



Risk factors for development of lameness in gestating sows within the first days after moving to group housing



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ABSTRACT

Lameness in sows is an important welfare issue that is affected by housing conditions and is thought to be influenced by hierarchical fights within the first days after mixing sows in groups. A longitudinal study in 15 randomly selected herds was performed to investigate the incidence of sow lameness and possible risk factors within the first days of group housing. Each herd was visited just before and again 3–5 days after the sows were moved to group housing. The floor characteristics and dimensions of the group housing facilities were assessed. Locomotion ability, body condition, skin lesions and degree of faecal soiling were recorded for all sows. Additional information on housing and management was obtained using a questionnaire. Amongst the 810 sows included in the study, the mean lameness incidence was 13.1% (95% confidence interval 10.9–15.6%). Following binomial logistic regression analysis, sows with >10% of the body covered with faeces had an increased risk for development of lameness (odds ratio, OR = 2.33, $P = 0.001$). An increase in space allowance from 1.7 m² to 3.0 m² (OR = 0.40, $P = 0.03$) and of herd size from 144 to 750 sows per herd (OR = 0.71, $P = 0.02$) decreased the risk of development of lameness. Neither the degree of aggression, indicated by skin lesions, nor the floor characteristics influenced the development of lameness. These results indicate that sows can benefit from a larger floor area.

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Introduction

Group housing of gestating sows has been mandatory in all member states of the European Union since 2013.¹ Although the change in sow housing was primarily driven by welfare concerns (Appleby, 2005), group housing may also present welfare issues, including injuries caused by post-mixing aggression and a higher prevalence of lameness (Gjein and Larssen, 1995a; Anil et al., 2003; Estienne et al., 2006; Chapinal et al., 2010). Lameness occurs in 8–27% of group housed sows (Bonde et al., 2004; Heinonen et al., 2006; KilBride et al., 2009; Pluym et al., 2011; Cador et al., 2014), although the number of lame sows can change throughout the reproductive cycle (Pluym et al., 2013) and during the period of group housing (Kroneman et al., 1993; Gjein and Larssen, 1995b; Calderón Díaz et al., 2013; Knox et al., 2014). Most of the lameness cases during group housing develop shortly after introduction of sows into the group (Kroneman et al., 1993; Anil et al., 2005; Chapinal et al.,

2010; Knox et al., 2014). Kroneman et al. (1993) reported an incidence of lameness of 10% within the first month of mixing. However, there is a lack of more recent data on the incidence of lameness shortly after transferring sows to group housing.

Lameness is influenced by housing conditions, including floor space allowance, group size and flooring. The impact of space allowance on the development of lameness in group housed sows has been studied, but the results are inconsistent (Gjein and Larssen, 1995b; Heinonen et al., 2006; Salak-Johnson et al., 2007; Willgert et al., 2014). The effect of space allowance on development of lameness may be dependent on group size, as demonstrated for finishing pigs (Street and Gonyou, 2008). However, studies investigating the association of group size and space allowance with development of lameness at sow level are lacking for group housed sows. Bare, slatted concrete floors, which are predominantly used for sow group housing, have been associated with development of lameness (Andersen and Bøe, 1999; Heinonen et al., 2006; KilBride et al., 2009). Slipperiness, abrasiveness, hardness, surface profile, void ratio and cleanliness are the main characteristics contributing to the injury potential of a floor (Webb and Nilsson, 1983; Webb, 1984; McKee and Dumelow, 1995). However, there has been limited investigation of these characteristics as risk factors for sow lameness (Cador et al., 2014). Furthermore, standards for floor characteristics, other than slipperiness, are lacking (Penny et al., 1965; Thorup et al., 2007).

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¹ See: European Commission, 2008. Council Directive 2008/120/CE of 18 December 2008 Laying Down Minimum Standards for the Protection of Pigs. <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1474487225453&uri=CELEX:32008L0120> (accessed 21 September 2016).

Table 1

Herd size, number of sows included in the study, sow breed and feeding system during gestation for each of the 15 herds in the study.

