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Prevalence of lameness and claw lesions during different stages in the reproductive cycle of sows and the impact on reproduction results

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Lameness in sows is an emerging disease condition with major effects on animal welfare and economics. Yet the direct impact on reproduction results remains unclear. The present field study investigated the impact of lameness and claw lesions throughout the reproductive cycle on (re)production results of sows. In five farms, a total of 491 group-housed sows were followed up for a period of one reproductive cycle. Sows were assessed for lameness every time they were moved to another area in the farm. Claw lesions were scored at the beginning and at the end of the cycle. Reproduction results included the number of live-born piglets, stillborn piglets, mummified fetuses and crushed piglets, weaning-to-oestrus interval and the presence of sows not showing oestrus post weaning, returning to service and aborting. Sows that left the group were recorded and the reason was noted. A mean prevalence of lameness of 5.9% was found, although it depended on the time in the productive cycle. The highest percentage of lame sows (8.1%) was found when sows were moved from the post-weaning to the gestation stable. No significant associations were found between lameness and reproduction parameters with the exception of the effect on mummified foetuses. Wall cracks, white line lesions, heel lesions and skin lesions did have an effect on farrowing performance. Of all sows, 22% left the group throughout the study, and almost half of these sows were removed from the farm. Lameness was the second most important reason for culling. Sows culled because of lameness were significantly younger compared with sows culled for other reasons (parity: 2.6 ± 1.3 v. *4.0 ± 1.8). In conclusion, the present results indicate that lameness mainly affects farm productivity indirectly through its effect on sow longevity, whereas claw lesions directly affect some reproductive parameters. The high percentage of lame sows in the insemination stable indicate that risk factor studies should not only focus on the gestation stable, but also on housing conditions in the insemination stable.*

Keywords: sow, lameness, reproduction, culling, claw lesions

Implications

Knowledge on the economic impact of claw lesions and lameness helps to understand how both the diseases influence economic losses, and indicates how these problems should best be addressed. The fact that the prevalence of lameness varies throughout the reproductive cycle and peaks after sows were housed in the insemination stable is crucial for risk factor analysis. Furthermore, it implicates that focus on housing in the insemination stable is important to improve the prevention strategy.

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Introduction

Lameness is a growing concern in swine breeding herds. Owing to the pain, suffering and limited freedom of movement, lameness is recognized as an important welfare concern (Whay *et al.*, 2003). Nowadays, the disease condition is implemented in the Welfare Quality® Assessment Protocol for pigs (Welfare Quality®, 2009).

In addition to the impaired welfare, lameness is allied to financial loss estimated at €37 per lame sow in Germany (Grandjot, 2007), $180 per lame sow in the United States (Deen *et al.*, 2008) and in a Dutch study, €20 to 30 per sow present in the farm (Schuttert, 2008). Economic losses can be attributed to increased work load, higher veterinary costs because of treatment or euthanasia, higher risk for total or partial condemnation resulting in less slaughter revenue and to an impact on reproduction (Rowles, 2001; Schuttert, 2008). The impact on reproduction can be divided into a direct and an indirect effect. Literature on the indirect effect of lameness on reproduction is more widespread and much more consistent than the direct impact on reproduction.

Indirectly, lameness may affect reproduction of sows by influencing sows' longevity, behaviour and feed intake. Lameness is the most important reason for euthanasia and the second most important reason for involuntary culling (Engblom *et al.*, 2007; Jensen *et al.*, 2010), leading to a detrimental impact on sow longevity. According to Bonde *et al.*, (2004), lameness leads to uncontrolled lying-down behaviour and, as a consequence, it may augment the risk of crushing piglets. The higher level of acute-phase proteins in lame sows indicates the presence of inflammatory processes (Heinonen *et al.*, 2006). Cytokines released by the inflammatory processes predispose to anorexia and lethargic behaviour (Johnson, 1997). In addition, Fitzgerald *et al.*, (2012) reported a negative effect of overgrown toes on feed consumption during lactation. Early culling of sows, reduced feed intake and impaired locomotion indirectly decrease the mean number of litters per sow per year and the mean number of weaned pigs per sow per year, increasing the cost per weaned piglet.

