Jarkko K. Niemi - Assessing financial losses associated with disease challenges in pig fattening

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Introduction: Inadequacies in hygiene and herd management can lead to elevated incidence of diseases in pigs, mortality and carcass condemnations, deteriorated animal welfare,

increased antimicrobial usage and reduced productive and economic performance of pig fattening. The occurrence and economic consequences of production diseases are influenced by farm management, the animal and the pathogen, and these diseases are particularly important in relation to hygiene and management. When assessing economic implications of diseases it is important to account for both clinical and subclinical diseases although studies often give inadequate attention to the latter. The aim of this study was to analyse financial impacts of four frequently studied types of sanitary challenges with influence on the feed intake and growth response in a fattening pig operation.

Materials and methods: Four sanitary challenges were investigated, namely: 1) digestive bacterial infections mainly with *Escherichia coli*; 2) poor housing conditions, including poor hygiene, space allowance and temperature stress; 3) lipopolysaccharide (LPS) challenges, which included experimental inflammation of pigs with LPS from *E. coli*; and 4) dietary intoxications with mycotoxins. Based on our earlier work (Stygar et al., 2016), a stochastic dynamic optimization model was developed to simulate the growth of pigs, implications of a disease challenge on production parameters, and to optimize the timing of slaughter in a heterogeneous group of pigs under each challenge. A scenario for each of four challenges was developed and the model was parametrized by using a previously published meta-analysis (Pastorelli et al., 2012). This allowed us to account for both subclinical and clinical forms of diseases.

Results: Mycotoxin challenges resulted in the largest financial loss, €11.55 per fattening pig, followed by digestive bacterial infections which incurred a loss of €8.64 per fattening pig. Losses associated with poor housing conditions and LPS challenges were both between €4 and €5 per fattening pig. Disease challenges were expected to result in increased variation of production results and time needed to finish a group of pigs which also incurred losses to the farmer.

Discussion: Farmers may face substantial financial losses due to inadequate herd health management and sanitary measures, and increased volatility of returns caused by animal diseases. Sanitary measures related to feed hygiene can be particularly important. Interventions designed to mitigate disease can benefit farmers financially, but in some cases the adoption of preventive sanitary measures may be costly. This study provided an example on how the effects of disease (clinical and subclinical disease) can be evaluated. However, further work on the model is needed.

References: Pastorelli H, van Milgen J, Lovatto P, Montagne L. 2012. Meta-analysis of feed intake and growth responses of growing pigs after a sanitary challenge. *Animal* 6: 952-961. doi: 10.1017/S175173111100228X. Stygar A, Niemi J, Oliviero C, Laurila T, Heinonen M. 2016. Economic value of mitigating *Actinobacillus pleuropneumoniae* infections in pig fattening herds. *Agricultural Systems* 144:113–21. doi: 10.1016/j.agsy.2016.02.005

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Research highlights: Inadequacies in hygiene and herd management can lead to elevated incidence of diseases in pigs, mortality and carcass condemnations, deteriorated animal welfare, increased antimicrobial usage and reduced productive and economic performance

of pig fattening. This study illustrates how the financial effects of a disease and the adoption of good farming practices can be evaluated. It points out that sanitary challenges can substantially reduce financial return of the farm.