



Risk-based meat inspection in a Nordic context

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TemaNord 2006:585

© Nordic Council of Ministers, Copenhagen 2006

ISBN 978-92-893-1440-4

Print: Arco Grafisk A/S, Skive, 2007

Copies: 440

Printed on environmentally friendly paper

This publication can be ordered on www.norden.org/order. Other Nordic publications are available at www.norden.org/publications

Printed in Denmark



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Nordic co-operation

Nordic co-operation, one of the oldest and most wide-ranging regional partnerships in the world, involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland. Co-operation reinforces the sense of Nordic community while respecting national differences and similarities, makes it possible to uphold Nordic interests in the world at large and promotes positive relations between neighbouring peoples.

Co-operation was formalised in 1952 when *the Nordic Council* was set up as a forum for parliamentarians and governments. The Helsinki Treaty of 1962 has formed the framework for Nordic partnership ever since. The *Nordic Council of Ministers* was set up in 1971 as the formal forum for co-operation between the governments of the Nordic countries and the political leadership of the autonomous areas, i.e. the Faroe Islands, Greenland and Åland.

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Preface

The original name of this project was “Modern meat inspection in a Nordic context (Modernisering av den offentlige kjøttkontrollen på nordisk plan)”. The project has been conducted by a Nordic project group, consisting of members from the competent Nordic authorities and the Nordic meat industry.

The main objective of the project was “to investigate and test solutions to achieve an efficient and modern meat inspection in the Nordic countries based on a future risk-based EU legislation” within the vision of “A risk-based meat inspection based on a sustainable Nordic primary production with healthy animals providing safe meat to the consumers”. The project is based on a pilot project (2002–2003) (Anon., 2003) that plotted the course for the main project. The project period was from 1 October 2003 to 30 September 2006.

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Additional important contributors to the project: Jens Kirk Andersen, Danish Institute for Food and Veterinary Research, who has participated in some of the meetings and has contributed to aspects connected to zoonoses. Also, Flemming Thune-Stephensen, Danish Meat Association and Rolf Aass, The Norwegian Independent Meat Association, Norway, who have both participated in relevant meetings.

Under this Nordic umbrella, various national projects have been conducted during the project period.

Summary including conclusions and recommendations

The vision of the project is “a risk-based meat inspection based on a sustainable Nordic primary production with healthy animals providing safe meat to consumers”.

The main objective of this project has been to investigate and test solutions to achieve efficient meat inspection in the Nordic countries founded upon risk-based EU legislation, and taking into account financial resources as well as the necessary professional skills.

In this context, *the definition of a risk-based meat inspection* is “A system based on risk assessment, “practical” risk management and risk communication in the meat chain at least from farm until the carcass leaves the slaughterhouse. The system also accounts for possible risks further on in the meat chain, including hygiene control at all levels, with added values such as taking into account tools used by different parties along the food chain like official control, quality systems, third party audits and audits by employees from the industry. Such a system is described as an “integrated risk-based meat inspection” and might simplify risk management and risk communication along the food chain. In particular it may facilitate improved information flow from the farmer, and between operators and meat inspectors. However, the distinct responsibilities and roles of the meat industry and the competent authority (meat inspection) need to be assessed on an ongoing basis”.

The above is described in *chapter 1*, which also includes a description of background and a history of meat inspection.

Since the approval of the Regulations on food hygiene and official controls in April 2004, it has been possible to carry out pilot projects on e.g. post-mortem procedures without performing additional traditional inspection since 1 January 2006. Accordingly, due to time limitations, fewer pilot projects were performed during the project period than originally intended. However the concept and elements in a risk-based meat inspection have been addressed and defined, and several pilot projects have now started or are scheduled for the future. Consequently, the Nordic project has resulted in a report that more resembles a reference book than practical results from pilot projects.

Chapter 2 sets the framework both nationally and internationally; the Regulations on food hygiene and official control, and the Codex Code of Hygienic Practice for Meat are frameworks, which, among others, are

based on the principles of a risk-based meat inspection and include the entire food chain.

Conclusions – chapter 2

Official Controls on Products of Animal Origin, should cover all aspects that are important for protecting public health and, where appropriate, animal health and welfare. Such controls should be based on the most recent relevant information available and should be possible to adapt as relevant new information becomes available.

The nature and intensity of the official controls should be based on an assessment of public health risks, animal health and welfare where appropriate, the type and throughput of the processes carried out, and the food business operator concerned.

The Regulation of official control on products of animal origin provides possibilities such as visual inspection of slaughter pigs, and declaration of *Trichinella*-free herds and of regions with a negligible *Trichinella* risk. These issues are of particular interest in the Nordic countries. The Regulation includes possibilities for adopting measures through pilot projects studies in order to trial new approaches to hygiene controls on meat.

The Draft Code from Codex is more flexible than the Regulation of official control on products of animal origin with respect to who is responsible for, and who can perform, the various tasks associated with inspection/control of meat.

Chapter 3 describes the organisation of meat inspection, focusing on staffing for meat inspection, and the financial system for meat inspection within the Nordic countries. Additionally, chapter 3 includes experience from abroad on organising the meat inspection.

The meat inspection service is an integrated section of the competent national authorities, with different organization in the Nordic countries. Considerable resources are expended on meat inspection in Nordic countries and there is a continuing need to deliver a cost-effective meat inspection service with focus on food safety, to monitor expenditure closely, and to implement savings wherever possible to ensure a competitive Nordic industry. Annex A of this report describes the current financing systems for meat inspection, and instructions for staffing, for each Nordic country.

By a range of systems, the meat inspection costs of small slaughterhouses are ‘subsidised’ in each of the Nordic countries. The Danish Veterinary and Food Administration in Denmark operates a government-funded package (“Regeringens konkurrencevnapakke”) of 10 mill. DKK annually. Norway has instituted a maximum fee of NOK 1.00 per kg. The other Nordic countries operate a time-based meat inspection fee for the

small slaughterhouses. These measures effectively subsidise the meat inspection costs of these slaughterhouses.

Conclusions – chapter 3

The Nordic countries have developed systems to evaluate whether meat inspection fees cover the actual expenses of this service. In Denmark, Sweden and Finland these systems seem to function very well, and the fee paid (in particular by large slaughterhouses) apparently covers the meat inspection expenses. In Iceland and Norway the systems are insufficient for this task. In Norway a general food production fee covers a substantial proportion of the meat inspection costs. To date, it has not been possible to determine whether the fee is sufficient to cover the actual expenses.

Risk assessment, and the possibilities and limitations of risk assessment in a Nordic context, are debated in chapter 4.

This chapter also discusses the value of risk assessment in relation to the specific zoonotic agents *Toxoplasma gondii*, *Salmonella* and *Y. enterocolitica*.

Conclusions – chapter 4

Modernisation of meat inspection into a risk-based system requires that the system is sensitive to changes in the epidemiological patterns of a range of meat-borne zoonotic infections. Quantitative techniques from epidemiological studies or risk assessments should be used for evaluating different specific questions. Any system oriented towards minimizing public health risk should operate a risk-based approach – thus not all biological hazards should necessarily be focused into a chain-based meat inspection system.

The general approach in Nordic countries for controlling enteropathogens in the meat chain has been to implement risk management systems in the pre-harvest phase in combination with strict slaughter hygiene. A recent Danish cost-effectiveness study challenges this approach, and suggests that at the level of infections found in the Nordic countries, post-harvest interventions may be more efficient. Decontamination of carcasses with hot water/ hot vapour techniques may be an effective option (discussed under risk management).

In chapter 5 the concept of, and the elements in, a risk-based meat inspection are addressed and the future needs for pilot projects etc. are assessed.

Conclusions – chapter 5

The role of meat inspection as the most important element of risk management in the meat chain, and also the possibilities for cost-efficient risk management in the meat chain have been assessed. In this context, categorisation of herds and the use of other risk management options are discussed.

Risk-based meat inspection should have a food safety, as well as a food chain perspective, focusing on “table to farm” i.e. the relationship between those agents causing disease in humans with food products, food processes etc.

Risk-based meat inspection should include the use of practical risk management tools chosen on the basis of a cost-effective approach, in contrast to traditional meat inspection, which is based on the zoonotic diseases predominant 100 years ago.

In Nordic countries systems/registers, which cover the requirements for Food Chain Information between primary producer and slaughterhouse, are available, with the exception of information on use of veterinary medicinal products. Central registration on the use of veterinary medicinal products only occurs in Denmark.

In general, provision of all the information 24 hours before arrival of animals at the slaughterhouse is not necessary in Nordic countries. Much of the information will already be present (from animal health registers, monitoring of zoonoses and monitoring of residues). The rest of the information such as herd of origin, number of animals, transport vehicle etc. will be detailed in the document that accompanies the animals.

Visual post-mortem inspection should be implemented on slaughter pigs.

The cost-effectiveness study on Danish interventions at the herd and slaughterhouse level is important in this context. Another issue from this perspective is the possible implementation of hot water or steam on whole carcasses for reduction/elimination of emerging agents in comparison to intervention at herd level.

New, reliable and rapid methods for detection of zoonotic agents e.g. VTEC (Verocytotoxigenic *E. coli*), would be of high value in a risk management context.

National projects carried out in relation to the Nordic project are summarised in chapter 6.

The national projects carried out under the Nordic umbrella have provided valuable information related to practical issues, such as the use of historical data as a basis for categorisation of animals and distribution of Food Chain Information at the regional level.

Conclusion – chapter 6

The Norwegian project on Food Chain Information concluded that Food Chain Information demonstrates the need for an electronic system that provides all the relevant information directly.

Plans and intentions from implementing pilot project studies within the common Nordic project appear in chapter 7.

The basis for suggesting pilot projects in 2003 was the expectation that the EU Regulations on food hygiene and official controls would be adopted and implemented earlier than occurred. It was also assumed that company staff could be used to assist with official tasks, including those involving sheep, cattle and pigs.

Additionally, there have been extensive discussions within the EU on how to implement the Food Chain Information system. Finally, transitional measures, as well as implementing measures, were decided upon, giving member states a four-year period in which to undertake full implementation of the Food Chain Information system in all species and sectors.

The Regulation of official control on products of animal origin gives the opportunity to carry out pilot projects on, for example, post-mortem inspection procedures. However, it has only been possible to conduct such projects, without also having to perform traditional inspection, since 1 January 2006.

Because of these delays and the transitional period, fewer pilot projects were performed during this study than originally intended. The concept of, and elements in, a risk-based meat inspection have been addressed and defined and some pilot projects have now been started or are scheduled for the immediate future.

Conclusion – chapter 7

Several pilot projects in the different Nordic countries have been planned and some have already been started. Since Iceland and Norway are members of EEA (European Economic Area) and not members of EU, the launching of pilot projects depends on the speed with which EEA States could agree on the relevant acts in the Regulation.

Recommendations

Chapter 3

It is important to utilise the possibilities provided in the Regulation of official control on products of animal origin to optimise the use of resources and improve the efficiency of meat inspection in Nordic countries.

Chapter 4

It is important to realise that it is not always necessary to conduct all the steps in a risk assessment. For example, if either the release assessment or the exposure assessment demonstrates a negligible probability, the analysis is terminated with a negligible risk. Additionally, comparison of the effects of different strategies or interventions might not always need a full risk assessment; e.g. an assessment on the effects of the exposure might be sufficient.

Chapter 5

Cost-effectiveness analyses should be an integrated part of decision making to optimise risk management. Risk management should be considered from the “table to farm” perspective e.g. the relationship of disease in humans to food products (processes etc.) should be considered, and where in the entire food chain it would be most beneficial to intervene.

The use of hot water or steam on whole carcasses would have an important impact on reduction/elimination of agents such as *VTEC* on beef and sheep carcasses, *Y. enterocolitica* on pig carcasses and *Salmonella* on carcasses of all species. Such tools might be used when it is not possible to solve an emergent health problem by intervention at herd level and/or by general slaughter hygiene.

A risk-based approach should be used when assessing the tasks and staffing for official control in slaughterhouses.

Existing resources within the competent authorities and industry should be as targeted as possible in order to obtain the most cost-effective risk management.

The routine exchange of information between competent authorities, slaughterhouses and organisations, in case of suspicion and/or presence of zoonotic agents, should be continuously improved and assessed. This

work should be carried out in cooperation between the competent Nordic authorities and the relevant organisations.

Pilot studies on Food Chain Information should be initiated to gain experience on the system. The proposed paradigm should be used as a

common Nordic model to fulfil the requirement for Food Chain Information where inter and intra community trade has been developed.

Based on risk assessment, visual inspection should also be possible in the future for cattle and lambs, including documentation of the effect on food safety.

Risk assessment of visual inspection should be conducted and compared with alternative procedures, including serological or other laboratory tests, that provide guarantees at least equivalent to the specific post-mortem procedures in the current Regulations.

The model for poultry inspection (responsibilities of authorities and industry) should be investigated, and the use of a similar model considered for slaughtering other species like pigs or cattle; this approach may maximise effective use of available resources and provide optimal food safety.

Alternative systems (e.g. computerised image analysis) that may replace some of the current post-mortem procedures should be investigated.

Chapter 7

Common Nordic pilot projects should be initiated on the following issues:

- Visual post-mortem inspection of beef carcasses,
- Further adaptation of the inspection based on risk assessment,
- Use of company staff for meat inspection.

The Regulation of official control on products of animal origin gives the opportunity for amending or supplementing existing procedures for meat inspection, whilst taking into account scientific and technical progress; i.e. tailoring the meat inspection to the actual risks and with respect to the holding, region or country of origin, using the principles of risk analysis and taking into account resources.

It is important to make use of those possibilities in the Regulation to obtain a meat inspection, which is more risk-based, and to optimise the use of resources to maximise the effectiveness of meat inspection.

1. Introduction

“Modern meat inspection in a Nordic context” is a project funded by the Council of Nordic Ministers. The Nordic countries represent nearly 25 million people:

Sweden (9 mill.)
Denmark (5.5 mill.)
Finland (5.3 mill.)
Norway (4.6 mill.)
Iceland (0.3 mill.)

Nordic countries have largely small farms, but big farm units also occur (in particular for pig production in Denmark). With the exception of Danish cattle and sheep, animal markets and animal auctions associated with animal slaughter do not occur in Nordic countries.

1.1 Vision – a risk-based meat inspection system

Vision: A risk-based meat inspection based on a sustainable Nordic primary production with healthy animals providing safe meat to consumers.

Such a vision should be based on:

- Risk assessment, risk management and risk communication,
- Cost-benefit and cost-effectiveness analyses,
- Possibilities for visual post-mortem inspection of all species,
- Clear division of responsibility between the meat industry and the competent authorities to provide consumer confidence,
- Auditing of slaughterhouses,
- Delegation of rational and reasonable tasks to the industry.

When carrying out inspections and reviewing procedures based on HACCP (Hazard Analysis Critical Control Point), the official veterinarian may, according to the Regulation of official control on products of animal origin¹, take into account additional measures taken by the food business operators to guarantee food safety. Such measures may include

¹ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation for official controls on products of animal origin intended for human consumption Annex 1, Section I, Chapter II, A 3

implementation of integrated systems, private control systems, independent third party certification or other means, and these measures should be documented and animals covered by these schemes clearly identifiable.