However, the direct effect of lameness on reproduction (i.e. direct improvement or deterioration of the breeding or farrowing performance of a sow), is less clear. Several studies did not find any effect (Kroneman *et al.*, 1993; Andersen and Bøe, 1999; Heinonen *et al.*, 2006; Willgert, 2011), whereas other studies described a negative relationship between lameness and farrowing performance (Grandjot, 2007; Anil *et al.*, 2009). Moreover, comparison between these studies is difficult as different methods and different stages in the reproductive cycle were used to assess lameness. As sows can recover over time, it may be recommended to assess lameness in the same sows at several times. In addition, knowledge on the stage in the reproductive cycle at which lameness is most prevalent may have a key value regarding risk factor analysis.

In breeding herds, sows are commonly housed in three main areas: the insemination stable (shortly after weaning), the gestation stable and the farrowing crates. Each of these areas is related to a different physiological status of the sow and is characterized by its own specific floor, feeding strategy, environment and management. Several studies already referred to floor characteristics (Newton *et al.*, 1980; Mouttotou *et al.*, 1999) and feed (Simmins and Brooks, 1988) as important risk factors for claw lesions and lameness. When sows are moved to a new area within the farm, the possible risk factors for development of lameness to which sows may be exposed will also change.

The aim of the present study was to evaluate the short-term effect of lameness and claw lesions on (re)production at the three main stages of the reproductive cycle in sows. In addition, the prevalence of lameness and claw lesions was investigated at each of these three stages.

Material and methods

Animals and housing

A total of 491 sows from five randomly selected farms were included in the study. General information about every farm is given in Table 1. All farms had at least 750 sows and all sows were housed in groups during gestation. On all farms, the gestation stable was provided with a partly slatted, concrete floor without bedding material. Farms 1 to 4 used free access stalls. On farm 5, sows were housed in small groups of 15 sows per pen and were fed by use of trough feeding. Space per animal during gestation ranged between 2.0 and 2.6 m^2. At the insemination unit, sows were housed individually with solid concrete flooring in the front half and concrete slats in the rear half. Only on the farm 5 metal slats were used in

Table 1 *Descriptive data of the farms (*n *= 5) and the investigated group of sows on each farm in the study*

	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5
Farms in study					
Farm size (no. of sows)	1100	1000	1700	750	750
Breed	French hybrid	PIC	Danbred	Danbred	Topigs-40
Batch farrowing system	Weekly	2 weekly	2 weekly	2 weekly	3 weekly
Type of group housing	FAS	FAS	FAS	FAS	Small pen
Litters/sow/year	2.2	2.5	na	2.2	2.3
Piglets weaned/sow/year	23.6	29.2	na	26.0	28.2
Piglets born alive/litter	11.6	12.8	na	11.7	13.9
% stillborn piglets	10.8	4.4	na	4.2	9.1
Sows in study					
Total no. of sows	54	109	141	86	101
Parity (mean (s.d.))	2.3 (1.5)	1.0 (0.0)	3.3 (1.3)	2.1 (1.4)	3.8 (1.9)
Parity of sows that remained in the group (mean (s.d.))	2.3 (1.7)	1.0 (0.0)	3.3 (1.4)	2.1 (1.5)	3.5 (1.7)
Parity of sows that left the group (mean (s.d.))	2.3 (1.2)	1.0 (0.0)	3.1 (0.8)	2.2 (1.2)	4.4 (2.1)

FAS = free access stalls; na = data not available.
Part of the sows left the group during the study due to culling, euthanasia, death, anoestrus, rebreeding or abortion. The mean parity of the sows that left the group as well as of the sows that remained in the group is also given.

