

## Risk factors for piglet mortality in outdoor farrowing systems

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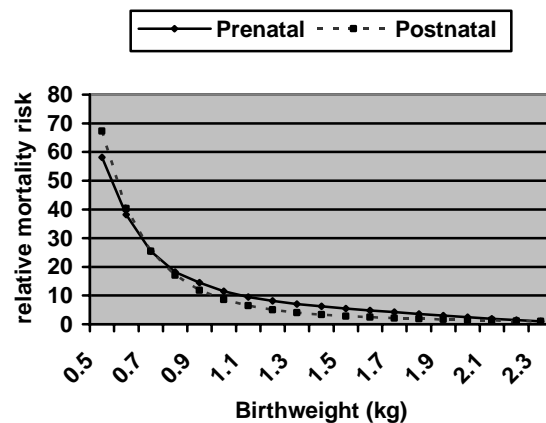
**Introduction** Outdoor farrowing system account for 27% of breeding sows in England, and it is therefore important to understand the factors affecting their production efficiency. Piglet mortality is a significant economic and welfare issue, with farrowing and preweaning losses in commercial outdoor herds currently averaging 19% of all pigs born. Since sophisticated environmental and human interventions at the time of farrowing are infeasible in these systems, risk factors may differ in importance from those seen in indoor systems. A better understanding of the risk factors for different causes of mortality will help to design strategies to minimise losses.

**Methodology** As part of a large genetic research programme (Roehe *et al.*, 2007), data were collected on 17191 individually identified piglets from sows farrowing over 3 parities in individual outdoor paddocks on Scottish farms over a 15 month period. For each piglet, litter information, gender, birthweight, fostering history and survival were recorded. All piglets which died before weaning were subject to post mortem investigation to determine cause of death. The data were used to investigate the influence of different factors on prenatal mortality (born dead) and postnatal mortality (dying during the suckling period), by fitting a generalised linear model using the logit link function of the Genmod procedure of SAS. A risk factor analysis was carried out, fitting farrowing month and parity (a single confounded variable), gender and gestation length as fixed class variables. Litter size, litter birthweight variation and piglet birthweight were fitted as covariables, with birthweight fitted by a linear-quadratic-cubic regression (higher order regressions were non significant for other factors).

**Results** From a mean total litter size of  $13.6 \pm 2.87$  (SD) piglets, overall survival at birth was 97.3% and survival during the nursing period was 90.15%. The major cause of postnatal mortality was crushing, accounting for 73-84% of all identified causes of death in different parities. Low vitality, starvation and scour each accounted for less than 10% of losses per parity. Factors affecting prenatal and postnatal mortality are shown in Table 1. The pattern of mortality risk with month/parity was inconsistent. Male pigs were at 1.16 greater risk of stillbirth (ns) and 1.19 risk of subsequent mortality ( $P < 0.01$ ) than females. Risk of both prenatal and postnatal mortality reduced progressively for each 0.1 increment in birthweight between 0.5 and 2.3 kg (Figure 1), and increased progressively for each 0.05 increment in within-litter standard deviation between 0.10 and 0.65. Both parameters increased with sow parity.

**Table 1** Factors affecting piglet mortality

Factor	DF	Chi-sq	P-value
<b>Prenatal mortality:</b>			
Month/parity	15	34.02	0.0034
Gender	1	2.45	0.1175
Gestation length	8	23.96	0.0023
Birthweight	1	20.26	<0.0001
(Birthweight) <sup>2</sup>	1	11.97	0.0005
(Birthweight) <sup>3</sup>	1	10.61	0.0011
Litter bwt variation	1	11.95	0.0005
Total born	1	1.15	0.2835
<b>Postnatal mortality:</b>			
Month/parity	15	97.52	<0.0001
Gender	1	10.3	0.0013
Gestation length	8	18.29	0.0192
Fostering	1	31.25	<0.0001
Birthweight	1	49.72	<0.0001
(Birthweight) <sup>2</sup>	1	19.39	<0.0001
(Birthweight) <sup>3</sup>	1	11.57	0.0007
Litter bwt variation	1	18.48	<0.0001
Total born	1	3.44	0.064



**Figure 1** The relative risk of mortality in relation to birthweight (with 2.3 kg as reference weight)

**Conclusions:** Birthweight and birthweight variability exerted the predominant influence on both prenatal and postnatal mortality under outdoor conditions. Genetic approaches to optimise these traits therefore offer an important opportunity to improve pig welfare and enterprise profitability.

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**References:** Roehe, R., Shrestha, N.P., Mekaway, W., Knap, P.W., Smurthwaite, K.M., Jarvis, S., Lawrence, A.B., Edwards, S.A. 2007. Genetic analyses of piglet survival and individual birth weight on first generation data of a selection experiment for piglet survival under outdoor conditions. Proceedings of the British Society of Animal Science, p65.