The text above is in line with the *definition* of a risk-based meat inspection system:

“A system based on risk assessment, “practical” risk management and risk communication in the meat chain at least from farm until the carcass leaves the slaughterhouse. The system also accounts for possible risks further on in the meat chain, including hygiene control at all levels, with added values such as taking into account tools used by different parties along the food chain like official control, quality systems, third party audits and audits by employees from the industry. Such a system is described as an “integrated risk-based meat inspection” and might simplify risk management and risk communication along the food chain. In particular it may facilitate improved information flow from the farmer, and between operators and meat inspectors. However, the distinct responsibilities and roles of the meat industry and the competent authority (meat inspection) need to be assessed on an ongoing basis”.

Short definition:

“A risk-based meat inspection system based on the whole meat chain, comprising different parties along the food chain (integrated risk-based meat inspection)”.

1.2 Objectives

1.2.1 Overall objective

To investigate and test solutions to achieve an efficient meat inspection in Nordic countries based on risk-based EU (European Union) legislation.

1.2.2 Specific objectives

- At the Nordic level, evaluate practical and relevant ways of
 - Risk assessment and risk management,
 - Food chain information,
 - Staffing of meat inspection.
- Propose new and relevant training programmes for both veterinarians and technicians working in meat inspection, in order for them to achieve the relevant and necessary qualifications according to the Regulation.

- Argue for a change of the legislation towards a risk-based meat inspection system, including visual inspection that is not only limited to pigs (also covering cattle, sheep and lambs) and focusing on the whole food chain.
- Argue for a change in the legislation towards a meat inspection system, with more involvement of employees from the industry and with auditing from the authorities.
- Communicate results from the project to the authorities in the Nordic countries, the Nordic meat industry and the EU Commission.

The basis for suggesting pilot projects within the Nordic project was:

- a) it was anticipated that the Regulations on food hygiene and official control would be adopted earlier than occurred;
- b) it was considered a more flexible way of employing company staff in red meat inspection (cattle and pigs); and
- c) it was expected that there would be pilot projects within the EU on how to implement Food Chain Information.

However, transitional measures and implementation measures were decided upon, giving the member states a four-year period in which to undertake full implementation of the Food Chain Information system in all species and sectors. This changed the perspective of carrying out the proposed pilot projects.

Since the adoption of the Regulations on food hygiene and official control in April 2004, it has been possible to carry out pilot projects on e.g. post-mortem procedures without performing additional traditional inspection since 1 January 2006. Accordingly, due to time limitations fewer pilot projects were performed during the project period than originally intended. However the concept and elements in a risk-based meat inspection have been addressed and defined, and several pilot projects have now started or are scheduled for the future.

1.3 Project organisation

In the steering group, each of the Nordic countries was represented by

- At least one person from the authorities,
- At least one person from the organisation of the slaughterhouses (Iceland had no representatives from the slaughterhouses).

The steering group appointed two slaughterhouses in each Nordic country to conduct projects by the meat inspection units in cooperation with the slaughterhouses.

1.4 Background

Traditional meat inspection focuses upon a panorama of zoonoses that were considerably more important decades ago than they are today. Accordingly, many of the zoonoses of importance today are not detected by current ante- and post-mortem meat inspection (Table 1.1). In addition, there are examples of dissemination of pathogenic bacteria such as *Y. enterocolitica* and *Salmonella* spp., in association with incision and palpation of carcasses during post-mortem inspection (Nesbakken et al., 2003; Pointon et al., 2000).

Table 1.1 Some zoonotic agents in the food chain – preventive measures

Agent (or disease)	Herd level	Slaughter-hygiene	De-contamination by steam/hot water ⁴	“Classic” meat inspection	Freezing	De-boning	Processing, storage, consumption
<i>Salmonella</i>	+++	++	++	- ¹	-	-	*
<i>Campylobacter</i> (poultry)	+++	-	++	-	+++	-	*
VTEC 5 (cattle/sheep)	+?	++	++	-	-	-	*
<i>Y. enterocolitica</i> (pig)	+++	++	++	-	-	-	*
<i>L. monocytogenes</i>	-	+	+	-	-	-	*
<i>Toxoplasma</i> (sheep)	-	-	-	-	+++	-	*
<i>Toxoplasma gondii</i> (pig)	+++	-	-	-	+++	-	*
<i>Trichinella</i> (pig)	+++	-	-	+++	+++	-	*
<i>Cysticerci</i> (cattle)	++	-	-	++	+++	+	*
<i>Tuberculosis</i>	+++	-	-	++	-	-	*
BSE ⁶ /TSE ⁷	+++ ²	+ ³	-	+ ²	-	+	-

(+++ = great effect, ++ = good effect, + = limited effect, - = probably negligible effect).

The table is based on Anon. (1992), Nesbakken & Skjerve (1996), Nesbakken et al. (2003), Nesbakken (2004), Pointon (2000), Skjerve et al. (1996), Skovgaard (1983), and several articles concerning zoonotic agents in Lund et al. (2000)

* reduction/elimination by heat-treatment (+++). However, avoidance of cross-contamination during processing, storage and preparation of foods that are not heat-treated before consumption is essential

¹ In a few cases, *Salmonella* can be suspected at ante-mortem inspection in cattle showing clinical signs

² Assumes clinical signs

³ Removal of specified risk material (SRM)

⁴ Article 3, point 2 in Regulation (EC) 853/2004

⁵ Verocytotoxigenic *E. coli*

⁶ Bovine Spongiform Encephalopathy

⁷ Transmissible Spongiform Encephalopathies

According to the Regulation of official controls on products of animal origin², the nature and intensity of official control on fresh meat, that is future meat inspection, should be risk-based and take into account public health risks, animal health and animal welfare.

A risk-based meat system at its greatest extent should allow possibilities for a differentiated meat inspection system to be put in place. The Regulation allows only visual post-mortem inspection of pigs. This would mean a possibility for a differentiated meat inspection with focus on zoonotic agents in the specific country/region.

A dynamic and risk-based meat inspection system should serve as a flexible tool in relation to risk management, and operate appropriately and effectively whether the hazard addressed is a threat to human or animal health.

The Regulation of official control on products of animal origin is a step in the right direction. However, it will probably take some time to adjust the meat inspection to the zoonotic panorama of today. The future goal is the implementation of a flexible and dynamic risk-based meat inspection system in the Nordic countries.

1.5 Meat inspection – the history

Within the EU/EEA, the classical meat inspection (ante- and post-mortem inspection) of today is more or less identical to that of more than 100 years ago. Robert von Ostertag (1899) is the godfather of the classic meat inspection based on the “new” scientific knowledge about the pathways of *Trichinella spiralis* and the tapeworm *Taenia saginata* and Robert Koch’s work on tuberculosis (approx. 1890). At that time, the meat inspection procedures (inspection, palpation and incisions in lymph nodes and organs) were highly risk-based and focused upon the important zoonotic agents. However, the occurrence of these zoonoses has declined. Bovine tuberculosis has been eradicated from domestic animals in the Nordic countries, and the occurrence of *T. spiralis* in pigs is extremely low, and almost non-existent in Denmark and Norway. However, *Trichinella spiralis* and other *Trichinella* species are common in Finnish natural fauna causing infection pressure towards farms (Sukura et al. 2001, Oivanen et al. 2002, Oivanen 2005). Other important zoonoses like salmonellosis, campylobacteriosis and yersiniosis are not possible to detect by the historical organoleptic meat inspection (Table 1.1). In a few cases, *Salmonella* may be suspected at ante-mortem inspection of cattle, but in general, the traditional meat inspection has limited impact on the most important agents of public health significance in the Nordic countries.

² Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation for official controls on products of animal origin intended for human consumption

Due to different approaches within the Nordic countries and cooperation between the meat industry and the competent authorities, *Salmonella* is relatively well controlled in this region.

In a former Nordic project (1988–1992), an attempt was made to develop a meat inspection system that took into account the Nordic zoonoses (Anon, 1992). At that time Denmark was already a member of EU, and Finland, Iceland, Norway and Sweden started the discussion about membership in the immediate future. Although the project group presented an interesting proposal for a new dynamic Nordic meat inspection system, the joining of Finland and Sweden to the EU, and the EEA agreements of Iceland and Norway, effectively stopped the implementation of the Nordic initiative.

2. International regulations

2.1 EU Regulation on meat inspection – framework and possibilities for meat inspection

The Regulation of official controls on products of animal origin³ sets out the framework for official control in slaughterhouses, game handling establishments, and cutting plants placing fresh meat on the market. This legislation is a part of the “hygiene package” adopted 29 April 2004, and has been applied since 1 January 2006.

Official controls on products of animal origin should cover all aspects that are important for protecting public health and, where appropriate, animal health and animal welfare. They should be based on the most recent relevant information available and it should therefore be possible to adapt them as relevant new information becomes available. The nature and intensity of the official controls should be based on an assessment of public health risks, animal health and welfare where appropriate, the type and throughput of the processes carried out, and the food business operator concerned.

The above Regulation also specifies the necessary competency for the staff performing the official control in those establishments, as well as the numbers of official staff needed to carry out the official control in order to fulfil the requirements in the legislation.

From article 5, point 5 in the Regulation of official controls on products of animal origin it appears that

- a) “Member States shall ensure that they have sufficient official staff to carry out the official controls required under Annex I with the frequency specified in Section III, Chapter II.
- b) A risk-based approach shall be followed to assess the number of official staff that has to be present on the slaughter line in any given slaughterhouse. The number of official staff involved shall be decided by the competent authority and shall be such that all the requirements of this Regulation can be met”.

The present procedures for meat inspection, i.e. inspection of animals before and after slaughter, are very detailed. Many of these procedures have been in place within the EU for more than 40 years without any

³ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption

specific changes. Even though the existing rules have been effective at preventing certain diseases, there has been a need to revise them in order to direct the control/inspection towards the food safety hazards of today and which are also related to modernised and industrialised production.

In the Regulation of official controls on products of animal origin the possibility for simplifying and/or change existing routine procedures in the slaughterhouse is given.

2.1.1 Principles in the Regulation of official control products of animal origin (meat)

- Control of meat mainly based on audit of the own-check systems – HACCP-based programmes
- Nature and intensity of auditing tasks with respect to individual establishment shall depend upon the assessed risk
- A risk-based approach shall be followed to assess the number of official staff that need to be present on the slaughter line in any given slaughterhouse
- Ante- and post-mortem inspection continue as tasks for the competent authority
- Checks on the Food Chain Information
- Slaughterhouse staff can, provided certain conditions are fulfilled, be allowed to assist with certain specific official tasks under supervision of the official veterinarian
- Specific requirements and training for official veterinarians and auxiliaries
- Visual inspection possible for fattening pigs kept under controlled housing conditions in integrated production systems since weaning, based on epidemiological or other data

The Regulations on food hygiene and the Regulation of official controls on products of animal origin requires exchange of information in all parts of the food chain, from primary producer to slaughterhouse and competent authority, with respect to sending animals for slaughtering. Such information is a prerequisite for accepting the animals for slaughtering and for human consumption.

In principle, the relevant Food Chain Information must be provided to the slaughterhouse at least 24 hours before the arrival of the animals at the slaughterhouse. The Regulation on food hygiene for animal products contains a long list of the relevant Food Chain Information, which should be covered, including, among others, information on treatment with veterinary medical products and information on withdrawal period, status of the holding of provenance, animal health status, and relevant reports about previous ante- and post-mortem inspections.

The Regulation of official controls on products of animal origin demands the official veterinarian to carry out audit and inspection with regard to Food Chain Information. This means that the official veterinarian must verify that animals are not slaughtered unless the slaughterhouse has received and checked the relevant Food Chain Information. However, the official veterinarian may allow animals to be slaughtered even though the relevant information is not available, on condition that the information in question is supplied before the carcass is approved for human consumption.

As exchange of information about the food chain is a new element in the legislation, a four-year lead-in period for full implementation of the system has been decided upon. This means that by the end of 2009, the system should be implemented in all sectors and for all species.

2.1.2 Pilot studies

The Regulation of official controls on products of animal origin also contains possibilities for adopting national measures following pilot projects used to investigate new approaches to hygiene controls on meat.

2.1.2.1 Implementing measures

The Regulation of official controls on products of animal origin provides the opportunity to amend or introduce measures on several issues in relation to the control of meat. Among others these measures might include:

- Assessment of the performance of slaughterhouse operators and their staff
- The method of communicating inspection results
- Risk-based criteria to determine when the official veterinarian need not be present throughout the ante- and post-mortem inspection
- Rules concerning the tests for the official veterinarian and official auxiliaries
- Alternative procedures, including serological or other laboratory tests, that provide guarantees at least equivalent to specific post-mortem inspection procedures
- Circumstances in which conditions relating to the holding, region or country of origin of animals, and to the principles of risk analysis indicate certain of the specific post-mortem inspection procedures are not necessary
- Conditions under which holdings and regions can be certified officially free of cysticercus or trichinae
- Methods to be applied when examining for specific hazards such as Transmissible Spongiform Encephalopathies (TSE), cysticercosis, trichinosis, tuberculosis and brucellosis

2.2 Meat hygiene in the context of Codex Alimentarius – an international approach to a risk-based meat inspection system

2.2.1 Background and status of the revised Code of Practice for Meat Hygiene

The Codex Committee on Meat and Poultry Hygiene was reopened in 2001. At its first meeting (the eighth session) held in February 2002 in New Zealand, work on a revised international code of practice for a risk-based meat inspection and meat hygiene was initiated.

The aims were to coordinate existing codes on meat and meat hygiene and develop a common code of practice for fresh meat, both “red” and “white”. When the Committee held its ninth session in 2003, a discussion paper on hygienic provisions for processed meat was introduced. At this session the committee agreed to extend the Code to include “processed meat”. As a consequence the name of the Committee has been changed into Codex Committee on Meat Hygiene (CCMH).

Another two sessions have been held in 2004 and 2005. At the latest session, The Eleventh Session of the Codex Committee on Meat Hygiene, the following points were agreed by the committee:

- To forward the Draft Code of Hygienic Practice for Meat for adoption at step 8
- To revoke the existing codex text on meat inspection and meat hygiene⁴
- To request the codex Commission to revoke the General Principles for Meat Hygiene.

After just four years work, the Code on Hygienic Practice for Meat has been completed. Since the Committee has accomplished its task, it has been adjourned *sine die*, pending future assignments of new work by the Codex Alimentarius Commission.

⁴ Recommended International Code of Practice for Fresh Meat (CAC/RCP 11-1976, Rev. 1-1993); Recommended International Code of Practice for Game (CAC/RCP-29-1983, Rev. 1-19, 93); Recommended International Code of Practice for Ante-Mortem and Post-Mortem Inspection of Slaughter Animals and for Ante-Mortem and Post-Mortem Judgement of Slaughter Animals and Meat (CAC/RCP 41-1993); Recommended International Code of Practice for Processed Meat and Poultry Products (CAC/RCP 13-1976, Rev 1 (1985)); Recommended Code of Practice for Poultry Processing (CAC/RCP 14-1976); Recommended International Code of Practice for the Production, Storage and Composition of Mechanically Separated Meat Intended for Further Processing (CAC/RCP 32-1993)

2.2.2 The Draft Code of Hygienic Practice for Meat

2.2.2.1 Introduction and Scope of the Code

Traditionally meat has been viewed as a vehicle for a significant proportion of human food-borne disease. Although the spectrum of meat-borne diseases of public health importance has changed with changing production and processing systems, continuation of the problem has been well illustrated in recent years by human surveillance studies for specific pathogens such as *Salmonella* spp., *E. coli* 0157:H7, *Campylobacter* spp. and *Y. enterocolitica*.

