

## **Animal welfare and economic optimisation of farrowing systems**

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### **Abstract**

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*In many countries, including the UK, the majority of domestic sows are housed in farrowing crates during the farrowing and lactation periods. Such systems raise welfare problems due to the close confinement of the sow. Despite the fact that many alternative housing systems have been developed, no commercially viable/feasible option has emerged for large scale units. Current scientific and practical knowledge of farrowing systems were reviewed in this study to identify alternative systems, their welfare and production potential. The aim was to establish acceptable trade-offs between profit and welfare within alternative farrowing systems. Linear programming (LP) was used to examine possible trade-offs and to support the design of welfare-friendly yet commercially viable alternatives. The objective of the LP was to optimise the economic performance of conventional crates, simple pens and designed pens subject to both managerial and animal welfare constraints. Quantitative values for constraints were derived from the literature. The potential effects of each welfare component on productivity were assessed by a group of animal welfare scientists and used in the model. The modelled welfare components (inputs) were extra space, substrate and temperature. Results showed that, when using piglet survival rate in the LP based on data drawn from the literature and incorporating costs of extra inputs in the model, the crates obtained the highest annual net margin and the designed pens and the pens were in second and third place, respectively. The designed pens and the pens were able to improve their annual net margin once alternative reference points, following expert-derived production functions, were used to adjust piglet survival rates in response to extra space, extra substrate and modified pen heating. The non-crate systems then provided higher welfare and higher net margin for sows and piglets than crates, implying the possibility of a win-win situation.*

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