The cost-benefit of salmonella control in Swedish pigs

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Introduction

Analysis of the expected costs and benefits of salmonella control pre-harvest in the pork production has been performed on EU level (1). As optimal measures to begin salmonella control in pig production in a high prevalence situation are not known, estimates of the costs for initiating such a control include large uncertainties. However the costs for running a salmonella control program can be estimated in countries where such programs are in place. In Sweden, where approximately 3 million pigs are slaughtered yearly and the prevalence of salmonella is low, the cost of the control is shared by the tax payers and the producers.

The goal of the program is that animals sent to slaughter should be free of salmonella and it includes (2)

- surveillance of feed production according to HACCP principles and heat treatment of feed
- a voluntary preventive hygienic herd program
- compulsory sampling of breeding herds once a year and sow pools twice a year
- compulsory measures following suspicion or detection of salmonella in pig herds
- surveillance of live animals by sampling of lymph nodes from fatteners and adult pigs at slaughter
- surveillance of carcasses by swab samples at slaughterhouses
- a control program for food
- compulsory notification of human cases of salmonella infection
- surveillance of antibiotic resistance in isolates of salmonella in animals.

A thorough analysis of the cost-benefit of this program has been requested by various stakeholders. Pending this, a quick calculation based on previously published and unpublished data was made. The calculated costs of the program were compared to the costs of two different what-if scenarios without a compulsory control program. The analysis indicates that the saved costs exceed the cost of salmonella control in Swedish pigs.

Material and Methods

Estimated costs of the present control program in Sweden

The costs for the part of the Swedish control program that covers pig production were obtained from published reports and from authorities (Swedish Board of Agriculture; National Food Administration as well as stakeholders (Swedish Animal Health Service; Swedish Dairy Association) engaged in the program.

The data included the yearly cost of:

i) surveillance in pigs and pig products
ii) eradication of salmonella from infected pig farms
iii) preventive measures in the feed sector (3).

Estimated costs of human salmonellosis caused by pork

The cost of human illness due to salmonella from Swedish pigs was calculated using an indirect friction method including costs of reactive arthritis, inflammatory bowel disease and the value of statistical life (4). Based on a previous study, the proportion of Swedish salmonella cases caused by domestic pork was set to 0.08% (5).

Expected costs for the control using two different what-if scenarios

The salmonella situations in Denmark and the Netherlands were used as scenarios for a possible Swedish salmonella situation without a compulsory control program.

Information about sampling strategies used in the ongoing surveillance of salmonella in pigs and pig products in these countries were retrieved from Danish official reports (6) and from Peter van der Wolf , GD Animal Health, Deventer, The Netherlands (Pers com, 2011). From these data, probable costs for sampling in the Swedish production chain were calculated.

Expected increase in costs of human salmonellosis under the two what-if scenarios

Estimates of the expected increased number of human cases under the two scenarios were calculated using seroincidence data for Denmark and the Netherlands respectively (7; pers com G Falkenhorst, 2009). The cost of these human cases was calculated with the indirect friction method described above. The proportion of the total cost caused by domestic pork and pork products was estimated using source attribution data for Denmark (8) and the Netherlands (Pers com Wilfred van Pelt, RIVM, The Netherlands, 2011).

The calculated costs of the present Swedish program in pigs/pork were compared to the costs of different surveillance strategies and the expected increased costs for human cases in two different scenarios without a compulsory control program.

Results

The cost of the Swedish salmonella control program for pigs was estimated to 840 000 € (7 600 000 SEK) and the cost of human salmonella cases caused by domestic pork was estimated to 24 000 € (220 000 SEK). The costs of the Swedish control program were similar to the estimated costs when applying the Dutch surveillance strategy under Swedish conditions (figure 1). However, when applying the Danish surveillance strategy under Swedish conditions the costs increased considerably (figure 1).

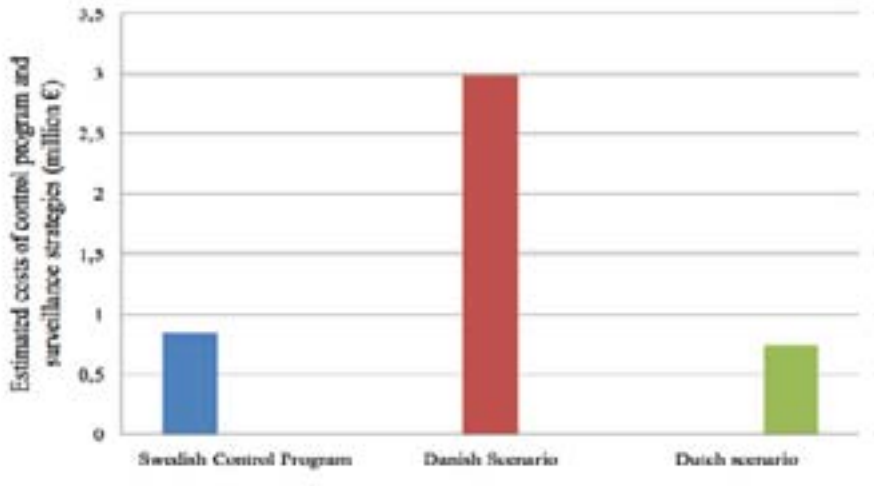

Figure 1: The costs (million €) of the Swedish salmonella control program for pigs compared to estimated costs of salmonella surveillance when applying the Danish and Dutch surveillances systems under Swedish conditions.