A temporary risk-based approach to meat hygiene requires that hygiene measures should be applied at those points in the food chain where they will be of greatest value in reducing food-borne risks to consumers. This should be reflected in application of specific measures based on science and risk assessment, with a greater emphasis on prevention and control of contamination during all aspects of production of meat and its further processing. Application of HACCP principles is an essential element.

The scope of the Draft Code of Hygienic Practice for Meat covers hygiene provisions for raw meat, meat preparations and manufactured meat (derived from domestic ungulates, domestic solipeds, domestic birds, lagomorphs, farmed game birds (including ratites) and wild game) from the time of live animal production up to the point of retail sale. The Code of Hygienic Practice may also be applied to other types of animals from which meat is derived.

2.2.2.2 Basic elements and principles of the Code

The Draft Code of Hygienic Practice for Meat is based on twelve general principles of meat hygiene, with the overall aim to produce meat that is safe and suitable for human consumption.

Some basic and essential elements in the Code are:

- The meat inspection must be risk-based
- The entire food chain, from primary producer to consumer, is included
- HACCP principles should be used to the greatest extent practicable throughout the food chain
- Ante- and post-mortem inspection must be adjusted on a science- and risk-based approach
- Meat inspection should be tailored to the animal and public health status within the actual country or region
- Clear division between competence and responsibility of the establishment and the competent authority
- Personnel involved in meat hygiene must have the appropriate training, knowledge, skills and ability when carrying out their tasks

The Draft Code of Hygienic Practice for Meat is fundamentally in line with the EU Regulation of official controls on products of animal origin, which applied from 1 January 2006. However the revised draft code of practice is more flexible in relation to whom is responsible for, and who may carry out, the different tasks in connection with inspection and control of meat.

2.3 Conclusions

The Regulation of official controls on products of animal origin intended for Human Consumption, is a part of the “hygiene package” adopted on 29 April 2004, and applicable from 1st January 2006.

Official controls on products of animal origin should cover all aspects that are important for protecting public health and, where appropriate, animal health and welfare. They should be based on the most recent relevant information available and should therefore be possible to adapt as relevant new information becomes available.

The nature and intensity of the official controls should be based on an assessment of public health risks, animal health and welfare where appropriate, the type and throughput of the processes carried out and the food business operator concerned.

The Regulation provides possibilities such as visual inspection of slaughter pigs, and declaration of *Trichinella*-free herds and of regions with a negligible *Trichinella* risk. These issues are of particular interest in the Nordic countries. The Regulation includes possibilities for adopting measures through pilot projects studies in order to trial new approaches to hygiene controls on meat.

The draft code from Codex is more flexible than The Regulation in relation to who is responsible for, and who can perform the different tasks associated with inspection/control of meat.

3. Organisation of the meat inspection

3.1 Review of meat inspection. Experience from other countries

Some countries have already developed other approaches and alternatives to classic meat inspection. Outside the EU, Australia, USA and Canada have given especially valuable inputs during the discussions in the Codex Alimentarius meetings over the last four years. The sections below on USA and Canada are based on the Report of Proceedings from the World Meat Hygiene & Inspection Congress, Downing College, Cambridge, UK, 6–8 July 2004.

3.1.1 Australia

The Australian meat inspection system is an example of both a risk-based and integrated meat inspection system. Exporting slaughterhouses in Australia have at least one official veterinarian employed by the competent authority, AQIS (Australian Quarantine and Inspection Service). However, personnel employed by the slaughterhouse carry out ante- and post-mortem inspection. The competent authority demands that the meat inspection is based on implementation of an official risk-based quality assurance system, Meat Safety Quality Assurance System (MSQA) and a programme, Meat Safety Enhancement Program (MSEP) that has to be implemented in the slaughterhouse. The programme has to be approved by AQIS. HACCP is an important element in the programme. Independence from production is ensured since the personnel carrying out the official tasks are working within the quality assurance department and not as ordinary operators within the production department. The official veterinarian revises the quality assurance system. In addition, AQIS, represented by the “Area Technical Manager”, performs audits (Anon., 2003).

3.1.2 USA

The meat inspection system of slaughter pigs in USA is another example of placing greater responsibility on industry for the production of safe food. The Food Safety and Inspection Service (FSIS) has been conducting a project since 1996: The HACCP-Based Inspection Models Project. A cornerstone of this project is that establishments must take more responsibility for independently identifying, and removing, minor dressing

defects and abnormal conditions that could pose a threat to the consumer. Further, carcasses and viscera that have passed inspection must meet finished product standards that have been established by FSIS. The changes that have been made in meat inspection procedures in the project during the last ten years have resulted in the evolution of a new paradigm: Under established HACCP performance standards, the meat industry has primary responsibility for food safety, including identifying and removing carcasses not suitable for consumption. In the beginning of 2006 five pig slaughterhouses participated in the project (web 11).

3.1.3 Canada

For the past ten years the appropriate Canadian literature has been dominated by discussions about enhancing the safety and suitability of meat products at the producer and processor level; about how the effectiveness of the meat inspection could be increased; and about facilitating the allocation of resources on the basis of risk and making the industry assume a greater responsibility and accountability for their products.

From 2004 the HACCP system has been mandatory in the food safety enhancement programme. Under the HACCP system, the operator has the responsibility for identification and removal of all carcass processing defects, identification and removal of specified pathologies, and primary evaluation and management of all process controls. In the next few years the Canadian Food Inspection Agency will focus its activities on audit and verification procedures, and establishing an accredited training programme for industry workers (five-day training programme). Such qualified workers could then be accredited to detect and trim defects, and identify specific pathologies (Huska, 2004).

3.2 Organisation of meat inspection in the Nordic countries

Previously, and with the exceptions of Finland and Sweden, the Nordic national governments financed most of the costs of the official meat inspection. However, this has now been changed towards a system financed by the industry.

For many reasons, profit margins have been reduced during the last few years and therefore the whole meat producing chain must be examined to find new and more efficient ways to operate, in order to reduce expenses. Meat inspection is one of the cost factors that has increased and has to be considered. There is a continuing need to deliver a cost-effective meat inspection with focus on food safety, to monitor expenditure closely, and to implement savings wherever possible to ensure a competitive Nordic industry.

Annex A of this report describes the current financing systems of official meat inspections, and instructions for staffing, for each of the Nordic countries. The meat inspection service is an integrated part of the national competent authorities, with a different organization in each country. There have been different approaches that have led to the current instructions for staffing (e.g. Förslag till bemanningsnorm, Sweden 2005; Norwegian fee project 2001, 2006). The different approaches are essentially a consequence of different structures of the industry, delegation of tasks to the industry (e.g. *Trichinella* control, sampling tasks, stamping, depending on animal species), working agreements and geography.

The minimum requirement for staffing given in the legislation, is that at least one official veterinarian must be present during the ante- and post-mortem inspection. Beyond this, there are no requirements regarding the number of official staff laid down in the current legislation, nor in the Regulation of official controls. However the competent authority must ensure that they have sufficient official staff available to carry out the official control, as required in the Regulation of official controls on products of animal origin.

3.3 Meat inspection costs in the Nordic countries

3.3.1 Background

A report comparing the costs and finances of the official meat inspection in the Nordic countries has been issued⁵, and is based on a Nordic seminar, “Costs and financing of official meat inspection in the Nordic countries”, which was held by the Nordic Committee of Senior Officials for Food Issue (EK-FJLS) (Næringsmidler) and arranged by the Norwegian Food Safety Authority and The Norwegian Ministry of Agriculture and Food.

3.3.2 Legal basis

The control must be performed regularly, with a frequency determined by risk assessment, and the general Regulation of official controls⁶ that was applied from 1 January 2006 sets out the requirements for financing of controls in detail. Articles 26 to 29 of the Regulation place a general obligation on Member States to ensure that official controls are properly financed, but in broader terms, it is left to each member state to decide how this is achieved. In the Regulation, minimum meat inspection fees

⁵ Rapport – En sammenligning av kostnader ved og finansiering av den offentlige kjøttkontrollen i de nordiske landene. Oppfølging av nordisk seminar, Holmen Fjordhotell, Asker 30. mai 2006

⁶ Regulation (EC) 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure compliance with the feed and Food Law, animal health and animal welfare rules.

are specified by species. In addition, the Nordic countries have their own national regulations for calculation of fees for the official meat inspection. The Regulation will be included in the legislation of the EEA countries, Iceland and Norway. The decision-making process regarding the implementation of the hygiene Regulation (hygiene package) has been delayed and depends on how rapidly the EEA States can reach agreement on the relevant acts. Current forecasts suggest agreement will be reached by approximately 1st January 2007.

3.3.3 Staffing

3.3.3.1 Background and legal basis

From the Regulation of official controls on products of animal origin⁷ member states must ensure that they have sufficient official staff to carry out the official controls required. A risk-based approach shall be followed to assess the number of official staff that must be present on the slaughter line in any given slaughterhouse. The competent authorities must ensure that at least one official veterinarian is present in a slaughterhouse throughout both ante-mortem and post-mortem inspection. Based on risk assessment, the competent authority may derogate from this approach for certain animals under certain conditions.

In all Nordic countries the costs of the official meat inspection in the slaughterhouses are perceived as comprehensive, and work is continuing to reduce these costs as much as possible.

The Nordic countries have established models for calculating the number of meat inspection personnel, based on number of slaughter animals, species, line speed and number of slaughter lines that are sufficient to perform ante-mortem inspection, post-mortem inspection, audits, sampling, analyses, animal welfare, training of personnel, and administration.

3.3.4 Calculation of fee

Each Nordic country has a system for calculating the fee, and a system for correcting the calculation with respect to the actual expenses of meat inspection at each slaughterhouse. Descriptions of these systems are in Annex A of this report.

The fee for each slaughterhouse is calculated one year in advance, and whilst each country has a different approach, the principles are similar. The basis for the calculation is the necessary number of personnel to accomplish the meat inspection consisting of ante-mortem inspection, post-mortem inspection, audits, sampling, analyses, animal welfare, training of

⁷ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption.

personnel, and administration related to the number of slaughter animals, species, line speed and number of slaughter lines.

Norway has its own special system for the calculation. From 2006 the meat inspection fee calculation is based only on the real costs of meat inspection of carcasses (necessary sampling and analyses, and administration included). Other activities related to meat inspection, such as control/audits of the slaughterhouse, sampling and analyses related to surveillance programmes and training, are covered by a general fee on food production. This general fee is essentially an additional meat inspection fee. In 2006, this fee is NOK 0.48 per kg carcass.

A common principle in the Nordic countries is that the slaughterhouse should pay a meat inspection fee that fully covers the costs of the competent authority. However, this does not seem to be the case in Iceland (see section 3.3.5 below).

3.3.5 Meat inspection costs

During, or after, the financial year in most Nordic countries a comparison is made between the calculated and real costs of meat inspection. The result of this comparison is the basis for adjustments of the calculation of the fees for the subsequent year(s). In Denmark, Sweden and Finland there is a good correlation between the calculated and real costs of the meat inspection in the large slaughterhouses.

In 2006 the system for calculation of meat inspection fees was changed in Norway, as previously described (see Section 3.3.4). However, there is still a relatively large difference between the total fee paid by the slaughterhouses and the registered costs for the elements of the meat inspection that the fee is intended to cover. The additional general food production fee is meant to cover other activities related to meat inspection, such as control/audits of the slaughterhouses, sampling and analyses related to surveillance programmes and training. However, it is difficult to determine whether these fees actually correspond to the real costs of the tasks that these fees are supposed to cover.

Information on the fees paid by the slaughterhouses in Iceland and the real costs of the meat inspection, fees here represent only approximately 50% of the real costs for meat inspection of domestic four-legged animals. However, the slaughterhouses slaughtering poultry apparently pay a fee that is approximately 20% higher than the real meat inspection costs. This finding partly explains the high Icelandic meat inspection fee for poultry.

3.3.6 Small slaughterhouses

All small Nordic slaughterhouses seem to be subsidised to some extent. Denmark defines small slaughterhouses as those that slaughter less than

15,500 animal units per year; this corresponds to about 1000 tons of carcasses annually. The difference between the fee and the real costs of meat inspection is financed by a government fund called “Regeringens konkurrencevnepakke”. This is an annual resource of 10 mill. DKK and is part of the budget of the Danish Veterinary and Food Administration.

Norway has instituted a maximum fee of NOK 1.00 per kg for small slaughterhouses, with the rest of the costs covered by the Norwegian Food Safety Authority. The other Nordic countries operate a time-based meat inspection fee for the small slaughterhouses. These measures effectively subsidise the meat inspection costs of slaughterhouses slaughtering less than 1000 tons carcasses/year.

3.3.7 Summary

Considerable resources are expended on the official meat inspection in Nordic countries. Work is continuing to improve the efficiency of the meat inspection. However, the tasks for the meat inspection, and consequently the needs for resources, are laid down in the EU Regulation.

In all Nordic countries there is a system for reimbursement of the expenses for the meat inspection. The official authorities invoice the slaughterhouses, basing the fee on the resources spent on the meat inspection at each slaughterhouse. Calculation of the fees is based on models incorporating a sufficient number of meat inspection personnel. In principle, the slaughterhouses should pay all expenses.

From the Regulation of official controls on products of animal origin⁸ a risk-based approach should be followed to determine the number of official staff that should be present on the slaughter line in any given slaughterhouse. The number of official staff should be decided by the competent authority and be such that all the requirements of this Regulation can be met. According to this Regulation visual inspection is also possible for fattening pigs under certain conditions. Additionally other meat inspection procedures might be changed after risk evaluation.

3.3.8 Conclusions

The Nordic countries have developed systems to evaluate whether meat inspection fees cover the actual expenses of this service. In Denmark, Sweden and Finland these systems seem to function very well, and the fee paid (in particular by large slaughterhouses) apparently covers the meat inspection expenses. In Iceland and Norway the systems are insufficient for this task. In Norway a substantial proportion of the meat inspection costs are covered by a general food production fee. To date, it has

⁸ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption

not been possible to determine whether the fee is sufficient to cover the actual expenses.

By a range of systems, the meat inspection costs of small slaughterhouses are ‘subsidised’ in each of the Nordic countries. The Danish Veterinary and Food Administration in Denmark operates a government-funded (“Regeringens konkurrenceevnepakke”) of 10 mill. DKK annually. Norway has instituted a maximum fee of NOK 1.00 per kg. The other Nordic countries operate a time-based meat inspection fee for the small slaughterhouses. These measures effectively subsidise the meat inspection costs of these slaughterhouses.

3.3.9 Recommendation

It is important to utilise the possibilities in the Regulation to optimise the use of resources and improve the efficiency of meat inspection in Nordic countries.

4. Risk assessment as a basis for efficient risk-based meat inspection

This chapter describes a constructive approach to risk assessments within the process of developing a risk-based meat inspection. The chapter includes the main aspects covered by the sub-group working on risk assessment, and the full documentation of activities may be found on a web-page (web 1). Whilst it is difficult to discuss risk assessment without considering aspects of risk management, the main features of risk management are commented upon in other chapters.

Risk assessment procedures have been used in the food toxicology sector for decades, but have only been relatively applied to biological hazards. A major difference between chemical and biological risk assessment is that results may be more universally relevant for chemical hazards, while this is often not the case for biological hazards. The epidemiology of infectious diseases may differ between areas, countries and continents, and separate studies for data collection and model building are often necessary.