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the rear half. The width of the concrete slats varied between 8 and 11 cm whereas the metal slats measured 1 cm. Slots of the floors on all farms did not exceed 2 cm. Farrowing stalls contained cast iron (partly), slatted flooring without bedding. During lactation, sows were provided feed and water *ad libitum*. As farm 2 had recently started with new sows, all sows had farrowed only once at the beginning of the study.

Measurements

Within each farm, one randomly selected group of sows was followed up for a period of one reproductive cycle (from weaning to weaning). Every group was investigated five times, that is two claw lesion scorings and three lameness assessments, over a period of 5 months (Figure 1). Visual lameness assessment was performed on the day the sows were moved from one stage on the farm to another (L1, L2 and L3) and was based on the Welfare Quality® Protocol. In this protocol, a lame sow is defined as a sow unable to use one or more limbs in a normal manner varying in severity from reduced ability to bear weight, to total recumbancy. However, in the present study, only distinction was made between lame and healthy sows. Claw lesion scoring of sows was carried out twice in the farrowing stable: 1 week before the sows were weaned (C1) and 1 week after farrowing (C2) (Figure 1). Seven claw parameters were scored: length of toes, length of dew claws, wall cracks, heel cracks and/or overgrowth, skin lesions above the claw, heel–sole cracks and white line cracks. The first five parameters were based on the Dutch scoring method 'Nederlandse Zeugenklauwencheck' (Hoofs, 2006). The last two parameters were scored following the Zinpro® Feet First method (Feet First® Team, 2010). Each of the four claws of the hind legs were scored from one to four, with score 1 meaning no lesion and score 4 meaning a severe lesion. The sum of the score of the four claws was made and was called the 'total score' (minimum 4 to maximum 16). However, when performing statistical analysis, total score was included as a dichotomous variable. This means that sows without lesions on any of the four claws (total score = 4) were coded 0 and sows with a total score of 5 to 16 were coded 1. By summing the seven 'total scores', a 'global score' was obtained for each sow (minimum 28 to maximum 112). For the data and statistical analyses, global scores were regarded as continuous variables.

Parity of sows was categorized into four groups: 1, 2, 3 to 5 and ⩾6 parity. Reproduction results in this study are defined as a combination of the farrowing performance, crushed piglets and the breeding performance. Information on farrowing performance and crushed piglets that was collected for the investigated cycle included the number of piglets born alive (continuous variable) and the absence or presence of stillborn piglets, mummified foetuses and crushed piglets (dichotomous variables). The breeding performance of sows included 'showing oestrus post-weaning', 'weaning-to-oestrus interval', 'returning to service' and 'abortion' (defined as expulsion of foetuses between day 35 and day 108 of gestation). The weaning-to-oestrus interval was regarded as a continuous variable, the other three as dichotomous variables. Coming into oestrus within 10 days after weaning, positive pregnancy diagnosis by ultrasound scanning 23 to 35 days after breeding and absence of abortion were coded as normal (0).

Sows that left the group during the study were recorded, as well as the time and the reason (not coming in oestrus, returning to service, abortion, death, euthanasia or culling).

