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MODELLING AS A TOOL TO IDENTIFY KEY MEASURES TO REDUCE SALMONELLA PREVALENCE IN SLAUGHTER PIGS

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- Introduction
Since the control of Salmonella carriage is a major public concern, a new European regulation dealing with zoonosis aimed at reducing Salmonella in the pork food chain is required. At the herd level, several control measures are available to reduce the seroprevalence (Farzan et al., 2006, Roesler et al., 2006). Additional potential measures can be derived from what is used in other species, for instance vaccination. These control measures are characterized (i) by which mechanisms they modify, (ii) by which animals are targeted, (iii) during which period, and (iv) how efficiently they act. The aim of this study was to demonstrate how a modelling approach can help to apply a measure in an optimal way.

Material and method
In this study, a stochastic mathematical model representing the farrow-to-finish herd dynamics (Lurette et al., 2008) as well as the Salmonella spread was used. We tested three reduction levels for two parameters that are assumed to be affected by the potential control measures: the infection probability and the Salmonella quantity shed. The measures were applied either to sows or pigs during their whole lifetime, or only to lactating sows, post-weaning pigs and finishing pigs. The assessment criterion used to compare the effect of the measures implemented was the percentage of groups of delivered pigs with a seroprevalence lower than 5% (p5%).

Results
Scenarios which led to more than 50% of groups of delivered pigs with a low seroprevalence differed according to the parameter considered, its level of reduction and the animals targeted. Indeed, reducing the infection probability by 50% for all pigs induced a p5% higher than 50%. This value was only obtained with a 90% reduction when applied to finishing pigs (Fig. 1). A p5% higher than 50% was reached by reducing the quantity of Salmonella shed only when applied to all sows and for a reduction of at least 50% (Fig. 2).

Discussion
These results show that a modelling approach is a helpful tool to define the key features of potential Salmonella control measures at the herd level: which animals need to be targeted, during which period, and which efficiency the measure should reach to obtain a given Salmonella prevalence improvement.

Scenarios identified by the model results can be experimented to assess which level of parameter reduction can be reached by a measure implementation. Moreover, experimentations have shown that measures act on several mechanisms at once (for example vaccination). These measures could be therefore assessed with the model by testing the combined effect of several parameter reductions.

References