Microbiological criteria – Danish experience with use of the food safety criteria on minced meat and meat preparations

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Abstract

The recently introduced EU Commission regulation 2073/2005 on microbiological criteria for foodstuffs sets food safety criteria on Salmonella in minced meat and meat preparations. Products intended to be eaten cooked are to be sampled weekly by five samples of 10g each. If Salmonella is found and the product is on the market, a recall will take place.

Data from several EU countries in 2005 show a Salmonella prevalence varying from 0-8% in minced pork and 0-4% in minced beef. In Denmark, a total of 32 recalls were performed in 2006. This is costly, and it is questionably whether it has any impact on food safety, since the meat is supposed to be heat-treated prior to consumption.

If surveillance for Salmonella is conducted it is usually at slaughterhouse or herd level. This makes it impossible to source all raw material from Salmonella-free animals. Even if Salmonella is not found in samples from live animals, there is no guarantee that Salmonella might not be present in the meat from the same animal, because e.g. cross-contamination might have taken place at the abattoir.

Following a request from the UK, the Commission has agreed to ask EFSA for a quantitative risk assessment by December 2008 to possibly review the microbiological criteria in meat, based on data provided by the Member States. In line, the Danish Meat Association has decided to initiate a project on collection of semi-quantitative Salmonella data in minced pork and beef and meat preparations. There is a need for other Member States to provide equal information to ensure that representative data will be available for EFSA.

Introduction

The Commission Regulation No 2073/2005 (Commission, 2005) has been in force since January 1, 2006, and according to this regulation minced meat and meat preparations intended to be eaten cooked must fulfil the food safety criteria on absence of Salmonella in five samples of each 10g.

According to Article 8 of the regulation, Member States are granted a possible transitional derogation related to the food safety criteria for Salmonella, allowing, until 31/12 2009, one of the five samples to be positive for products placed on the national market. This opportunity is used in some Member States, not in others and at present discussed in some. Denmark does not make use of the derogation.

The preamble (9) to the EU regulation 2073/2005 highlights the relevance of basing microbiological criteria on formal risk assessment and internationally approved principles. However, it is questionable whether this has taken place for the microbiological criteria, e.g. it is unknown what the effect of the criteria is on the number of human cases of salmonellosis – and other more cost-effective means have not been evaluated.

This paper describes the Danish experience on dealing with the microbiological food safety criterion on minced pork and beef and meat preparations (pork and beef) intended to be eaten.
cooked. A food safety criterion applies for products on the market, meaning that the focus is on the consumer. Sampling is done at least weekly (5 x 10g samples). The demand is absence of Salmonella in the five samples, and if Salmonella is found the sampled batch must be withdrawn or recalled. A withdrawal means that the company shall withdraw the food in question from the market where the food has left the immediate control of that initial food business operator and inform the competent authorities. A recall means that consumers are also informed in order to recall from them products already supplied to them. In Denmark only recalls are performed.

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UECBV, avec and CLITRAVI, the main meat industry federations working with this dossier in EU, support this possibility for the requirements to be reconsidered in the light of a quantitative risk assessment.

The Danish Meat Association has decided to initiate a project including performing of semi-quantitative analyses when finding Salmonella in minced pork and beef and in meat preparations in the surveillance programme described in Regulation No 2073/2005. These data will subsequently be made available for EFSA. With other words: we are interested in knowing how contaminated a positive sample is; are we talking about few bacteria or high loads?

The aim of the project is to:
1. Provide semi-quantitative data for a risk assessment
2. Based on semi-quantitative data to support introduction of risk-based regulation if possible, because this will have a larger impact on food safety in a more cost-effective manner.

Materials and Methods

The samples included in this study consist of the samples taken routinely according to Regulation No 2073/2005. The ratios of the different kinds of products are not laid down from the start, as the production is dependent on orders. An estimate is that 40% of the samples will consist of minced pork, 40% of minced beef and 20% of meat preparations. The Danish study will include a minimum of 500 samples, and hopefully up to 1000 samples.

The industry finances the extra costs for analysis of the dilution line. If the plan described above does not supply a sufficient number of positive samples, an additional study may be initiated at the Danish Meat Research Institute.