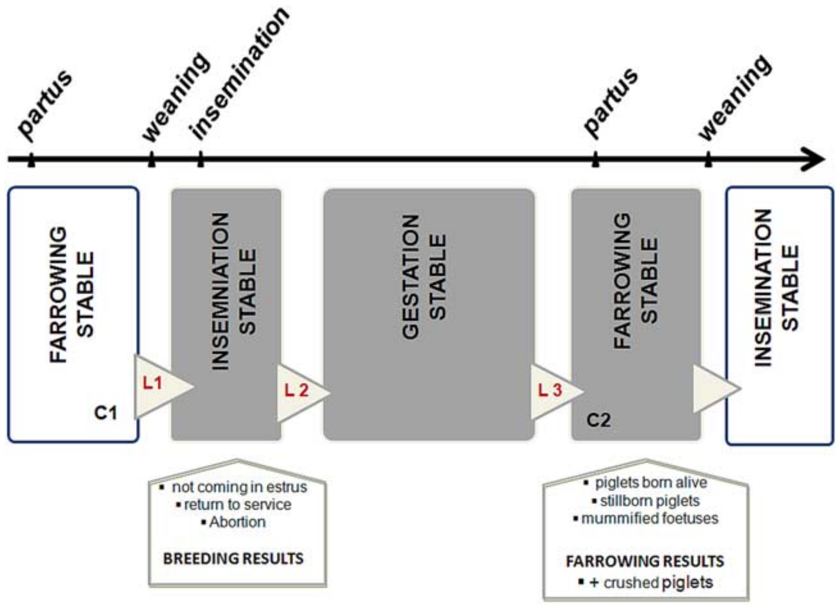

Figure 1 Measurements during the reproductive cycle of the sows: Lameness assessment was performed when sows were moved between different stables (L1 to L3). Claw lesion scoring was performed in the farrowing stable: 1 week before weaning and 1 week after farrowing (C1 and C2). Reproduction data of one period were considered (breeding performance, farrowing performance and crushed piglets). C1, C2 = claw lesion score; L1, L2, L3 = lameness assessment 1, 2 and 3.

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Table 2 *Overview of the farrowing and breeding performance of the sows in the study*

Farrowing performance	Mean	s.e.	Minimum	Maximum
Piglets born alive	14	0.18	0	23
Stillborn piglets	1.2	0.08	0	11
Mummified foetuses	0.5	0.05	0	7
Crushed piglets	0.6	0.06	0	11
Breeding performance	Mean	s.e.	Mean %	
Weaning-to-oestrus interval	6.0	0.33	–	
Number of sows				
Not showing oestrus	24	–	6	
Returning to service	39	–	10	
Abortion	4	–	1	

Descriptive data on the number of piglets born alive, stillborn piglets, mummified foetuses and crushed piglets over all 381 sows as well as descriptive data on breeding performance including the mean weaning-to-oestrus interval and the mean number and percentage of sows that did not show oestrus, did return to service or aborted during the study.

As it is essentially different, distinction was made between sows that left the group because they were removed from the farm (sows removed from the farm) and sows that left the group but that remained on the farm (sows removed from the group). The reasons for removing sows from the farm were culling, euthanasia or death. The reason why sows left the group but remained in the farm was because they did not show oestrus, they returned to service or they aborted.

An overview of the reproduction results across all farms is given in Table 2.

Statistical analysis

Normality of continuous variables was evaluated. Linear and logistic regression models were built with farrowing and breeding-related variables as dependent variables. To account for the clustering of sow in the farm, a fixed farm effect was included. In addition, total and global claw lesion scores, as well as lameness and parity, were included as fixed effects. A stepwise forward model-building procedure was followed, and all factors with a P-value <0.05 were retained in the final multivariable model.

Descriptive statistics were used to illustrate the prevalence of claw lesions and lameness throughout the productive cycle. To evaluate whether parity and global score differ between healthy and lame sows (0/1), between sows that were (1) or were not (0) removed from the farm, and between sows removed because of lameness (1) or because of other reasons (0), univariable linear regressions, with either parity or global score as dependent variable and farm as fixed effect, were performed. To evaluate the difference in global score between the first and the second claw lesion scoring, mixed model linear regression was performed, with global score as dependent variable, sow as random effect, to correct for repeated measurements, and time of claw lesion scoring, farm and interaction time × farm as fixed effects.

All statistical analyses were performed using IBM SPSS Statistics 19 (IBM, New York, USA).

To analyse the effect of the three measuring periods (L1, L2 and L3) on lameness, a multilevel logistic regression model was fit using MLwiN 2.02 (Centre for Multilevel Modeling, Bristol, UK). Farm (1 to 5), measuring period and the interaction farm × measuring period were included as fixed effects.