4.1 Principles of risk assessments

Most of the reports produced in the food area have used the Codex Alimentarius (Codex) terminology, and it is interesting to compare the process described by Codex with the guidelines issued by Organisation Mondiale de la Santé Animale/World Organisation for Animal Health (OIE). According to Codex, the steps of a risk assessment include:

- Hazard identification, to identify the microorganisms or the microbial toxins of concern
- Exposure assessment, including an assessment of the extent of actual or anticipated human exposure
- Hazard characterisation, with a qualitative or quantitative description of the severity and duration of adverse effects that may result from the ingestion of a microorganism or its toxin in food. A dose-response assessment should be performed if the data are obtainable
- Risk characterisation, representing the integration of the hazard identification, hazard characterization, and exposure assessment determinations to obtain a risk estimate; providing a qualitative or

quantitative estimate of the likelihood and severity of the adverse effects which could occur in a given population, including a description of the uncertainties associated with these estimates

Source: web 3.

According to the International Animal Health Code, chapter 1.3.2, guidelines for risk analysis, article 1.3.2.4, a risk assessment consists of an initial hazard identification followed by:

- Release Assessment: pathways (e.g. biological factors, country factors or commodity factors) necessary to “release” pathogenic agents into a particular environment, typically animals or raw meat, including prevalences in live animals
- Exposure Assessment: pathways (e.g. products, processes, handling) necessary to “expose” humans, including the probability of exposure (qualitatively or quantitatively), consumption patterns
- Consequence Assessment: relationship between specified exposure and consequences of those exposures, e.g. estimated or documented disease in humans, including severity of disease
- Risk Estimation: integration of results from release assessment, exposure assessment and consequence assessment to produce overall measures of risks associated with the hazards identified

Whilst there are clear similarities between the Codex and OIE approaches, the use of two separate systems may be confusing. The question of which is preferable remains open, but it is assumed that different risk assessments will either use the Codex or OIE guidelines. As long as this is a transparent process, it should not represent any major problem, but rather give the risk assessment groups slightly more freedom in which to conduct each separate study.

The OIE approach has been previously used in Denmark (Alban et al., 2002). The framework for the OIE approach is linked to the import/ export situation, a much simpler scenario than describing the complexity of the whole meat chain. The OIE system has also evolved over time within this framework, while Codex approaches to microbiological risk assessments have been more directly translated from applications in food toxicology.

For risk assessment studies focusing on food safety in specific domestic chains, it may be difficult to distinguish between a risk assessment and elements of a HACCP system that the industry is required to run. In practice the latter is simpler, and the term risk assessment for food chain models is mainly used if the study is organised by national authorities, but could also be carried out by research institutes, organisations etc.

Although there are many similarities, especially in terminology, the HACCP system is established by teams within the meat industry.

It is important to realise that it is not always necessary to conduct all the steps recommended by OIE/ Codex in a risk assessment. For example, if either the release assessment or the exposure assessment shows a negligible probability, the analysis is terminated with a negligible risk. Additionally, comparison of the effects of different strategies or interventions might not always need a full risk assessment, e.g. an assessment on the effects of the exposure might be sufficient (see chapter 5.7 on cost-effectiveness and cost-benefit analysis).

Due to the strict formal requirements of a full risk assessment, many studies have preferred to use the less ambitious title 'risk profile' in their documents. Internationally, this has been typical for Australia and New Zealand. Again this remains controversial, as many consider a risk profile to be part of risk management, leading to a management system ordering a full risk assessment. Within the European Food Safety Authority (EFSA), a risk assessment is made by an expert group, whereas the relevant EFSA panel subsequently produces an opinion based upon the risk assessment and their homepage (web 4) reflects this. The opinion might differ from the risk assessment, because it might consider other aspects than those considered by the expert group.

While discussion about these definitions may present as obscure, the reality is that the way expert groups are formed and how they act and together represent various degrees of freedom within the risk-based approach.

A wide range of risk assessments linked to meat and meat-borne pathogens have been presented. In addition to the scientific papers available, a recommended resource for reports and other documents is the web-page Food Safety Risk Analysis Clearinghouse under University of Maryland, USA (<http://www.foodrisk.org/index.cfm>). Examples of large risk assessments on pathogens established in the meat chain that may be accessed through this page include:

- Draft Risk Assessment of the Public Health Impact of *E. coli* O157:H7 in Ground Beef
- Final Opinion of the Scientific Steering Committee on the Geographical Risk of Bovine Spongiform Encephalopathy (UK)
- Project Report: Quantitative Risk Assessment of Salmonella in Sheep Meat Produced in New Zealand

4.2. Risk Assessments and Risk-based Meat Inspection

The term risk-based may seem simple, but even the meaning of the word *risk* can be difficult. The traditional definition of ‘risk’ in epidemiology is a probability, and looking for risk factors in epidemiological studies is mainly trying to describe probability of something happening. In risk analysis, risk is used as a synthesis of two components, the probability of an event and the consequence or cost of this event. In the context of a risk-based meat inspection or risk-based surveillance it is clear that it is the last definition that is appropriate. These definitions are discussed in a paper by Stärk et al. (2006).

Other chapters in this report have discussed the distinct role of the public sector and the industry in improving food safety through meat inspection. This discussion is strongly related to the use of risk assessments, as the industry is obliged to work under a HACCP-based system. While many aspects of the HACCP system are similar to risk analysis, there are also distinct differences, both in terminology and approaches. Common to both of them are the first steps linked to hazard identification and characterisation. Further steps in HACCP may be compared to a mixture of risk assessment and risk management. Any system will require some cost-benefit analysis for the decision-making process, – and this could also be modelled within a risk assessment framework.

While the formal structures of HACCP and risk analysis may differ, it is important to focus on the similarities, as the public sector and the meat industry are obliged to work together to resolve issues in which hazards may be considered the starting point, and risk management or control the endpoint.

While the basic structure of the process of establishing a risk assessment in the food sector has been accepted through a long process within Codex, assisted by WHO/ FAO, it is not clear how this approach can be linked to the development of a truly risk-based system of meat inspection.

It is important to remember that the formulation of risk assessment, as done during the Codex process in the early 1990s, was a mixture of establishing a terminology and a system based upon a long history of risk assessments in toxicology. A further complicating issue is that OIE uses a slightly different terminology and approach in their recommendations for establishment of risk assessments.

Although the terminology and framework for risk assessments have changed, there is a long history of using qualitative risk assessments for food safety in the meat chain and for meat inspection. Thus, the original meat inspection system developed in Germany was also risk-based, and obviously using the knowledge of pathogens at that time.

Modernisation of meat inspection into a risk-based system requires that the system is sensitive to changes in the epidemiological patterns of a range of potentially meat-borne zoonotic infections. Quantitative techniques from epidemiological studies or risk assessments should be used for evaluating different specific questions. Any system oriented towards minimizing public health risk should take a risk-based approach – thus not all biological hazards should necessarily be focused into a chain-based meat inspection system. However, efforts must always be directed at those places along the food chain where the greatest effect is seen, and based on risk assessment and a cost-effective approach.

The ideal starting point is that a hazard has a documented population impact, as recognised by documented disease cases in humans caused by meats. If the epidemiological pattern is stable, then established systems may often be appropriate. If a change in epidemiological pattern is observed, then a rapid response might be relevant. In principle, in the absence of an epidemiological link between occurrence in animals and disease in humans, there is no reason to focus on risk management for handling this hazard in the meat chain.

Interpretation of epidemiological patterns is a matter of understanding and explaining, based upon the available data. It is important to remember that from understanding epidemiological patterns to presenting a more predictive risk assessment model involves a major step.

Documentation of epidemiological patterns may use data derived from:

- The number of sporadic cases, as documented through the national health authorities,
- Clusters of disease/ outbreaks, as recorded by the health authorities or food inspection services,
- Epidemiological studies aimed at establishing connections between the recorded disease pattern and possible risk factors.

In Nordic countries, information should be available at a sufficient level of detail through the National health record systems, and additional epidemiological studies, to enable such an evaluation to be undertaken. Whilst substantial documentation on disease patterns already exists, Tracing back to meat may be more difficult.

In some cases it may be difficult to establish a direct epidemiological link between hazards occurring in animals/meat and disease occurring in humans. Many of the agents in farm animals are enteric agents, also found other places such as wild animals, birds and drinking water. Molecular typing methods may be an option to find the relative importance of various sources, and this has been done successfully for *Salmonella* infections in Denmark, using models derived from risk assessment meth-

odology. This approach is recommended for other agents also in order to obtain further evidence of the links between meats and disease.

The mathematical techniques used in risk assessments are all based upon a mixture of empirical data and various degrees of data gaps that require some subjective elements to enter the model. The two main techniques (stochastic Monte Carlo and Bayesian) used in establishing risk assessment models have different possibilities of handling the uncertainties, linked to data variability and uncertainty due to lack of information or other sources of uncertainty. The general aim of a risk assessment process will be primarily to assess risk, and secondarily to identify sources of uncertainty and try to reduce their impact in the model. This process will typically be repeated when a risk assessment advocates data collection or other work to improve the model, and then the same model, or an improved version, can be run again with the new data.

4.3 Results from the sub-project on risk assessment

The sub-group on risk assessment was organised with a core group from each country⁹. In addition to the core group, several scientists participated in the meetings (web 1).

In the risk assessment part of the overall project, the working platform was linked to seminars on various topics linked to risk assessments. The original intention was organise seminars on risk assessments concerned with the following pathogens:

- *Toxoplasma gondii*,
- *Salmonella*,
- *Y. enterocolitica*,
- *E. coli* (VTEC).

However, seminars were only held on the two of these; a seminar in Oslo in late 2004 addressed *Toxoplasma gondii* and a seminar in Copenhagen in August 2005 focussed upon *Salmonella*. A seminar on *Y. enterocolitica* was considered unnecessary, as a separate report on *Y. enterocolitica* was presented for the Norwegian Scientific Committee for Food Safety in 2005: A preliminary risk assessment of *Y. enterocolitica* in the food chain: some aspects related to human health in Norway (web 5). Due to time constraints, no seminar was held on VTEC. However, numerous risk assessments and scientific opinions have previously addressed this topic (EFSA (web 4); Food Safety Risk Clearinghouse (web 2)).

⁹ Eysteinn Skjerve, Norway; Lis Alban, Denmark; Ivar Vågsholm, Sweden; Auður Lilja Arnþórsdóttir, Iceland; Riitta Majala, Finland (replaced with Pirkko Tuominen)

The question of whether animal species or infectious agent should be used as the entry point into a risk assessment was discussed, and illustrates one of the dilemmas in using risk assessment approaches to meat inspection:

- The *biological agent approach* allows a specific focus on one agent and this fits well into the basic framework of performing a risk assessment. However, a separate process is needed (risk evaluation or risk ranking) to prioritise agents of concern,
- The *animal species approach* is more directly linked to the animal chain/meat inspection system and may seem a more attractive approach if the result of a risk assessment will be used to modify a meat inspection procedure. However, establishing quantitative risk estimates for a wide range of pathogens linked to one animal species may be difficult and present an overwhelming amount of work.

If risk assessment procedures are to be used, the best approach would be to use the animal species as the entry to identification and ranking of hazards, and a focus on the agent/animal interaction if a more specific risk assessment is to be undertaken. This tactic has been used in other countries, and lists describing this type of risk ranking for the Nordic countries can be found elsewhere in this report.

The three hazards covered represent uniquely different situations:, *Salmonella* being a very well established pathogen, *Y. enterocolitica*, having emerged over the last decades (Tauxe, 2002), and *Toxoplasma gondii* being a pathogen of which the public health importance remains uncertain, with incidence of infection possibly grossly underestimated (Table 4.1).

Table 4.1. The hazards discussed by the sub-group on risk assessment

Hazard	Documented health risk	Risk management in meat inspection
<i>Toxoplasma gondii</i>	<i>Toxoplasma</i> is common in mutton and is also found in pork. Epidemiological studies indicate consumption of raw or undercooked meats from sheep/pig to be an important risk factor for humans. Infections in pregnant women and immunocompromised individuals may cause abortions, congenital defects or severe disease/death. Some studies indicate that <i>Toxoplasma gondii</i> is important for the general public and not only high-risk groups.	Neither the public meat inspection nor the industry has made any attempt to intervene in the transmission of <i>T. gondii</i> to humans from meats.
<i>Salmonella</i>	<i>Salmonella</i> represents a documented health risk for consumers, but the population impact of <i>Salmonella</i> infections from domestic meat is limited in Nordic countries. Even in Denmark, where <i>Salmonella</i> was previously a serious concern, the problem has declined to a level where imported meats represent a more important source than domestic meats.	All Nordic countries spend relatively large resources on surveillance for <i>Salmonella</i> in animal feed, live animals and the whole meat chain (both industry and public sector). Cost-benefit aspects of <i>Salmonella</i> surveillance may be questioned.
<i>Yersinia enterocolitica</i>	<i>Y. enterocolitica</i> infections are among the most important enteric agents transferred to humans mainly from pork products.	The meat industry has tried to intervene in the <i>Y. enterocolitica</i> infection chain by improved slaughter hygiene and changing handling procedures for infected material (heads/tonsils). No specific resources are allocated from the public sector.

4.3.1 *Toxoplasma gondii*

The seminar on *Toxoplasma gondii* focused on discussions linked to hazard characterisation. An extensive documentation package was compiled before the meeting as a background for the discussions: (web 6). Various aspects of the biology of the parasite were discussed within the framework of hazard characterisation:

- Epidemiology in man,
- Epidemiology in farm animals and wildlife,
- Recent studies on strain diversity

T. gondii may occur in all vertebrates, but in the commercial meat sector the main focus is on the occurrence in sheep and pigs. Serological studies have documented various prevalences in all animals, but presently the accepted view is that cattle represent a minor problem due to the low occurrence of viable muscular cysts in beef. The stability of the parasite under various combinations of salt, pH etc. has not been described in detail, due to the large amount of work required for culturing the parasite.

Recent research indicates the presence of various biotypes of *T. gondii*, with different pathogenicities to humans and animals. It is still unclear if varieties found in farm animals and wildlife are of high pathogenicity to man. This question is of major importance, if any risk management strategy should involve meat inspection or intervention in the meat chain to limit the transfer of the parasite to humans. Some studies have indicated serious neurological symptoms associated with *T. gondii* infections in persons outside the assumed risk groups, and these reports may indicate that *T. gondii* should be taken more seriously by the whole meat sector.

In the final discussions, the hazard characterisation was summarised and some follow up research topics outlined. The group generally agreed that the following topics should be addressed before any initiative to include control of *T. gondii* in the meat chain is advocated:

1. Characterisation of the various strains of *T. gondii* found in farm animals and wildlife should be undertaken. These strains could then be compared to strains isolated from abortions or clinical cases in humans,
2. More studies are needed to study the viability of the cysts in processed products, especially various fermented products made from mutton or pork,
3. Collection of information on the stability of infection in domestic herds to assess whether previous testing of herds can be used to classify the likelihood of infection in individual flocks of slaughter animals.

These topics are now being followed up by various activities based upon materials and discussions from the Oslo seminar. A preliminary risk assessment of *T. gondii* in pork has been performed by the Danish Meat Association. This risk assessment concluded that if pork is thoroughly heat-treated, frozen or salted prior to consumption, then the risk of *Toxoplasma* infection is negligible. Only mildly cured, non-heat-treated ready-to-eat pork products may be of concern, and only if the raw meat used for such products has not been frozen prior to manufacturing. The Danish work demonstrates that for *Toxoplasma* in pigs and pork, post-harvest measures focusing on processing might be more effective, both in terms of risk-based approach as well as costs, than pre-harvest measures consisting of, for example, herd certification (Boes et al., 2006).