The five samples that are collected weekly from one batch according to 2073/2005 are kept cooled during transport to the laboratory. Because Denmark does not make use of the derogation the five samples are pooled to one sample adding to a total of 50 grams at the laboratory. Next, 450 ml buffered peptone water is added to the pooled sample. This is the original sample, the 0-dilution. From this sample a dilution line is made. The dilution line is kept at chilling temperature (0-5 °C), until the result of the original sample is available. If the original sample is positive for Salmonella the dilution line is taken into analysis.

For analysing the original sample the laboratory uses their own routine method(s). In Denmark these are the PCR method BAX, the immunoassay system Vidas, or the NMKL no 71, 5th Edition, 1999. For verification of Salmonella-suspect samples the laboratories use NMKL no 71.
Results

Table 1
Variation in prevalence of Salmonella in different EU member states, (EFSA, 2005)

<table>
<thead>
<tr>
<th>Carcasses (swabs)</th>
<th>Cuts of meat</th>
<th>Minced meat (10-25g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork</td>
<td>0-9%</td>
<td>0-18%</td>
</tr>
<tr>
<td>Beef</td>
<td>0-0.6%</td>
<td>0-8%</td>
</tr>
</tbody>
</table>

*: RTE= Ready to eat

According to Table 1 it can be seen that Salmonella is present in carcasses (pig and beef). Also Salmonella can be found in cuts of meat and in minced meat.

In Denmark, Salmonella is found in app. 1% of the carcass swabs (Annual report 2005). An earlier Danish study showed that the number of Salmonella bacteria on positive Salmonella carcasses generally is low (Olsen and others). The prevalence in the minced meat is presumably lower due to grinding and mixing. Nevertheless Salmonella will be found from time to time due to the sporadic occurrence.

According to 2073/2005 a batch means a group or set of identifiable products obtained from a given process under practically identical circumstances and produced in a given place within one defined production period. It is important for the producers to well-define a batch in order to identify products that must wait for results and/or eventual recall or withdrawal. If possible, testing of batch is done prior to shipping. This is possible for products with a shelf-life of e.g. 7-8 days or frozen products and when using rapid testing methods. However, this is a problem for retailers, where products have a 24 hour shelf-life.

In Denmark, we have had 32 recalls of batches of minced meat in 2006 due to finding of Salmonella in minced meat, see Table 2. A total of 19 batches derived from wholesale production and 13 batches derived from retail production.

Table 2
Recalls conducted according to Regulation 2073/2005 in different types of meat, Denmark, 2006

<table>
<thead>
<tr>
<th></th>
<th>Minced pork</th>
<th>Minced beef</th>
<th>Mixed pork and beef</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of batches</td>
<td>13</td>
<td>17</td>
<td>2</td>
</tr>
</tbody>
</table>

Discussion

Salmonella may be present in an animal in a herd delivering animals for slaughter. Usually, there are no clinical symptoms of infection, because infection is subclinical.

The Danish surveillance-and-control program for Salmonella for pigs is based on serological testing of pigs at slaughter. Thereafter, the herd is allocated to one out of three herd levels (Alban et al., 2002). This implies that the exact Salmonella-status of each single animal is not known at the time of slaughter. Hence, it is impossible to source all raw material from Salmonella free animals, Even if Salmonella is not found in samples from live animals, it is no guarantee that Salmonella might not be present. Cross-contamination at the abattoir might e.g. occur.

Salmonella action plans in other EU countries also operate on herd level, meaning that the Salmonella status is known on herd level and not on animal level. Even animals from e.g. seronegative herds can be positive for Salmonella (Alban et al., 2002). This can e.g. be a result of recent infection, where antibodies have not yet been developed.
Our experience is that the food safety criteria on Salmonella do not improve food safety, since withdrawal or recalls of batches, where Salmonella is found do not influence the prevalence. Often Salmonella is found by chance and it is not an indicator that this batch is unsafe compared to the batch right beside it.

Focus should rather be on the intended use e.g. ready-to-eat products or not. Moreover, focus should be on ways of controlling the process and minimizing contamination with Salmonella or other enteric pathogens.

Recent contacts with meat producers in EU have shown that there is a great need to revise the current microbiological criteria. However, EFSA will need comparative data to perform a quantitative risk assessment. Therefore it is important for industry and member states to provide semi-quantitative data.

The challenge is to develop a regulation that will ensure food safety in a cost-effective manner for the sake of both consumers and industry.

References