Results

Impact on (re)production results

After stepwise forward model building, significant associations were found between the independent variables (parity, lameness, claw score and farm) and the dependent variables (stillborn piglets, mummified foetuses, crushed piglets and number of live born piglets) (Table 3). In the final model, no significant associations between risk factors and breeding performance (showing oestrus post weaning, weaning-to-oestrus interval, returning to service and abortion) were found. However, several claw lesions were related to farrowing performance. The presence of skin lesions above the claw ($P = 0.021$) and white line lesions ($P = 0.036$) significantly increased the odds of stillborn piglets. Heel lesions were significantly associated with the presence of crushed piglets ($P = 0.017$). The odds of mummified foetuses increased when wall cracks were present ($P = 0.044$). An influence of lameness could only be found for the presence of mummified foetuses. The odds of having mummified foetuses were twice as high in lame sows compared with healthy sows. A significant farm effect was found for all of the farrowing results, whereas parity was significantly associated with the presence of stillborn piglets and crushed piglets (Table 3).

Prevalence of claw lesions

The percentage of sows with and without lesions for each of the seven claw parameters that were scored the first and second time claw lesion scoring was performed, are represented in Figure 2. Heel cracks were found to be the most frequent lesions (96% sows with lesions) whereas skin lesions above the claw were only occasionally found (8% of sows with lesions). No significant difference in global score, the sum of seven total scores, was present between the sows that remained in the group and the sows that left the group during the study. In general, the mean global score slightly improved from first (mean (s.d.) score of 35.8 (3.9)) to second time (mean (s.d.) score of 34.9 (3.2)). However, a significant farm × time interaction ($P = 0.012$) was found. The change between the first and second global score was found to be significant only at farms 1 and 4.

Prevalence of lameness

In total, 106 sows (21.6%) left the group during the study. Of these, 54 sows (51.0%) were removed from the group with returning to service as the most important reason. The remaining 52 sows (49.0%) were removed from the farm because of culling, euthanasia or death. Udder health problems (33%) and feet and leg problems (15%) were the

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Table 3 *Final multivariable logistic regression models related to the risk factors for farrowing performance and crushed piglets with farm, parity, claw score and lameness as independent variables and presence of stillborn piglets, mummified foetuses and crushed piglets as dependent variables*

Variable	*n*	b	s.e.	Odds ratio	95% CI	*P*-value
Stillborn piglets (0/1)[e]						
Intercept		0.24	0.47	–		
Farm	5					0.025
Parity	4					0.012
Parity 1		Reference	–			
Parity 2		1.61	0.51	5.00	13.59−1.84	0.002
Parity 3 to 5		1.14	0.43	3.14	7.26−1.35	0.008
Parity ≥6		1.27	0.73	3.56	14.89−0.85	0.080
White line 1[a]	306	0.65	0.31	1.91	1.04−3.51	0.036
Skin 1[b]	306	1.42	0.62	4.13	1.23−13.79	0.021
Mummified fetuses (0/1)[e]						
Intercept		−1.08	0.43	–		
Farm	5					0.052
Wall cracks 1[c]	306	−0.75	0.37	0.47	0.23−0.98	0.044
Lameness	306	0.87	0.35	2.38	1.19−4.75	0.014
Crushed piglets (0/1)[e]						
Intercept		1.58	0.97	–		
Farm	4					<0.001
Parity	4					0.029
Parity 1		Reference	–			
Parity 2		0.20	0.52	1.23	3.38−0.44	0.696
Parity 3 to 5		1.18	0.47	3.24	8.17−1.29	0.013
Parity ≥6		1.29	0.73	3.63	15.19−0.87	0.077
Heel lesions 1[d]	236	−2.23	0.93	0.11	0.02−0.67	0.017

Regression analyses were based on the results of 306 sows.
[a]Total claw score for white line lesions.
[b]Total claw score for skin lesions above the claw.
[c]Total claw score for wall cracks.
[d]Total claw score for heel cracks and overgrowth. The number behind the total score refers to the first time (at weaning) or second time (at farrowing) claw lesion scoring was performed.
[e]Absence (0) or presence (1) of stillborn, mummified and crushed piglets, respectively.
b, regression coefficient.

most important reasons for culling. Sows that were removed from the farm had a mean parity of 4.0 ± 1.8, whereas sows specifically culled because of feet and leg problems had a mean parity of 2.6 ± 1.3.

