

## **A partial budgeting analysis on different strategies to reduce the prevalence of lung lesions in finishing pigs at slaughter**

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### **Abstract** [max 1500 words]

In many countries, *ante-* and *post-mortem* inspections of food producing animals at the abattoir are mandatory activities carried out to ensure public health, animal health and meat quality. The detection of illness, injuries and pathological lesions at meat inspection can lead to partial or whole carcass condemnation as well as decreased meat value, which translates into direct economic losses for primary producers. In addition, some lesions detected at meat inspection may be related to subclinical endemic diseases, which do not threaten animal and human health but are a source of indirect costs for the farmer, such as for instance reduced feed conversion efficiency and increased demand for medicines and labour on farm.

Lung lesions are the most frequent findings at meat inspection of slaughter pigs. Some of them are indicative of specific pathogens (e.g., *Actinobacillus pleuropneumoniae* and *Mycoplasma hyopneumoniae*) while others can only be related to aspecific respiratory diseases. Regardless the nature of the infection, it is possible to implement managerial strategies to reduce the occurrence and spread of respiratory diseases in finishing pigs. However, such strategies come with additional costs that might prevent their implementation. The objective of this study was to assess the economic impact of two strategies aimed at reducing the prevalence of lung lesions detected at meat inspection of slaughter pigs by improving the health conditions of the animals during the production cycle.

We performed a partial budget analysis, which allows to evaluate whether a new strategy in farm management or production practice will change the net benefit, by considering the effects of the measure on net cost change and net income change.

We modelled a farrow-to-finish pig farm with 355 sows, built using economic data, meat inspection data, and biological parameters from literature and expert opinions. The baseline farm model was based on the current standard practice for pig production in Sweden. We then compared it with two hypothetical strategies aimed at reducing the occurrence and spread of respiratory diseases, namely: avoiding the practice of mixing litters after weaning (S1) and keeping purchased pregnant gilts separated from sows during gestation, farrowing and suckling period (S2).

A sensitivity analysis of the impact of the stochastic parameters on outcome values was performed using the @Risk (Palisade, Ithaca, NY) add-on application in Microsoft Excel. All stochastic variables considered were assumed to have normal distribution with 10% standard deviation around their mean values.

The deterministic result for net benefit change when adopting S1 was +33 805 SEK. The sensitivity analysis indicated that meat sale price for carcass without lung lesion had the greatest impact on the net benefit (-0.50 correlation coefficient), followed by foregone raised pigs (0.49) and prevalence of lung lesion when mixing litters (0.42).

The deterministic result for net benefit change when adopting S2 was +173 160 SEK. The prevalence of lung lesion if not separating gilts had the greatest impact on the net benefit (0.58 correlation), followed by meat sale price for carcass without lung lesion (0.44) and mortality because of lung lesion when separating gilts (-0.35).

The results indicate that the proposed strategies to reduce the occurrence and spread of respiratory diseases in finishing pigs could be economically sustainable under the assumed conditions. By comparing the impact analysis in the two simulation models, the prevalence of lung lesions if not adopting one of the strategies turned out to be one of the greatest impactors for the net benefit change of the farm. This means that as the prevalence of lung lesions increases (as observed in the past few years), the importance of adopting an effective strategy to decrease respiratory infections becomes more and more relevant and economically beneficial. In addition, the results from this study can be used to support the farmers towards cost-effective management strategies to reduce post-mortem findings through improvement of animal health and welfare.