Cost reductions in the Danish Salmonella surveillance program

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Abstract

In 1993 Denmark implemented a surveillance program for Salmonella in pigs and pork. Since then the program has been adjusted several times leading to a reduction of the associated cost. The program has been optimized in breeder and multiplier herds as well as for fattening pig herds and at the slaughterhouses. All in all, optimizations of the program have reduced the over-all costs from 0.65 € to 0.15 € per fattening pig produced. This has been achieved without jeopardizing the food safety which can be seen from the numbers of human Salmonella infections attributed to pork. From 1993 to 2005, the number of human cases has decreased from app. 1,100 to around 100-200 per year.

Introduction

In 1993, the Danish authorities launched a program for surveillance of Salmonella in pork (Mousing et al., 1996). The surveillance program was comprehensive and expensive, and the financial burden was shared between producers, industry and the authorities. Over the years, the program has been adjusted several times. The industry's need for ensuring a cost-effective program has been an important part of the motivation for changing the program. The adjustments have been approved by the authorities because the industry has been able to demonstrate that the changes did not jeopardize food safety. Only the major and more important changes are mentioned in this proceeding.

The surveillance in breeder and multiplier herds is based on detection of antibodies in serum. In 1996, the number of samples collected from each herd was reduced from 20 to 10 per month.

In fattening herds, Salmonella specific antibodies are detected in meat juice samples collected at slaughter. Based on the seroprevalence, herds are classified as level 1, 2 or 3, indicating a low, intermediate or high risk, respectively. Initially, 70,000 samples were collected and examined each month. In 2001, the criterion for classification of herds was changed – reducing the number of samples to 50,000 per month (Alban et al., 2001). The meat-juice ELISA-test was also simplified. Before 2001 each sample was examined by a double test. From 2001 and onwards a single analysis is used. Analyses showed that this did not alter the ability of the program to correctly classify herds (Alban et al., 2001). By this change in procedure the cost associated with serology was reduced. In 2005, a risk-based approach was applied in fattening herds (Enoe et al., 2005). In herds with no positive samples, sampling was reduced to one sample per month, hereby reducing the total number of samples per month to 21,000.

In fattening herds assigned to level 2 or 3, pen faecal samples are collected. In 2003, the procedure was changed from analyzing individual samples to pooled pen samples. Typically 20 samples are collected in a herd and instead of analyzing these as 20 individual samples, the laboratories now pool the individual samples by 4 to 5 pooled samples (Enoe et al., 2003). Furthermore, the number of sero and phage typing was reduced to only one isolate from each herd unless specific resistance patterns were found. These initiatives reduced the associated cost by 60%.
Up till 2001, the surveillance at the abattoir was based on examination of 27,000 samples of different cuts of pork. This was changed to a surveillance based on pooled swab samples from 5 carcasses per day (Sørensen et al. 2001), reducing the associated cost with 60%.

Pigs from level 3 herds are slaughtered under special hygienic precautions. Slaughter hygiene is measured by microbiological testing and if the number of positive samples exceeds a predefined limit, the carcasses included in the batch are heat-treated causing considerable loss in carcass value. This regulation is still in force, but in 2001 the authorities approved, that carcasses from level 3 herds are showered with hot water (81°C), which has a well documented reducing effect on Salmonella (Jensen et al. 2001). This process too is monitored by microbiological testing, but very seldom batches of carcasses are found positive for Salmonella leading to heat treatment. This change in processing carcasses from level 3 herds has reduced the costs with 90%.

Materials and methods

The expenses to the Danish Salmonella surveillance are published every year (Anonymous 1998 – 2005). From the information in these reports the expenses for the Salmonella surveillance can be calculated per fattening pig produced. Unfortunately accounts for the years 2001 and 2005 are not available. In the calculations the increase in number of slaughter pigs produced in Denmark has been taken into consideration and costs have been converted to the price level to 2006.

Results

As seen from table 1 and figure 1 (With adjustments), adjustments and optimizations of the surveillance program has led to considerable reductions in the costs per fattening pig produced.

<table>
<thead>
<tr>
<th>Year</th>
<th>Costs per fattening pig produced, in €, price level 2006</th>
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<tbody>
<tr>
<td>1998</td>
<td>0.65</td>
</tr>
<tr>
<td>1999</td>
<td>0.67</td>
</tr>
<tr>
<td>2000</td>
<td>0.50</td>
</tr>
<tr>
<td>2002</td>
<td>0.32</td>
</tr>
<tr>
<td>2003</td>
<td>0.20</td>
</tr>
<tr>
<td>2004</td>
<td>0.19</td>
</tr>
<tr>
<td>2006</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Table 1. Account of expenses for the Salmonella surveillance. The expenses are presented per slaughter pig produced. Calculation was not done for the years 2001 and 2005 due to lack of data.

It has also been looked upon what the cost of the program would have been today had there been no optimizations of the surveillance. As above, all figures were transformed to 2006-prices. The results are shown in fig. 1 (Without adjustments).
Fig 1. Expenses for the Salmonella surveillance with and without cost-effective adjustments. The results for the years 2001 and 2005 are interpolated.

Discussion

Adjustments of the Danish Salmonella surveillance program has led to a reduction of the over-all cost associated with the program from 0.65 € to 0.15 € per fattening pig. The adjustments and optimizations have been approved by the authorities, because the industry has been able to demonstrate that the changes could be carried out without jeopardizing the food safety. This is supported by the number of human cases of Salmonella infection attributed to pork. From 1993 to 2005 the number of human cases has decreased from app. 1,100 till around 100-200 per year (Anonymous 2, 1998-2005).

References