Figure 3 shows the percentage of sows that were scored lame at the three visual lameness assessments (L1-L2-L3). The mean percentage of lame sows for all farms was 5.5 ± 3.3%, 8.1 ± 6.1% and 4.1 ± 4.4% at L1, L2 and L3, respectively. The difference between L1, L2 and L3 was found to be significant ($P = 0.027$) and the prevalence of lameness significantly varied according to the farm ($P = 0.002$). The interaction between farm and measuring period was not significant. On every farm, the percentage of lame sows peaked at the moment of the second lameness investigation, that is, when sows were moved from the insemination stable to the gestation stable. At L1, 27 sows were assessed to be lame. Of these, nine sows left the group before L2 could be performed. At L2, a total of 32 lame sows were found. Only two sows that were lame at L1 were still lame at L2 and four sows that were lame at L2 were also lame at L3. There was no significant difference in parity between sows that were lame (mean parity of 2.6 ± 1.7) and sows that were not lame (mean parity of 2.5 ± 1.7).

Discussion

Direct impact

On the basis of the models, some claw lesions seem to have a direct impact on farrowing performance of sows. An effect of claw lesions on reproductive performance was also reported by De Pita (2010), Anil (2011) and Fitzgerald *et al.* (2012) but could not be shown by Enokida *et al.* (2011). In the present study, white line lesions and skin lesions above the claw increased the risk for stillborn piglets. Both skin lesions and white line lesions may facilitate entry of bacteria causing infection, pain and clinical lameness. An association between white line lesions and lameness in breeding sows was described by Anil *et al.* (2007). De Pita (2010) reported a positive association between white line lesions and the likelihood of having ≤10 piglets born alive. In the same study, the likelihood of having ≤10 piglets born alive was positively associated with the number of stillborn piglets. The reason why sows with wall cracks have lower odds of having mummified foetuses remains unknown.

Contrary to claw lesions, a clear direct impact of lameness on breeding and farrowing performance could not be shown

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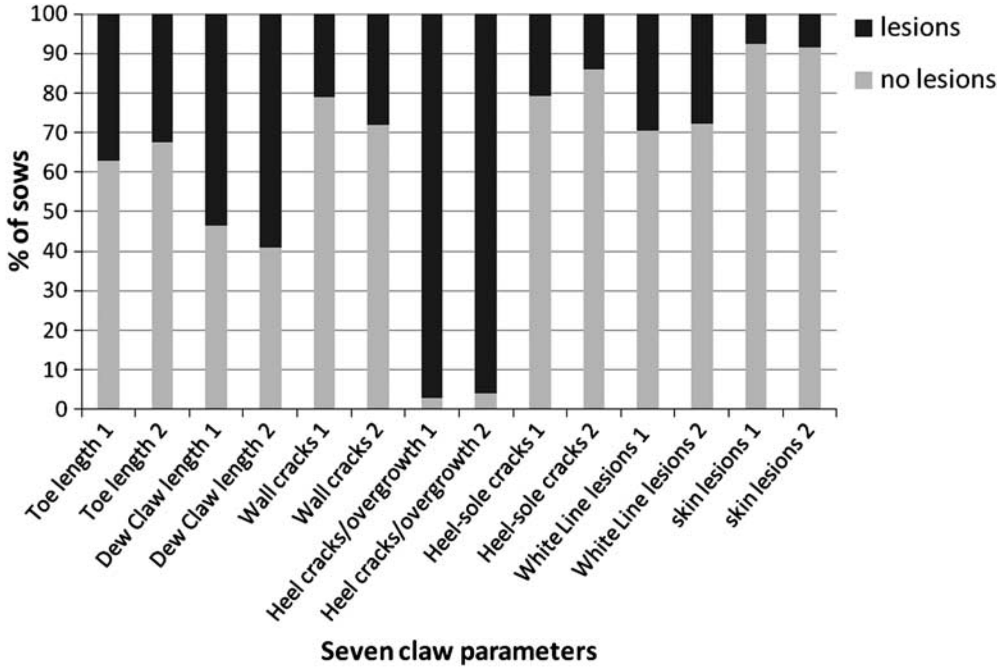