Herd identification	Herd size	Sows included in study	Sow breed	Feeding system
1	350	35	Finnish Landrace	Free access stalls
2	560	98	Dalland	Free access stalls
3	210	30	Topigs 20	Free access stalls
4	450	55	Topigs 20	Trough feeding, no barriers
5	180	22	Topigs 20	Free access stalls
6	210	37	Danbred	Free access stalls
7	144	30	John Sykes Rymer (JSR) Genetics	Electronic sow feeders
8	750	60	Danbred	Free access stalls
9	550	61	Pig Improvement Company (PIC)	Trough feeding, partial barriers
10	240	23	Crossbreds	Free access stalls
11	225	9	Belgian Landrace	Ad libitum feeding
12	400	89	JSR Genetics	Electronic sow feeders
13	745	98	Dalland	Trough feeding, no barriers
14	450	72	Topigs 20	Free access stalls
15	500	91	PIC	Vario-Mix ^a

^a Feeding system without identification, with one feeding place and a storage space for dry feed.

In sows, social ranking is established after 2–3 days (Arey and Edwards, 1998). Within the first few hours following grouping, aggression may be intense and can result in skin lesions and other injuries (Turner et al., 2006). Aggressive encounters amongst sows have been suggested to result in lameness, but the association has not been confirmed (Kroneman et al., 1993; Gjein and Larsen, 1995b; Chapinal et al., 2010). In the present study, the incidence of lameness within the first 3–5 days of group housing was determined, with the aim to identify herd and sow level risk factors for development of lameness.

Materials and methods

Study design and study population

Data were collected from 15 herds, randomly selected using the pig herd national database of the Belgian Federal Agency for Food Safety, during a longitudinal study from August 2012 to May 2013 (Table 1). The following eligibility criteria were applied: (1) sow herd or farrow-to-finish herd; (2) group housing of gestating sows;

(3) use of a batch production system; and (4) willingness of the farmer to participate. Herds using bedding material during group housing were excluded. The median herd size was 400 sows (range 144–750 sows). One batch of sows (9–99 sows) from each of the 15 herds was randomly selected for the study.

Data collection

Four weeks after artificial insemination, the sows were moved from the insemination unit (i.e. individual stalls) to the gestation unit (i.e. group housing). Herds were visited just before and again 3–5 days after the sows were moved to group housing. Data collection comprised assessment of flooring and group size in the gestation unit, as well as locomotion, body condition, skin lesions and scoring for faecal soiling.

Flooring and group size

Flooring 'dirtiness', quality, wetness and slip resistance at the gestation unit were assessed during the second herd visit according to a standardised protocol (Table 2). The mean floor area available to each sow and the percentages of slatted and solid floor were calculated. Group size was determined as the number of animals per pen.

Table 2

Overview of the protocol to assess the floor and sow characteristics measured as possible risk factors for development of lameness in sows.

Risk factor	Method	Scoring system or unit	Location
Dirtiness	Visual assessment	Percentage of the floor covered with faeces Score 0: No faeces on the floor (clean) Score 1: 25% Score 2: 50% Score 3: 75–100% of the floor (severely dirty)	Entire stable
Quality	Visual assessment	Quality of the floor Score 0: Good quality flooring, without any enlarged gaps, protruding objects or level differences between successive slats Score 1: Presence of enlarged gap width Score 2: Presence of protruding sharp objects Score 3: Combination of score 1 and 2	Entire stable
Wetness	Hygrometer (HM8-BF30, Merlin Technology GmbH)	Continuous (%)	At least every third of the dunging area Free access stalls: front and rear half of 10% of stalls Other group housing systems: in two random locations of each lying area and around every feeder and drinking valve
Slip resistance	Portable Skid Resistance Tester (Munro Instruments) with TRL rubber slider ^a	Continuous (British pendulum number = coefficient of friction × 100)	At least every third part of the dunging area ^b
Body condition	Renco Lean Meter (Renco Corporation)	Backfat thickness (mm)	P2 position (6–8 cm from dorsal mid-line at the level of the last rib)
Skin lesions	Visual assessment	Total number of skin lesions	Whole body (excluding the tail)
Sow dirtiness	Visual assessment (Welfare Quality, 2009)	% of body soiled with faeces Score 0: <10% of body soiled (clean) Score 1: 10–30% of body soiled Score 2: >30% of body soiled (very dirty)	Both sides of body

^a At each herd, the Skid Resistance Tester was calibrated; TRL, Transport Research Laboratory.

^b At each point the mean of eight readings was taken; the floor was not cleaned before measurements were performed.

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