From 8–10 May 2006 a conference on *Toxoplasma*, devoted particularly to foodborne infection, was held in Palermo, Italy. The overall aim of the conference was to discuss if the focus of *Toxoplasma* control should change from perinatal *Toxoplasma* screening in pregnant women to control of *Toxoplasma* infection in food animals and meat. Generally, the occurrence of *Toxoplasma* in pigs and pork was demonstrated to be

low and still decreasing, with the possible exception of in outdoor-reared pigs. Occurrence in sheep and goats, especially in the Mediterranean countries, is still high and of not only zoonotic, but also veterinary importance. The overall conclusions of the conference were that a monitoring programme in pigs and sheep would neither be justifiable nor cost-effective. Focus, if any, would be better concentrated on production of those meat products with a high risk of *Toxoplasma*. This implies that risk management should generally be directed at meat products, rather than live animals. Further research into meat processing methods that inactivate *Toxoplasma* in meat was advocated. No clear conclusion was drawn with respect to outdoor-reared pigs, but it was noted that a considerable number of outdoor farms are able to produce *Toxoplasma*-negative pigs. Labelling meat with *Toxoplasma* warnings, or as *Toxoplasma*-free, was discussed; however, as opinions differed considerably, the conference participants were unable to reach a final conclusion on this.

A similar discussion has been initiated in Norway, where mutton is the most important meat-source of the infection. It is not easy to suggest interventions in sheep husbandry that would reduce infection loads in sheep flocks. A PhD project at the Norwegian School of Veterinary Science (NSVS) also aims to establish a full risk assessment linked to the Norwegian mutton chain. Survival of *Toxoplasma* cysts in fermented mutton products is currently being researched in a collaborative project between NSVS and a research group in Australia. Additionally, strains from arctic mammals are currently being characterised in association with a NSVS PhD project. Throughout the main project, sera from sheep flocks have been collected over two consecutive years to test if prior information about flock infection status may be used to classify flocks coming to slaughter (Chapter 6.5). The *T. gondii* research being conducted within the project are good examples of using network projects as platforms for defining data gaps and identifying key questions to be addressed before a full risk assessment can be set up.

It seems realistic to envisage scientific information being substantially advanced and more precise within a few years. It should then be possible to revisit this topic and agree on possible risk management strategies for this hazard in the pork and mutton chain.

4.3.2 *Salmonella*

The aim of the *Salmonella* seminar was to link an update on the biology and epidemiology of *Salmonella* in the Nordic countries with the ongoing changes in the EU legislation in this field.

The EU legislation requires an alteration in the surveillance of pork, whether nationally produced or imported. Furthermore, economic efficiency in surveillance is of growing importance because of increasing competition among meat producers. Resources are limited, and the ques-

tion is how maximum food safety can be achieved with the available resources. Moreover, how can a cheap and efficient surveillance system be established without jeopardising human health?

Surveillance and control of *Salmonella* has been a major focus for the competent authorities and meat industry in all Nordic countries for decades. While culturing methods have been the backbone for most of these programmes, and still is for most countries, a different approach was taken in Denmark when the surveillance system became based on serological methods.

During the seminar, the situation in the various Nordic countries was presented. Whilst certain endemic varieties occur in all countries, apparently only Denmark still has an endemic problem. Discussions also revealed large differences in risk management approaches if clones of salmonellae are detected in farm animals. No agreement was reached on how best to evaluate the possible impact of a variety of *Salmonella*. Considerable work must be completed, and data gaps filled, before it will be possible to agree upon an approach to evaluate whether any specific *Salmonella* type requires intervention.

From these discussions, it is clear that there is currently no agreement on a real risk-based approach to surveillance of *Salmonella*. This illustrates some of the difficulties in establishing risk-based surveillance systems.

The rest of the seminar focused on effectiveness and cost-benefit assessments of the Danish *Salmonella* surveillance programme. The Danish Meat Association is presently revising their system in collaboration with the authorities. As it has now been documented that human *Salmonella* infections from the relatively minor proportion of imported pork are epidemiologically more important than the fraction from Danish pork, this will be the starting point. Moreover, it is doubtful whether continuing with similar interventions to those used in the last decade will reduce the endemic level of *Salmonella* in Danish pork products.

4.3.3 *Y. enterocolitica*

Y. enterocolitica is a typical “Northern” enteropathogen. This may be due to the cold climate, but probably also due to the relatively low level of enteropathogens in farm animals in Nordic countries. This hazard has now been recognized for more than a generation as a pathogen to which humans are mainly exposed through pork products. While current meat inspection procedures, with extensive knife use on the carcass, may spread the agent into the meat, it has been documented that improvements in slaughter hygiene and other risk management procedures inside the meat industry, have reduced the risk to consumers. Nevertheless, a relatively large number of humans continue to be infected every year. The preliminary risk assessment from the Norwegian Scientific Committee

for Food Safety summarises the current knowledge on *Y. enterocolitica* in the food chain: (web 5).

The report suggests that probably the most efficient way to limit the spread of *Y. enterocolitica* from the tongue and tonsils is decapitation early on in the carcass dressing procedure. In such a procedure, the head, including tongue and tonsils, should be removed to a separate line. Also avoidance of incision of the sub-maxillary lymph nodes might reduce the spread. While most studies have viewed *Y. enterocolitica* as a ubiquitous hazard in pig production, Norwegian epidemiological data suggest that it is possible to reduce the herd prevalence of *Y. enterocolitica* O:3 by minimising contact between infected and non-infected herds. Ongoing research seems to confirm this view, and some herds have now been free for several years. If it is possible to establish pathogenic *Y. enterocolitica*-free segments of the population, pre-harvest risk management might be possible by categorising herds using serological methods. However, such a strategy has to be evaluated in a cost-benefit context, in which a structured risk assessment may be needed.

4.4 Future needs

In essence, a decision must be made as to whether a census approach, examining every single animal, is acceptable. In areas where more dangerous agents occur (*Taenia solium*, *Mycobacterium bovis*) it would be difficult to avoid the census-based approach to meat inspection, but in the epidemiological scenario in the Nordic countries a surveillance-based approach may be defensible.

4.5 Conclusions

The work within the sub-group on risk assessment has shown some strengths and some limitations of using risk assessment as the entry point for changing risk management in meat inspection:

A. Strengths of risk assessment procedures

- Team discussions bringing different scientific skills together are an excellent way to approach early stages of a risk assessment, especially during the hazard characterisation stage. As exemplified with the *Toxoplasma* seminar, distinct interpretation of epidemiological data may be undertaken, knowledge gaps identified, and suggestions for further work established
- Risk assessment may be well suited for suggesting possible risk management structures for hazards, where no public intervention procedures have been put in place

- Simulation techniques from risk assessments are excellent tools to identify variability and uncertainty when various data are summarised, and can also be of great value when options for intervention are compared within a cost-benefit approach

B. Limitations of risk assessment procedures

- A whole chain model, as has been attempted for some meat-borne pathogens, may be very difficult. Starting with a risk profile or risk ranking may be a decision basis, before turning to the ambitious exercise of establishing a chain model
- Definitions of risk assessment and risk assessment procedures may limit the flexibility of identifying relevant experts to participate in a risk assessment study. This appears to be the reason why preliminary risk assessments, scientific opinions, risk profiles etc. are used in reports. The terminology seems to be more strictly used in Europe/ EU than other places
- The data required for a full risk assessment is still limited e.g. proper dose-response data are often unavailable. Data behind exposure assessment and the effect of food handling is typically limited. Separate studies are needed for these topics to be included in a risk assessment model

Modernisation of meat inspection into a risk-based system requires that the system is sensitive to changes in the epidemiological patterns of a range of potentially meat-borne zoonotic infections. Quantitative techniques from epidemiological studies or risk assessments should be used to evaluate different questions. Any system oriented towards minimizing public health risk should take a risk-based approach – thus not all biological hazards should necessarily be focused into a chain-based meat inspection system.

The general approach in Nordic countries for controlling enteropathogens in the meat chain, has been to implement risk management systems in the pre-harvest phase in combination with strict slaughter hygiene. A recent Danish cost-effectiveness study (Nielsen et al., 2005) challenges this approach and suggests that post-harvest interventions may be more efficient at the level of infections found in the Nordic countries. Hot water/ hot vapour techniques to remove surface contamination may be an option (discussed under risk management).

4.6 Recommendations

It is important to realise that it is not always necessary to conduct all steps in a risk assessment. For example, if either the release assessment or the exposure assessment shows a negligible probability, the analysis is

terminated with a negligible risk. Additionally, comparison of the effects of different strategies or interventions might not always need a full risk assessment, e.g. an assessment on the effects of the exposure might be sufficient.

5. Risk-based meat inspection

5.1 The scope of a risk-based meat inspection

The overall aim of this project is to influence the development of the meat inspection towards a real and dynamic risk-based system, based on the principles in the EU food hygiene legislation. Through pilot projects, the traditional methods in meat inspection should be challenged, and a risk-based meat inspection developed, based on science.

The perspective of a risk-based meat inspection system should be from “table to farm”, i.e. the relationship between the occurrence of diseases in humans and food products, processes etc. (Table 1.1). Besides this, animal welfare and relevant animal diseases should be included, when appropriate.

A risk-based meat inspection system is based on the whole meat chain, comprising different parties along the food chain (integrated risk-based meat inspection) and is defined in chapter 1.1.

5.2 Criteria for risk-based meat inspection

The occurrence of zoonotic diseases within the Nordic human population reflects the regional zoonotic situation at herd level. Travel, import of foods, feed and live animals are all factors that will influence this situation. Accordingly, data from the national zoonotic centres and public health authorities are the basis for a risk-based meat inspection and risk management.

A risk-based meat inspection also has to take into consideration which animal diseases must be surveyed, and particular animal welfare aspects of the region. In addition, cost-effective aspects of control measures and interventions must be taken into account.

5.3 Tools for risk management

5.3.1 Food Chain Information

Food Chain Information is a new and essential element in the EU Regulations, as described in chapter 2. Food Chain Information provides obligations for all parties in the food chain including primary producer, slaughterhouses and competent authorities and is part of the ‘stable to table’

philosophy, underlining the importance of responsibility during each individual stage in the production.

There should be a free flow of relevant information and transparency between all stakeholders in this system, with the overall aim of strengthening food safety.

It is the responsibility of slaughterhouses (the food business operators) to request, receive, check and act upon the Food Chain Information of all animals, sent, or intended to be sent, to the establishment as a prerequisite for accepting the animals for slaughtering.

In a risk-based meat inspection system, the above information is used by the food business operator in planning the slaughtering and by the official veterinarian in deciding upon the relevant and necessary inspection procedures. *Salmonella* status at herd level is important information in relation to risk management and demands special care at slaughtering. Broken needles in animals is further important information, as these require specific inspection. Food Chain Information means that exchange of information need not to be provided as a verbatim extract, but may be provided through electronic data exchange and the existing systems for exchange of information should be used as much as possible, both between member states and within the same member state.

A total overview has been developed, providing information that is common for all the Nordic countries, and is based on the requirements on Food Chain Information described in the Regulations and upon the existing systems already in place in the Nordic countries.

This overview is part of the common Nordic report on Food Chain Information appended to this report as Annex B. This report also contains a proposal for a common Nordic paradigm to fulfil the requirements for Food Chain Information, both between member states and within the member state.

Descriptions of information systems in the Nordic countries demonstrate that, on a national level, information flow occurs between primary producers, slaughterhouses and competent authorities in association with surveillance programmes for, for example, *Salmonella* (pigs, poultry, and cattle), *Campylobacter* (poultry) and Bovine Spongiform Encephalopathy (BSE) (cattle). Monitoring of residues of veterinary medical products is conducted, both as own check and as official control, and includes exchange of information in cases of non-compliance. Additionally, the primary producer provides information concerning any instances of incorrect treatment with veterinary medical products.

In addition, zoonosis centres have already been established in Norway, Sweden and Denmark. In Finland, the zoonosis centre will start operating in January 2007. These centres contribute to the coordination, identification and control of relevant zoonoses.

In Nordic countries systems/registers, which cover the requirements for Food Chain Information between primary producer and slaughter-

house, are available, with the exception of information on use of veterinary medical products. Central registration on the use of veterinary medical products only occurs in Denmark.

In general, provision of all the information 24 hours before arrival of animals at the slaughterhouse it is not necessary in Nordic countries. Much of the information will already be present (from animal health register, monitoring of zoonoses and monitoring of residues). Other information, such as herds of origin, number of animals, transport vehicle etc., will be detailed in the document that accompanies the animals.

There is a need to improve the routine exchange of information between competent authorities, slaughterhouses and organisations in case of suspicion and/or presence of zoonotic agents. This work should be carried out in cooperation between the competent Nordic authorities and the relevant organisations.

In Norway, a framework project called "e-tracing" has been started, which involves a step-by-step implementation of a national, electronic infrastructure for efficient exchange of information in the food chain. This project will be completed by the end of 2006. The system shall initially include food production, based on agriculture, and sale of products from this production. There is no necessity for a system driven by the authorities, but for a national cooperation between different parties.

Among the tasks in this project are to identify and define the following basic principles:

- The need for joint standards
- The need for joint basic data registers
- The need for joint data-architecture
- The need for communication plans

The system has been planned to start operating in 2010.

5.3.2 Classical and modern meat inspection related to risk management

The elements that are mainly covered by the classical meat inspection are presented in Table 5.1. In addition, contagious animal diseases (refer to OIE list), e.g. Foot and Mouth Disease, animal welfare and suitability aspects are covered. However, the pathological defects currently diagnosed in Nordic countries by post-mortem inspection, are usually of limited consequence for human health. The microorganisms associated with the diagnosed illnesses are either of no significance to human health, or if they are, their route of infection is not from ingesting meat. Table 5.1 exemplifies this observation for inspection of pigs in Denmark. Conditions that are most often detected at the traditional meat inspection of slaughter animals today are animal health-related, and much less frequently public health-related (see annual reports from the meat inspec-

tion, and zoonotic reports at the national level). The main conditions seen at post-mortem in slaughter animals include emaciation, oedema, colour changes, tumours, haemorrhages, bruises, arthritis, septicaemia, etc. Reports indicate that the post-mortem inspection of apparently healthy animals detects only 20% of all the macroscopic lesions that are actually present in 1% or less of animals (European Food Safety Authority^{10,11}).

Table 5.1. The frequency of various pathological diagnoses, the frequency of their condemnation and the organisms most often involved.