Figure 2 Percentage of sows (total of 381) with and without lesions for each of the seven claw parameters that were scored at the first (1) and second (2) time claw lesion scoring was carried out. 1, performed at the end of the first lactation period, at the beginning of the study; 2, performed 5 days after parturition in the second lactation period, at the end of the study.

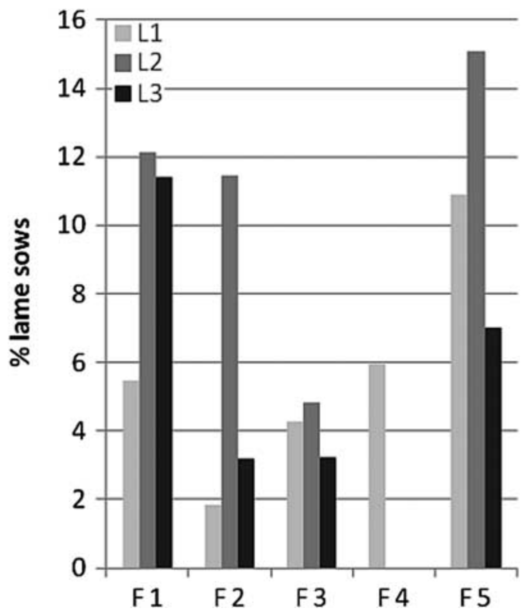

Figure 3 Percentage of sows that were lame at the three visual lameness assessments (L1 to L3) for each farm (F1 to F5).

with the exception of the effect on mummified foetuses. Lameness is a clinical sign that shows that movement is painful. The higher serum concentrations of acute-phase proteins in lame sows reported by Heinonen *et al.* (2006) indicate the presence of inflammatory processes. Pain and inflammation may cause reduction in feed intake and consequently may lead to a poor body condition of the sow. Poor body condition has been associated with the presence of mummified foetuses in sows (Knauer *et al.*, 2006).

Apart from the effect on mummified foetuses, no effect of lameness on reproduction was found in the present study. This is in contrast with the lower number of piglets born alive and higher piglet losses before weaning reported by Grandjot (2007) and Anil *et al.* (2009). The absence of a significant association between lameness and reproductive performance may be explained by the fact that reproduction results may strongly differ between individual sows. Therefore, it can be suggested to evaluate the impact on reproduction in longitudinal studies covering several reproductive cycles and using a sow as her own reference. However, in this study, parity and farm, as indicators for breed effect, were already taken into account when performing linear and logistic regression.

Indirect impact

In addition to the direct impact, lameness and claw lesions are assumed to have an indirect impact on reproduction results. Indeed, a relationship with the risk of removal from the farm was found as well as a significant association between heel lesions and crushed piglets.

With a prevalence of 15%, feet- and leg problems appeared to be the second most important reason for sow removal in this study. Moreover, sows removed from the farm because of feet and leg problems were significantly younger compared with sows removed because of other reasons. The finding that feet and leg problems are important reasons of early culling is in agreement with the results of other studies (Stalder *et al.*, 2003; Engblom *et al.*, 2007; Jensen *et al.*, 2010). Sows reach peak production between

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the third and sixth parity. Hence, removal of sows at a mean parity of 2.6 implies that part of the sows did not reach their most productive parities, nor repaid their investment costs yet (Ritter *et al.*, 1999; Stalder *et al.*, 2003; Anil *et al.*, 2009). A higher removal rate also increases replacement costs and the frequency of adding new gilts, which in turn implicates a higher health risk to the animals currently in the farm.

