, they were kept in groups of 15–20 animals. Each group was housed in a pen with a concrete floor area of 1.7 m<sup>2</sup> per gilt littered with straw and a separate roofed outdoor yard of 2.1 m<sup>2</sup> per gilt. The loose farrowing pens were

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