Diagnosis	% detected	% condemned	Microorganisms most often involved
Acute pneumonia	0.04	0.03	<i>A. pleuropneumoniae</i> , Mycoplasmas
Chronic pneumonia	0.65	0.01	<i>A. pleuropneumoniae</i> , <i>Past. multocida</i>
Acute pleuritis	0.06	0.04	<i>A. pleuropneumoniae</i> , <i>H. parasuis</i>
Chronic pleuritis	28.38	0.01	<i>A. pleuropneumoniae</i>
Abscesses	5.31	0.19	<i>Actinobacillus pyogenes</i> , <i>S. aureus</i> , <i>Streptococcus</i> spp.
Atrophic rhinitis	0.06	-	<i>Bordetella bronchiseptica</i> and <i>Past. multocida</i>
Arthritis	0.39	0.02	<i>H. parasuis</i> , <i>Erysipelothrix</i> , <i>Strept. suis</i> , <i>Strept. spp.</i> , <i>S. aureus</i>
Eczema	0.55	-	
Pyemia and abscesses	0.16	0.10	<i>A. pyogenes</i> , <i>S. aureus</i> , <i>Strept. spp.</i> (pyogenic)
Osteomyelitis	0.44	0.17	<i>A. pyogenes</i> , <i>S. aureus</i> , <i>Strept. spp.</i>
Tail bite and infection	1.39	0.14	<i>A. pyogenes</i> , <i>S. aureus</i> , <i>Strept. spp.</i> (pyogenic), <i>Pseudomonas aeruginosa</i>
Scars	1.44	-	-
Bone fractures	0.78	0.01	-
Peritonitis	0.84	0.03	<i>A. suis</i> , <i>A. pyogenes</i>
Muscle degeneration	0.02	-	-
Hernia	1.26	0.01	-
Pericarditis	0.61	0.01	<i>A. suis</i> , <i>Pasteurella</i> spp., <i>Strep. spp.</i>
Hepatitis	0.01	-	Several, often secondary
Hip dislocation	0.05	-	-
Infected wound	0.04	0.01	<i>A. pyogenes</i> , <i>S. aureus</i> , <i>Strept. spp.</i> , <i>Pseudomonas aeruginosa</i>
Nephritis	0.05	0.01	<i>Strept. spp.</i> , <i>Erysipelothrix</i> , <i>A. pyogenes</i> , <i>S. aureus</i> , <i>Proteus</i> spp., <i>E. Coli</i>
One testis	0.39	-	-
Other diagnoses	0.41	0.21	-

Data from the Danish meat inspection of pigs, 2005. Total number of pigs slaughtered: 20,581,562

Slaughter animals can be infected with zoonotic microorganisms causing clinical signs that may be detected during ante-mortem inspection and/or

¹⁰ Opinion of the Scientific Panel on Biological Hazards adopted on 22nd April 2004 and 1st December 2004

¹¹ Opinion on revision of meat inspection in veal calves. SCVPH adopted in April 2003; opinion on identification of species/categories of meat-producing animals in integrated production systems where meat inspection may be revised. SCVPH adopted in June 2001; opinion on revision of meat inspection procedures. SCVPH adopted in February 2000 revision of meat inspection procedures for fattening pigs.

lesions that are detectable post-mortem (e.g. tuberculosis). These are listed in Table 5.2. Several of the zoonoses that might be detected by traditional meat inspection do not presently occur in Nordic countries.

However, slaughter animals may also carry pathogenic microorganisms in their gastrointestinal tracts and/or on their coat without exhibiting any clinical signs of disease, or visible lesions post-mortem. During slaughter and dressing procedures, these pathogens, including *E. coli* O157 and other VTEC, *Salmonella* spp., *Y. enterocolitica*, *Campylobacter* spp. and *Listeria monocytogenes*, may contaminate the meat surface, but will not be visible to the meat inspection staff during conventional meat inspection of slaughter animals. In addition, it is recognised that physical meat inspection, involving palpation and incision of organs such as lymph nodes (as required and continued under the Regulation of official control on products of animal origin), increases the risk of cross-contamination of the meat with these organisms¹. Therefore, risk-based approaches are needed in order to reduce meat inspection-mediated cross-contamination of meat, whilst improving the efficacy of the conventional post-mortem inspection of slaughter animals.

Most of the organisms involved have no relevance for consumers as microorganisms in meat. However, bacteria like *Streptococcus* spp., *S. aureus*, *Erysipelothrix* have occupational significance for employees in the meat industry.

Animal welfare and animal diseases are covered by ante- and post-mortem inspection. In relation to Food Chain Information and available data, it should also be possible to improve and conduct this aspect of meat inspection from a risk-based perspective.

Table 5.2 illustrates that many important meat-related hazards would not be detected in the current meat inspection system, and identifies some limitations in relation to public health protection. Risk management tools are also included. It is important to evaluate risk management tools e.g. by cost-effectiveness analyses. This is because clinical manifestations of zoonotic diseases are rare. The classic meat inspection is inefficient in the control of these hazards. Accordingly, improved systems for detection of public health hazards should be introduced, to enable a more judicious use of resources.

Table 5.2. Some important zoonotic agents related to meat, and the impact of the current meat inspection for their control in Nordic countries

Agent	Occurrence in Nordic countries	Importance in human health (severe disease and / or many cases of disease)	Risk management tools. Cost-effectiveness must be evaluated regarding control measures and agents			
			Visually detectable at farm level	Detection at meat inspection	Slaughter hygiene, HACCP	Serological or bacteriological categorisation of herd
<i>Salmonella</i> spp.	Yes ¹	+++	- ² , notifiable	(+)	Yes	Yes
<i>Y. enterocolitica</i>	Yes	+++	-	-	Yes	(Yes) ¹⁰
<i>Campylobacter</i>	Yes	+++	-	-	Yes	(Yes) ¹¹
<i>L. monocytogenes</i>	Yes	+++	- ²	-	Yes ⁸	No
VTEC	Yes	+++	-	-	Yes	No
<i>Cryptosporidium</i>	Yes ¹³	+++	++		Yes ⁹	No
<i>Toxoplasma</i>	Yes	+++	-	-	No	(Yes) ¹²
<i>Sarcocystis</i>	Yes	-	-	-	No	
<i>Cysticercus bovis</i>	Yes	+++	-	+	No	Serological tests would increase detection rate
<i>M. tuberculosis</i>	No	+++	+, notifiable ³	+++		If herds are infected, specific procedures such as isolation are introduced at herd level
<i>Brucella</i>	No	+++	+, notifiable	+	No	Yes
<i>Trichinella</i> spp	Yes ⁴	+++	-	+++	No	Yes, and testing of fauna (wild)
<i>Erysipelothrix rhusiopathiae</i>	Yes	+	+	+		Occupational aspects
<i>M. avium-intercellulare complex</i>	Yes	?	-	+	?	
BSE	Yes, but very limited ⁵	+++	+ ⁶	+ ⁶	Yes (SRM) ⁷	Testing of risk animals

(+++ = high relevance, ++ = relevance, + = limited relevance, - = probably no relevance).

The Table has been made from a 'table to farm' perspective and is based upon those products from which humans acquire disease and also where in the food chain interventions are most efficient (see also Table 1.1). The table is based on Andersen (personal communication), Andersen (1988), Anon. (1992), Berends et al (1997), Borch et al. (1996), Fries et al. (1996), Nesbakken & Skjerve (1996), Nesbakken et al. (2003), Nesbakken (2004), Pointon (2000), Skjerve et al. (1996), Skjerve et al. (1998), Skovgaard (1983), MAF (2002), Fredriksson-Ahomaa et al. (2000) and several articles concerning zoonotic agents (Lund et al. 2000)

¹ The occurrence of salmonellosis varies among the Nordic countries.

² The producer may be able to detect clinical disease.

³ Bovine TB is notifiable.

⁴ The Occurrence of trichinosis varies between the Nordic countries.

⁵ Denmark: A few cases. Finland: One case. Sweden: One case. No cases yet diagnosed in Norway and Iceland

⁶ Assumes clinical signs

⁷ Specified Risk Material

⁸ HACCP during further processing is more important

⁹ Contamination of drinking water probably the most important transmission route

¹⁰ Probably not feasible; see under 5.6.3

¹¹ Feasible for broilers, but not for pigs, see under 5.4.3 under the heading "*Campylobacter* spp. and *Salmonella* spp. in poultry"

¹² May be feasible for populations with a relatively low prevalence; see under 5.6.3 and Table 1.1 (freezing)

¹³ Human health problems often associated with contaminated drinking water

5.3.3 Possibilities for risk management at farm level

5.3.3.1 The zoonotic agents

How should a risk-based meat inspection be carried out in relation to important zoonotic agents? At herd level, risk management might be conducted by using serological or bacteriological testing, followed by categorisation of animals. The Danish *Salmonella* programme on pigs is a good example of this approach.

5.3.3.2 Risk management by categorisation of herds

The Danish *Salmonella* Programme in pigs and pork

The Danish *Salmonella* Programme is a good example of categorisation at herd level. Estimating sources of human salmonellosis is essential as a basis for control measures. A model based on comparison of the number of human cases caused by different *Salmonella* sero- and phage types with the prevalence of the *Salmonella* types isolated from animal-food sources, weighted by the amount of food source consumed, is described as an example from the Danish Zoonosis Centre (Figure 5.1). This provides basic information on the impact of different sources (i.e. various animal products) on human salmonellosis.

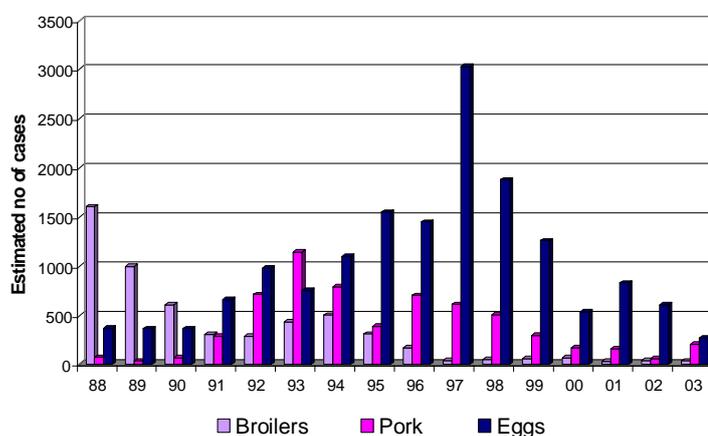


Figure 5.1. Major sources of human salmonellosis in Denmark (1988 – 2003) (Danish Zoonosis Centre)

Important elements of the Danish *Salmonella* programme are:

- Surveillance of all herds based on meat juice samples (ELISA-test)
- Microbiological testing of high risk herds
- Sanitary slaughter of pigs from high risk herds, including microbiological testing of a random sample of carcasses after slaughter

- Hot water treatment of carcasses from multiresistant *Salmonella* (MRSTDT104) infected herds and from highly infected herds
- Surveillance of *Salmonella* prevalence in fresh meat – random sample of carcasses at all slaughterhouses

This programme has been very successful, and the level of *Salmonella* in fresh meat in Denmark has declined from 2.3% in 1996 to 1.4% in 2004. It should also be mentioned that the diagnostic method used now is approximately twice as sensitive as that used previously. The prevalence of salmonellosis in humans caused by pork-related *Salmonella* has been reduced from about 20 per 100,000 inhabitants in 1993, to 3.8 per 100,000 inhabitants in 2003.

Trichinella spiralis

The EU legislation demands examination of all pigs for *Trichinella spiralis*. However, regions that can document absence of this parasite are exempt from this requirement. Countries like Denmark, that has not detected the parasite in domestic pigs since 1930, may conduct a risk-based surveillance study to achieve this exemption. Denmark intends to implement a safe and risk-based monitoring programme for *Trichinella* in domestic pigs, as well as a monitoring programme for *Trichinella* in wildlife. Norway and Sweden are also considering omitting examination for *Trichinella* in housed herds with sufficient GMP (Good Manufacturing Practice).

Campylobacter spp. and *Salmonella* spp. in poultry

Control of these two agents in Nordic countries is a good example of integrated ante-mortem inspection at herd level. Collection and analysis of faecal samples at herd level a few days before slaughter, is probably one of the most efficient tools to monitor these bacteria in poultry flocks.

Denmark

The Danish *Salmonella* action plan for broiler production is based on a tight monitoring programme in both central rearing, breeding flocks and in hatcheries. If *Salmonella* is detected, the birds are destroyed. In the broiler flocks sampling is carried out with 'sock tests' 2–3 weeks prior to slaughter. If *Salmonella* is detected, the flock is slaughtered at the end of the day. On average 1.7% of the flocks tested are positive. In the slaughterhouse, all batches are tested for *Salmonella*. 40 samples are taken from ante-mortem negative flocks and 60 samples from ante-mortem positive flocks. The action plan covers management at all steps of production.

Only feed from feed mills approved by the Danish Poultry Board can supply Danish poultry producers in poultry meat production. The feed

mills must fulfil a wide range of GMP rules in order to be approved by the Poultry Board.

The Danish Veterinary and Food Administration and the Danish Poultry Board have agreed to focus on 3 levels with respect to *Campylobacter* in broilers:

- At flock level, rules regarding management and hygiene given by the slaughterhouse must be followed. Payment for the birds is withdrawn if the flock is tested positive or/and the rules are not followed. All flocks are tested at the slaughterhouse, with a minimum 10 cloacal swabs per flock. Furthermore the slaughterhouse takes additional samples from each flock approximately one week prior to slaughter. 27% of the flocks tested were positive in 2004.

In 2004 five broiler farms participated in a field study in which insect screens were built up on one broiler house at each farm, while another house at each farm remained unprotected. *Campylobacter* infection time was delayed by a mean of 17 days in the screened houses, and 37% fewer *Campylobacter* positive flocks were seen at slaughter, as compared with flocks from unprotected houses. The estimated mean load of insects in ventilation air per broiler rotation in the unprotected broiler houses was 30,728 (range 2,233 - 180,300), of which 21% were flies. Furthermore 2831 flies from the surrounding area were investigated for *Campylobacter* carriage, which was found to be high (up to 33%) in hot summer if other production animals were present in the surroundings, and low (< 1%) when no other animals were present (Hald et al., 2005). A second field study on the effect of insect screens on *Campylobacter* infection of broilers will be carried out on 20 Danish broiler houses from June to November 2006. The purpose of the research is to develop useable insect screens that can minimize the risk of flies infecting the broiler flocks with *Campylobacter*.

- In the slaughterhouses, as many of the *Campylobacter*-positive flocks as possible are allocated to the production of quick-frozen products or heat-treated products. In Denmark, the registered number of *Campylobacter* cases in humans was approximately 1,100 in 1992 and approximately 4,600 in 2001. In 2004 there were approximately 3,700 human cases (Web 9).

A research project was conducted in 2005 on the use of Sono-Steam[®] on broilers (Force Technology and The Danish Poultry Meat Association). Sono-Steam[®] is a thermal ultrasound processing method that combines the effects of hot steam and high-frequency ultrasound. The project showed very promising results with the incidence of *Campylobacter* bacteria on broilers significantly reduced by log 2.7–3 when the new method was used (web 10).

- Finally labelling on products and campaigns from the Danish Veterinary and Food Administration focus on kitchen hygiene for the consumer. The most recent campaign was targeted towards the younger male population.

Finland

All flocks are tested for *Salmonella* before slaughter. Positive flocks are destroyed or heat-treated. Monitoring is performed at the slaughterhouse and cutting plant level. Following a positive *Salmonella* result, the premises are disinfected and sampling is increased. The prevalence of *Salmonella* in Finnish poultry is below 1% (Anon., 2004).

The *Campylobacter* control programme requires that all broiler slaughter batches should be sampled for *Campylobacter* at slaughter between June and October. From November to May random samples are taken. If two consecutive flocks from the same holding are positive, all flocks from that holding will be slaughtered at the end of the day until two consecutive flocks are negative. Production hygiene at holdings with *Campylobacter* positive flocks will be investigated (Anon., 2004).

Iceland

Iceland has had a similar system for poultry flocks to Norway since 1996 for *Salmonella*, and since 2000 for *Campylobacter*. A decline in human cases due to this intervention has been demonstrated.

Norway

Poultry have been examined for *Salmonella* at herd level before transport to the slaughterhouse for several decades. Positive flocks are eradicated or slaughtered at the end of the day, and the farm is disinfected.

The poultry industry is working together with the authorities, through the "Norwegian action plan against *Campylobacter* in broilers" (2001 – to date). Positive herds are slaughtered at the end of the day. Broilers from positive flocks are frozen or grilled. A reduction in the occurrence of *Campylobacter* at both herd level and in retail products has been achieved. Since 2001, the number of human cases has decreased from approximately 2800 cases annually to about 2200 cases annually in the period 2002–2004) (web 7).