In this study, a negative association was found between the presence of heel lesions and presence of crushed piglets. Heel lesions are very common among sows. The high percentage of sows with heel lesions (96%) in this study is in agreement with the results of previous studies (Gjein and Larssen, 1995; Anil *et al.*, 2007; Pluym *et al.*, 2011). Only a few sows did not have any heel lesion. Owing to the low number of sows without lesions, the association found between heel lesions and crushed piglets may not be an effect but just coincidence.

Prevalence of claw lesions and lameness

To be able to perform thorough risk factor analysis, and to start prevention at the right moment, knowledge on the changes in the prevalence of lameness and claw lesions throughout the reproductive cycle is important. The mean global score in general remained unchanged but significantly improved from first to second claw lesion scoring on farms 1 and 4. Trimming of long toes and healing of lesions may have contributed to this improvement. The high prevalence of sows with heel cracks and overgrowth was also observed in other studies (Gjein and Larssen, 1995; Anil *et al.*, 2007; Pluym *et al.*, 2011). The mean prevalence of lameness namely 5.6%, 8.7% and 5.1% at L1, L2 and L3, respectively, were slightly lower compared with the prevalence of 9.7% that was found in an earlier study conducted on Belgian farms (Pluym *et al.*, 2011). High differences between farms, as seen in other studies (Heinonen *et al.*, 2006; Pluym *et al.*, 2011), were also noticed in this study. Group housing is mentioned as an important risk factor for lameness (Anil *et al.*, 2005; Chapinal *et al.*, 2010). Notwithstanding, in this study, the prevalence of lameness was lowest at the end of the gestation period (L3) and highest at the moment the sows were moved from the insemination stable to the gestation stable (L2). On farm 2, lameness assessment could not be done when sows were moved from the insemination to the gestation stable, and therefore had to be done 2 weeks after the sows were introduced in group housing (stable groups). However, even without this farm, the prevalence remained highest at L2 (data not shown). Group housing probably can influence the development of lameness, especially shortly after introduction when sows fight to establish a dominance hierarchy. When this equilibrium is found, sows may have the time to heal from their injuries (Arey, 1998). Nevertheless, results of this study suggest that even housing in the insemination stable may have an impact on the development of lameness. The increase in prevalence at L2 is caused by a higher number of lame sows and not by a lower number of total sows owing to the sows leaving the group between L1 and L2. In the insemination stable, sows were housed in conventional stalls. Owing to immobility, muscle conformation and bone strength can deteriorate (Marchant and Broom, 1994). However, in the present study, sows were housed in stalls for at most 5 weeks, whereas impact of restricted mobility on the development of muscle and bone strength (Marchant and Broom, 1994), as well as on lameness (Karlen *et al.*, 2007), could only be shown after housing sows in stalls during almost the entire gestation period.

In addition to the differences between L1, L2 and L3, the prevalence of lameness significantly varied between farms. Differences in management (e.g. handling of animals, moving the sows at the time of oestrus detection) might explain the variation between farms. These results indicate that the prevalence of lameness differs throughout the reproductive cycle and that changes vary according to the farm. This substantiates our suggestion that lameness should be assessed several times during the reproductive cycle.

Conclusion

A direct effect of certain claw lesions on the farrowing performance of sows was shown, whereas for lameness a clear indirect impact on (re)production results was found. The prevalence of lameness differed between farms and varied throughout the reproductive cycle. Housing in the insemination stable seems to induce more lameness than housing in the gestation stable in the farms studied. Therefore, further investigation on risk factors, especially related to the insemination stable and introduction of sows in group housing is needed.

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