The expected increase in yearly costs for human salmonellosis due to domestic pork when applying the Danish and Dutch surveillances systems under Swedish conditions are presented in figure 2.

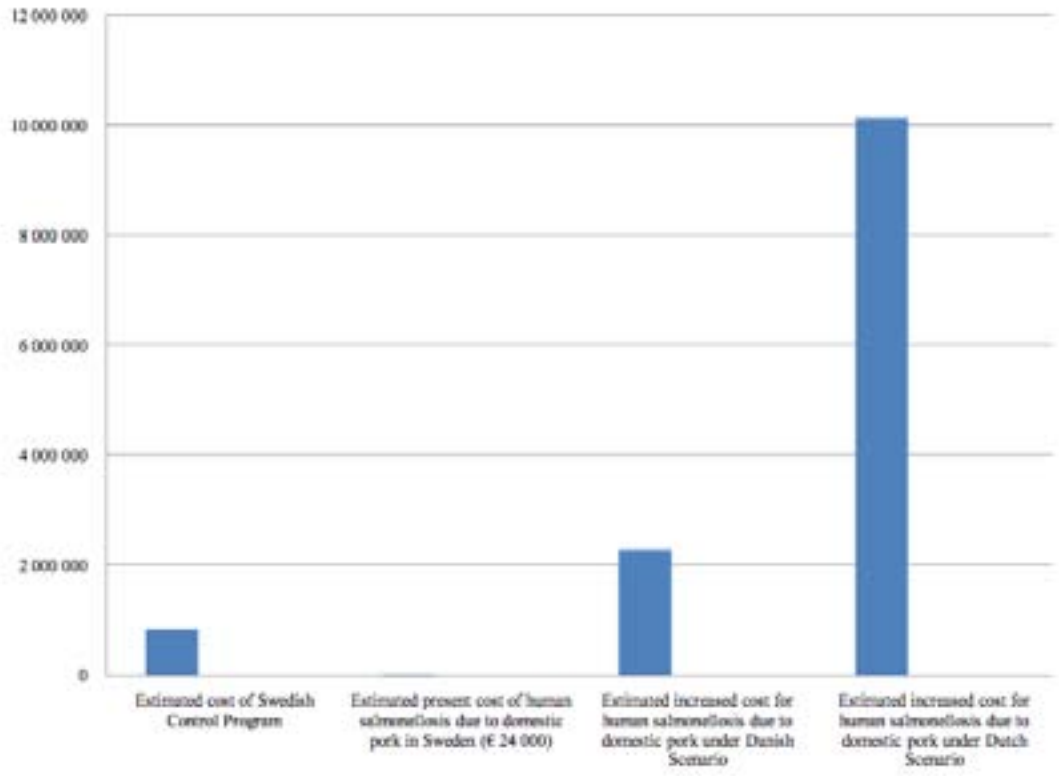

Figure 2: Increase in yearly costs (€) for human salmonella caused by domestic pork in Sweden under two possible scenarios without a control program compared to the cost of the present program and the estimated cost of present human cases caused by domestic pork in Sweden.

Discussion

Although the compulsory Swedish control program for salmonella keeps the costs of human salmonellosis due to pork on a very low level, the costs for the compulsory Swedish program were surprisingly low when compared to the expected cost when applying the Danish and Dutch surveillance systems under Swedish conditions. This may be partly due to the fact that indirect costs for eradication were not included in the calculation. However, the number of farms where interventions are needed is very low as the prevalence in Swedish pigs is very low.

Costs of the control program in Sweden and the surveillance programs in the scenarios are calculated only using direct costs whereas the estimations of costs of human illness are made including indirect costs to some extent. This makes it hard to make a direct comparison between programs and costs of human illness. Furthermore, the calculation of expected number of human cases can be done using several different methods, in this study a method based on seroincidence data was used. However, comparisons between the different scenarios and the present Swedish situation can be done if it is appreciated that the estimations include several assumptions and that the costs should be viewed as relative estimates and not absolute figures.

In this study an attempt was made to estimate the cost-benefit of the Swedish Salmonella Control Program. Under the assumptions made in this study, the calculated saved costs for avoiding the additional human salmonella cases exceed the cost of the present salmonella control in Swedish pigs/pork. Under exceptional circumstances, such as the large feed-borne outbreak in 2003, costs may however exceed the benefits.

Conclusion

In conclusion, the analysis presented in this paper indicates that the saved costs exceed the cost of salmonella control in Swedish pigs.

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