Sweden

The Swedish *Salmonella* surveillance and control programme with respect to broilers started as a voluntary programme, initiated by the industry and strongly promoted (not least economically) by the authorities in 1970. All links in the production chain (from breeders to slaughter, including feed) are parts of the programme. Since 1986 the control of all flocks of poultry must be bacteriologically monitored before slaughter.

Since 1991 all table-egg producing flocks (> 200 hens) are also monitored before and during production. Only heat-treated feed mill produced feed is approved for poultry, addition of non-heated whole grain is permitted, provided that it is produced, harvested and stored under conditions approved by the Swedish Board of Agriculture.

When *Salmonella* is detected, regardless of serotypes or prevalence, the flock is destroyed. The annual prevalence of *Salmonella* positive flocks during the last 10 years has been less than 0.2%

In 1991 a surveillance programme for *Campylobacter* was initiated and run by the industry. During 1991–2001 every single flock in Sweden was bacteriologically examined through neck-skin samples. Whilst an obvious reduction in prevalence of *Campylobacter* was achieved as a result of improved hygiene routines, a pronounced seasonal variation could not be avoided.

Since 2001 the industry, in close collaboration with the authorities, has initiated a project to investigate further possible routes of introduction, with the aim of introducing measures to prevent the introduction of *Campylobacter* in to the flock.

Y. enterocolitica

Pork products are the main source of the pathogen *Y. enterocolitica* that causes yersiniosis in humans in Norway (Ostroff et al., 1994). However, it is not possible to identify pigs contaminated with *Y. enterocolitica* at post-mortem meat inspection. In a serological study of pig herds in Norway, 182 (63.4%) of 287 herds were defined as positive for *Y. enterocolitica* O:3 (Skjerve et al., 1998). Among the positive herds, were significantly fewer combined herds of piglets and fatteners than fattening herds. Thus the epidemiological data suggest that it is possible to reduce the herd prevalence of *Y. enterocolitica* O:3 by minimising contact between infected and non-infected herds. Furthermore, attempts to reduce the prevalence at the top levels of the breeding pyramids may be beneficial for the industry as a whole. The meat industry might categorise herds using serological methods, and use these results in its strategy to reduce the risks for consumers (Figure 5.2). However, this possibility would depend on a reduction in the number of “positive” herds. The frequent occurrence of this agent at present would make such categorisation very expensive and is therefore currently not feasible. Cost-effective aspects are discussed in 5.7.3.

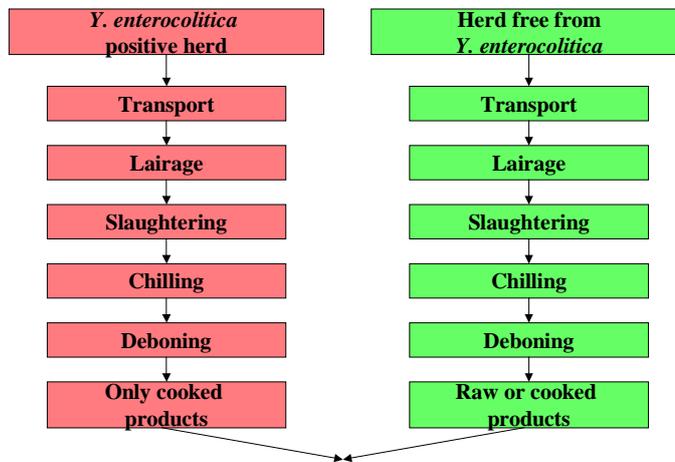


Figure 5.2. Flow diagram for production of *Y. enterocolitica*-free pork. Pigs from negative and positive herds should not be mixed to avoid contamination from carrier animals. Categorisation might be based on serological tests of the herds. This figure is representative of a general design for categorisation of zoonotic bacteria like *Salmonella* and *Campylobacter* (Adapted from Nesbakken, 2004)

Toxoplasma

Traditional organoleptic meat inspection cannot detect animals that are infected with *Toxoplasma*. In a Norwegian study, Skjerve et al. (1998) showed that as many as 18% of lambs and 44% of the sheep herds were infected with *Toxoplasma*. In 321 pig herds, 17 (5.3%) were positive, while 2.6% of the pigs were positive (Skjerve et al., 1996). Among the important risk factors for pregnant women in a Norwegian case-control study (Kapperud et al., 1996) were:

- Consumption of raw or undercooked minced meat products
- Eating raw or undercooked mutton or pork
- Eating unwashed raw vegetables or fruits
- Cleaning the cat litter box
- Low standard of kitchen hygiene

In this study, 0.18% of the women were infected during pregnancy. In conclusion, it is crucial to introduce preventive measures in the food chain to minimise infection from meat and in particular, mutton.

In Norway, as the carrier rate at sheep herd level is so high (44%), the herds might be categorised by serology in the slaughterhouse and “positive” carcasses frozen (Lund, 2000) (Figure 5.3). Another possibility is risk communication towards specific groups like pregnant women and HIV-infected individuals. Cost-effectiveness aspects are discussed in 5.7.3.

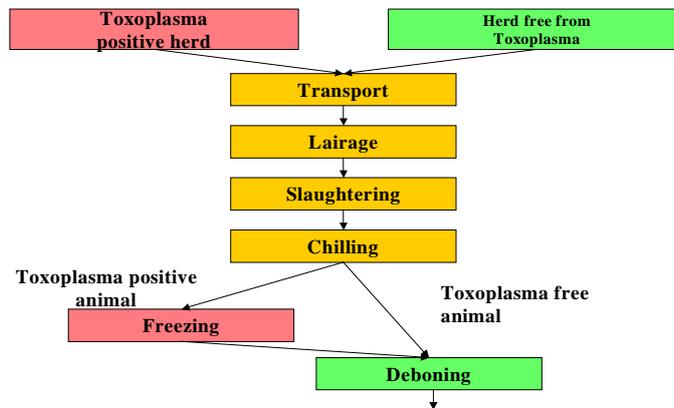


Figure 5.3. Flow diagram for production of *Toxoplasma* free mutton. Animals from “negative” and “positive” herds may be mixed. But after chilling, carcasses from “positive” herds are separated. This categorisation is carried out on the basis of serological tests performed at herd level or in the slaughterhouse. Carcasses from “positive” herds are frozen before de-boning or sale as whole carcasses. It is also possible to freeze risk products after de-boning. (Adapted from Nesbakken, 2004).

How reliable is categorisation of herds by *Toxoplasma*-status based on historical data? In Norway and Iceland, projects were performed in 2004 and 2005 to investigate this with *Toxoplasma* in lambs. The results are presented in sections 6.4 and 6.5. In Rogaland, Norway, there are many *Toxoplasma*-positive herds, and there is a high possibility of incorrect categorisation. Therefore categorisation based on antibodies against *T. gondii* in lambs is probably not a practical risk management tool in this region. In Iceland, the number of positive herds is apparently so low that mutton does not represent a great risk for toxoplasmosis there.

5.3.4 Possibilities for risk management in the slaughterhouse

5.3.4.1 Meat inspection (ante- and post-mortem inspection)

Ante- and post-mortem inspections are designed to detect slaughter animals, carcasses and organs unfit for human consumption. Ante- and post-mortem inspections are important tools for risk management related to some classical zoonoses, animal diseases, animal welfare and suitability of carcasses for consumption.

Ante-mortem inspection is performed in order to recognize slaughter animals with notifiable diseases, slaughter animals that are unfit for human consumption and animal welfare problems. The sensitivity in the inspection for detection of notifiable animal diseases in slaughterhouses must be high because such diseases may have a considerable impact on the animal health status at the national and international level. Such diseases may also impact significantly on national economy and international trade. All slaughter animals must be inspected before slaughter in order to detect any abnormality in clinical status, possibly referring to

notifiable diseases. Slaughter animals must also be inspected with respect to meat hygiene and safety. Slaughter animals may show clinical signs due to infection of zoonotic agents or the slaughter animal may be of poor quality due to other disease conditions. Animal welfare is also monitored by ante-mortem inspection. The welfare status reflects transport conditions and the conditions on farm.

Post-mortem inspection is based on visual examination, palpation, incisions and laboratory examinations. Some changes are pathognomic, and some changes may be caused by a variety of different agents. Meat inspection procedures allow the detection of certain zoonoses e.g. tuberculosis, atypical mycobacteriosis and trichinellosis, and notifiable animal diseases. In addition, carcasses that are unfit for human consumption due to non-specific pathological changes are also observed at post-mortem inspection. The meat inspection allows further examination when needed and laboratory examinations are used for detection of some bacterial infections and parasites. All pigs are examined almost real-time for trichinosis and bacterial cultivations are performed when needed. These procedures remove meat, which is unfit for human consumption.

However, some zoonotic agents are not diagnosed in the slaughterhouse and may go through the slaughter process without being noticed. In order to improve meat safety, diagnostic tools that might lead to improved preventive measures must be developed at all levels, including meat inspection. Modern and accurate detection methods of zoonotic agents would improve the opportunities for developing risk management at slaughterhouse level. However, some methods already exist, (see examples in Table 5.2 and Figures 5.1 and 5.2).

Supervision on residues of antibiotics/chemotherapeutics, hormones, pesticides and heavy metals in slaughter animals and in meat

According to article 9 in the Directive 96/23/EC (on measures to monitor certain substances and residues thereof in live animals and animal products) slaughterhouse establishments are obliged to take all necessary measures to accept only animals for which the producer is able to guarantee that withdrawal times have been observed; that the farm animals or products brought into the establishment do not contain residue levels which exceed the maximum permitted limits, and do not contain any trace of prohibited substances or products. According to the directive, own check systems (self-monitoring) to control possible residues in slaughter animals have been introduced. The drug residue control in slaughter animals comprises a random check and a suspicion check. Consequently, if the slaughterhouse finds any drug residues in pigs, it should take steps against the producer to prevent recurrence. Own checks in Danish poultry slaughterhouses are not based on analyses of samples, but focus on declarations from poultry farmers regarding the birds sent for slaughtering. The declaration states that only feed from feed mills approved by the Danish Poultry Council has been used, and that the birds

have only been fed with coccidiostatic-free feed in the end of the fattening period. Verification tests are carried out by the authorities as a part of the national surveillance programme. Similar actions are taken in the other Nordic countries.

Parallel to that, the Nordic authorities have established surveillance programmes for residues of antibiotics/chemotherapeutics, hormones, pesticides and heavy metals in animals and fresh meat, in order to verify the own checks of the slaughterhouses and to carry out monitoring schemes. Such activities are also in accordance with Council Directive 96/23/EC.

Furthermore, the Nordic authorities have prescribed statutory maximum residue levels of veterinary medicinal products and pesticides in animal products. Maximum residue levels are set in accordance with the Regulation on maximum residue limits (MRL) of veterinary medicinal product in products of animal origin¹² and Directive on fixing the maximum levels for pesticides residues in and of foodstuffs of animal origin¹³.

Results covering the last 15 years of surveillance indicate that residues of antibiotics/chemotherapeutics in Nordic slaughter animals and meat are very low. Furthermore, out of many thousands of samples taken over the last 15 years in the official surveillance programme, none have revealed the presence of banned hormones and growth promoters. Results from surveillance for pesticides and heavy metals in animals and fresh meat, also indicate that the presence of such residues is well below the established MRL.

For slaughter pigs, a minimum of 0.1% of the animals slaughtered the previous year are examined at random. The test sampling is carried out according to an established scheme, where animals and farmers are selected at random.

If a carcass is positive, but the residue level does not exceed the maximum permitted level, the slaughterhouse informs the farmer and a "deviation report" is elaborated, including an analysis of the nature of the deviation. If the residue level does not exceed the maximum permitted level, the carcass or the meat is released for human consumption.

If the residue level exceeds the maximum permitted level, the carcass or the meat is condemned. The slaughterhouse informs the local food authority about the positive test and also informs them about the corrective measures taken towards the farmer. For instance in Denmark, one effective corrective measure taken towards a farmer, who has had a positive animal exceeding the maximum permitted level, is a visit by an independent veterinarian from the Danish Meat Association. At the visit, all the conditions concerning use of antibiotics are examined, including rou-

¹² Council Regulation (EEC) No 2377/90 laying down a Community procedure for the establishment of maximum residue limits (MRL) of veterinary medicinal products in foodstuffs of animal origin

¹³ Directive (EEC) 86/363 of 24 July 1986 on the fixing of maximum levels for pesticide residues in and on foodstuffs of animal origin

tines about storage, treatment and documentation. The critical points regarding the use of antibiotics must be particularly observed. If any failures or defects in using antibiotics are detected, the veterinarian will propose changes/improvements. The result of the visit is published in a report to the farmer with a copy to the slaughterhouse. Similar actions are taken in the other Nordic countries.

5.3.4.2 Handling of unclean animals for slaughter

The requirements for animals to be clean is referred to in several parts of the hygiene rules, based on the substantial proof that unclean animals have been the source of carcass contamination and subsequent food poisoning.

It is the obligation of the farmers to take adequate measures, as far as possible, to ensure the cleanliness of animals intended for slaughter.

Slaughterhouse operators must establish procedures which ensure that each animal or, where appropriate, each lot of animals accepted onto the slaughter premises is clean.

The official veterinarian must, as part of his official tasks, verify that the food business operator complies with this requirement in order to ensure that if the hide, skin or fleece conditions of the animals are such that there is an unacceptable risk of contamination during slaughter, then they are not slaughtered for human consumption unless they are cleaned beforehand.¹⁴

The Commission has developed a guideline regarding specific subjects in the Regulation on food products of animal origin, specifying different means of reaching the objective “clean animals”.

With the exception of Iceland and Denmark, the Nordic countries have a system for handling unclean animals with a penalty fine system directed at the primary producer. From a practical point of view, it might not be realistic to completely avoid reception of unclean animals for slaughtering. Minimising the number of unclean animals is achieved by, for example, fining the primary producer and/or an assessment of whether there is a need for specific precautions to be taken during slaughtering.

5.3.4.3 Hygiene control

Hygiene control includes all measures that aim at ensuring the safety of meat in slaughterhouses. The slaughterhouse performs in-house control, which includes General Hygienic Practice (GHP), General Manufacturing Practice (GMP) and HACCP. These form the basics of the hygiene in slaughterhouses and have to be adhered to stringently. Errors in in-house control can lead to increased contamination of the carcasses with faecal or environmental contaminants. The adequacy of the in-house control

¹⁴ Regulation (EC) 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption, Annex 1, Section II, Chapter III, A 3

must be evaluated regularly, and improved when necessary. The official veterinarian performs supervision of hygiene control and inspects the quality of the in-house control regularly. The hygiene control in meat producing facilities is demanding due to the complex nature of meat and the meat producing chain. The hygiene control requires sufficient knowledge of zoonoses, meat hygiene and meat production. In Finland, official hygiene control is considered to be one of the main tasks of official veterinarians (Rahkio 1998) and hygiene control consumes about 30 to 40% of the working time of the official veterinarian (Lundén et al. 2006). Hygiene control should primarily be carried out as audits and should be included in a risk-based meat inspection that enables production of safe meat. The presence of official control in general is important, and the amount of the official control appears to be critical for a functional and effective control (Källström 2006).

5.3.4.4 GHP, GMP and HACCP

According to the Codex definition, GHP is: “All practices regarding the conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain”, while GMP, according to Institute of Food Science and Technology (IFST), London, UK, is “That combination of manufacturing and quality control procedures aimed at ensuring that products are consistently manufactured to their specifications”, which often includes hygiene practices. HACCP in slaughterhouses with successful implementation of GHP and/or GMP is an efficient tool to perform and survey slaughter hygiene. One example is the degree of cleanliness of the animals before slaughter.

The food business operator should check the visual cleanliness of the animals before slaughter. Unclean animals should be handled suitably to avoid contamination of the carcass. Surface carcass contamination is primarily a hygiene process issue, and can be reduced through a more preventative approach, based on systematic development and implementation of GHP/ GMP and HACCP. Microbiological monitoring at the end of the slaughter line verifies the efficacy of this system.

Slaughter of animals is an open process with many opportunities for contamination of the carcasses with potentially pathogenic bacteria. The process includes some process steps where the bacterial numbers may be reduced, but does not contain any point where hazards are completely eliminated. However, since faeces might contain pathogens such as *Salmonella*, *Campylobacter*, *E. coli* or others, prevention of contamination of the carcass with faecal material is important. Control of absence of faecal contamination of the carcass is performed in slaughterhouses in Nordic countries. Chilling of carcasses prevents the growth of pathogens such as *Salmonella* and is therefore often selected by the establishment as a Critical Control Point (CCP). However, improved slaughter hygiene, such as sealing off of the rectum with a plastic bag immediately after it

has been freed (CCP), can significantly reduce the spread of *Y. enterocolitica* to pig carcasses (Andersen, 1988; Nesbakken et al., 1994). According to data from the Norwegian National Institute of Public Health, the occurrence of human yersiniosis has dropped significantly after the introduction of the plastic bag technique in the main slaughterhouses slaughtering more than 90% of the pigs in Norway. Danish investigations have shown that removal of the unsplit pig head (including the tongue) as early as possible in the dressing process may improve the general microbiological status of the carcass, compared with the traditional method where the tongue is removed with the plucks and the head is inspected in accordance with the post-mortem inspection procedure (Christensen et al., 1994; Petersen et al., 2002).

5.3.4.5 Technologies for treatment of carcasses

While various other techniques for reducing carcass contamination are used in North America, these have not yet been accepted in the EU. The use of some of these techniques could have a beneficial effect by reducing the incidence of human foodborne illness.

According to the Regulation on specific hygiene rules for food of animal origin¹⁵, article 3, point 2, the use of potable water or water as defined in the Regulation on the hygiene of foodstuffs¹⁶, annex II, chapter VII, point 3 and 5, is allowed. Use of high temperature water or steam vacuuming has proved to be an efficient preventive measure (Tarp, 2004).

Treatments of carcasses with hot water or steam can, if HACCP, GHP/ GMP has been established and functions effectively, prove useful in reducing accidental or unnoticed contamination, especially of faecal origin and that may contain pathogens (Sofos et al., 1995).

The use of hot water or steam on whole carcasses would have an important impact on reduction/elimination of agents such as VTEC on beef and sheep carcasses, *Y. enterocolitica* on pig carcasses and *Salmonella* on carcasses of all species. Today, this approach is probably one of the most efficient tools against VTEC, as the epidemiology has not yet been clarified in detail. Such a tool might be used when interventions such as categorisation at herd level, or general slaughter hygiene, do not solve an emergent human health problem.

¹⁵ Regulation (EC) no 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin

¹⁶ Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs

5.3.5 Other possibilities for risk management

Risk management should be considered from the “table to farm” perspective, i.e. from which pathogens do humans become diseased and with which products (processes etc.) are these pathogens associated, and where in the whole chain will it be most beneficial to intervene. Decision-making tools like cost-effectiveness or cost-benefit analysis may prove useful in order to choose where in the chain the risk management should be implemented. This means that it may be relevant to manage a risk after the slaughterhouses e.g. at a cold store (freezing), a meat product plant (heat treatment or use of hurdles like curing etc.) or information to the consumer (e.g. labelling).

Cross-contamination within production of meat and meat products related to different species or different states within the same species handled

Possibilities exist for cross-contamination between different species when, for instance, sows are slaughtered and dressed at the slaughter line used for cattle. In this case the possibilities exist for cross-contamination of beef carcasses with pathogenic *Y. enterocolitica* and pig carcasses with VTEC.

Similar cross-contamination is possible when the same facilities within the de-boning department are used for different species, and when the same tools and the equipment are used for grinding meats obtained from different species.

Also, different states of zoonotic agents within one species such as *Salmonella* is a challenge for the meat industry, and the possibilities for cross-contamination are similar to the cross-contamination related to different species, often starting during transport to the slaughterhouse if different herds are mixed on the same truck.

5.3.5.1 Freezing

Freezing might be used to inactivate cysts of *Toxoplasma gondii* (Lund, 2000). These cysts are more readily inactivated than the larvae of *Trichinella spiralis* (Kotula et al., 1991). The EU requires that imported pig carcasses that have not been inspected for *Trichinella* must be submitted to a freezing procedure, e.g., storage at -25°C for 240 to 480 hours depending on the size of the cut or carcass, in order to destroy the larvae. However, some of the arctic variants of *Trichinella* survive freezing. Also, *Trichinella* in horses seems to be more resistant to freezing. *Campylobacter* is usually relatively sensitive to adverse conditions, but might survive for days or weeks depending on physiological conditions and the origin of the meat (Lund, 2000).

5.3.5.2 Meat processing

Meat processing (e.g. heat treatment, curing, drying, fermentation etc.) might be used to eliminate, reduce or control various pathogens. It is important to consider:

- The status of the raw material
- The recipe; use of ingredients (e.g. salt) and additives
- The effect of the production process, including possibilities for recontamination (e.g. handling of stabilized products)
- The packaging method
- The intended use by the consumer, e.g. ready-to-eat products, vulnerable consumer groups

5.3.5.3 Labelling

Labelling should provide the consumer with the correct handling instructions, according to the risk, without discrediting the product. A good example of this is the Commission Regulation (EC) 2073/2005 on microbiological criteria for foodstuffs which states: “When the requirements for *Salmonella* in minced meat, meat preparations and meat products intended to be eaten cooked of all species set down in Annex 1 are fulfilled, the batches of those products placed on the market must be clearly labelled by the manufacturer in order to inform the consumer of the need for thorough cooking prior to consumption”. If 25 g *Salmonella* samples are taken, this labelling requirement does not apply.

5.4 Risk-based approach as regards staffing, tasks and frequencies of official control

The general Regulation of official controls¹⁷ that was applied from 1 January 2006 sets out the framework for frequencies of official control. The control must be performed regularly, and with a frequency determined by a risk assessment.

The same principle applies for the official control on products of animal origin and as laid down in Regulation of official controls on products of animal origin¹⁸.

The legislation of official control on fresh meat is more general than previous legislation¹⁹, and has a risk-based approach. The official control

¹⁷ Regulation (EC) 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure compliance with the feed and food law, animal health and animal welfare rules

¹⁸ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption

¹⁹ Council Directive (EEC) 64/433 of 26 June 1964 on health problems affecting intra-Community trade in fresh meat

is mainly established on auditing of HACCP-based company programmes, except for those tasks that are related to inspection of slaughter animals; i.e. ante- and post-mortem inspection. The risk-based approach means, among others, possibilities for visual inspection of slaughter pigs and risk-based surveillance for *Trichinella* in slaughter pigs.

One of the aims of the Regulation of official controls on products of animal origin is that the nature and intensity of the official control should be based on an assessment of public health risks, animal health and welfare. The competent authority must ensure that they have sufficient official staff to carry out the official control that is required in the said Regulation. When assessing the quantity of official control, it must be ensured that the official control must remain functional and that confidence in the official control is maintained. Considerable problems threatening food safety may occur if the official control is not functional (Källström 2006).

5.4.1 Risk-based approach - slaughterhouses

A risk-based approach means an approach where the ante-mortem and post-mortem inspection are focused on the actual risk posed to human health. Also the inspection provides the basis of trade and export (animal health). Animal welfare should also be controlled. However, in contrast to current procedures, less focus, would be given to production diseases, e.g. pathological abnormalities.

According to the Regulation of official control on products of animal origin, ante-mortem and post-mortem inspection are still tasks for the competent authority, except for poultry, where company staff, under certain conditions, can perform specific inspection tasks.

Ante-mortem inspection must, in particular, determine whether there is any sign that welfare has been compromised, or any condition which might adversely affect human or animal health, paying particular attention to the zoonotic diseases and diseases on List A or, where appropriate, List B of the Office International des Epizooties (World organisation for animal health, OIE).

Post-mortem inspection must be performed on all carcasses and related offal immediately after slaughter. All external surfaces must be viewed. Minimal handling of the carcass and offal, or special technical facilities, may be required. Again attention should be particularly directed to the detection of zoonotic diseases and diseases on OIE List A and, where appropriate, OIE List B. The speed of the slaughter line and the number of inspection staff present should be such as to allow for proper inspection.

The competent authorities must ensure that at least one official veterinarian is present in a slaughterhouse throughout both ante-mortem and post-mortem inspection. Based on risk assessment, the competent author-

ity may derogate from this approach for certain animals under certain conditions.

A risk-based approach shall be followed to assess the number of official staff needed on the slaughter line in any given slaughterhouse (See 2.1.1). Table 5.3 summarises the aims, targets (the risk) etc. related to ante-mortem and post-mortem inspection in order to illustrate a risk-based approach.

Table 5.3. Overview of relevant factors related to effect of ante- and post-mortem (AM and PM) inspections

Aim	Target (risk)	Where to monitor?	For whom is the information relevant?	Level of detection at AM	Level of detection at PM
Consumer protection (food safety)	Zoonosis	Surveillance pre-harvest & post-harvest (bacteriology, serology & hygiene) (AM/PM) ¹	Authorities Industry	Low	Low
	Chemical residues	Surveillance (AM/PM) ¹	Authorities Industry	Low	Intermediate
	Other contaminations (e.g. faecal)	HACCP programme (hygiene) (PM) ¹	Authorities Industry	Low	High
Guarantee export/trade	OIE list A diseases (relevant OIE list B diseases)	AM/PM	Authorities Industry	High	Low
Animal welfare	Clinical inspection	AM/(PM)	Authorities Farmers	High	Low
Animal health (except OIE list A diseases and relevant list B)	Production diseases	AM/PM	Farmers	High	High

¹Monitoring is often performed at herd level (surveillance programmes) or at slaughterhouse level (hygiene), see chapter 5.4. Surveillance for residues is not performed as a part of the ante- and post-mortem inspection. However carcasses might be taken for analysis if there is a suspicion of chemical contamination.

From Tables 1.1 and 5.3 it can be seen that risk management of zoonoses is mainly performed at other points in the food chain than at the ante-mortem and post-mortem control. From Table 5.3 it can also be seen that at post-mortem inspection the level of detection for zoonoses, residues of unwanted substances and contaminants is very limited. However, faecal contamination, for example, may be detected through visual inspection. It should be mentioned that this control is often a part of the establishment's HACCP-system. Information on control of zoonoses is relevant for the authorities (as representatives of the public) and the industry.

Ante-mortem inspection is valuable in surveillance of notifiable diseases like OIE list A diseases and relevant OIE list B diseases. Conversely, the post-mortem inspection is of lesser value in this context. It is important to notice that surveillance for notifiable diseases is a guarantee for trade, both within and outside the EU.

Control of animal welfare is carried out as a part of the ante-mortem inspection. This information is relevant for the authorities and farmers.

Control of production diseases, pneumonia, abscesses etc. has traditionally been performed as part of the post-mortem inspection, since it has been focused on pathological abnormalities. However, in a risk-based approach, such surveillance should be minimised or modified since the information is relevant for the farmers only. Demand analysis, e.g. cost-effective analysis, should form the basis for the amount of such surveillance. Such surveillance, if selected should be financed by the users themselves.

As previously mentioned, handling of carcasses should be minimized to reduce the risk of contamination of the carcasses with pathogens. Therefore, visual inspection is preferable (chapters 1.4, 2.1.1 and 5.4.2). Visual inspection of the carcass and parts thereof (the plucks and the guts, including spleen etc.) should be performed. Depending on practical circumstances related to the slaughter line, it will often be necessary to have around 3 inspectors performing the visual inspection at the slaughter line, one inspecting carcasses, one inspecting the plucks and one inspecting the guts. However, staffing should be adapted to the local facilities.

Two valuable reasons for implementing a visual control system are the potential for decreased cross-contamination (i.e. no handling, cutting and incision) and reduced inspection costs.

The consequences of changing from a traditional meat inspection procedures, including manual handling, palpation and incision, to an entirely visual post-mortem inspection procedure have already been assessed in Danish slaughter pigs, by a comparative study of the two methods, including 183,383 slaughter pigs (Mousing et al., 1997). The results of this study generally revealed only small differences in non-detection rate for all classes of lesions, including those that are detected visually in both systems, for example chronic pleuritis.

5.4.2 Visual inspection of slaughter pigs

In the Regulation of official controls on products of animal origin, visual post-mortem inspection only of fattening pigs is a new possibility compared with the former legislation, which required visual inspection, palpation and incision. It is anticipated that visual inspection only generally will reduce the total time used to inspect a unit, i.e. the time used for inspecting a carcass, a pluck-set or gut-set etc.

The requirements for visual inspection of fattening pigs are linked to three specific conditions, which may be decided by the competent authority: relevant epidemiological or other data from the holding must be in place and considered, the pigs reared in an integrated production system, and under controlled housing condition.

The legislation neither specifies nor clarifies the three conditions, but postpones the matter to a later decision²⁰. Until then, the competent authority must decide which practical conditions should apply. It is recommended that the practical conditions are decided on the basis of opinions, such as that of the Scientific Committee on Veterinary Measures relating to Public Health²¹. Furthermore, any decision should be based on the zoo-sanitary status of the country or region. The following exemplifies the conditions that should apply in Denmark in particular, but with minor modifications the principles could apply in all Nordic countries.

5.4.2.1 Relevant epidemiological or other data from the holding

Fattening pigs must come from areas free of bovine and human tuberculosis in the pigs, and from herds free of brucellosis (*Brucella suis* and *Brucella abortus*). The slaughterhouse and authority at the slaughterhouse must have access to all results from the meat inspection and tests representing all herds from the pigs' origins. Finally, meat inspection data must cover a minimum of the previous 12-months prior to slaughter.

5.4.2.2 Controlled housing condition

Every movement of the animals to and from the holding, every input of feed and access to the holding from abroad, must be registered or controlled by the operator.

5.4.2.3 Integrated production system

Stakeholders must be unambiguously identifiable to each other. Written procedures for delivery of animals, feed etc. to and from the holding must be in place. Transparency and traceability must be stringently maintained. Efficient systems for exchanging relevant data between the parties must be in place. Safeguards must be put in place to protect the integrity of the system. Supervision and ongoing risk assessment must be carried out regularly.

In Iceland, lamb carcasses for the domestic market are inspected visually for contamination and pathological changes, externally and internally in the thoracic cavity, abdomen and pelvic cavity. The subiliaca, cervicalis superficialis, inguinal and popliteal lymph nodes are palpated. No incisions are made unless there is a suspicion of pathological changes,

²⁰ Regulation No 854/2004, article 18, point 12: Implementing measures may be laid down for fattening pigs, criteria for controlled housing conditions and integrated production systems

²¹ Opinion of the Scientific Committee on Veterinary Measures relating to Public Health on Identification of species/categories of meat-producing animals in integrated production systems where meat inspection may be revised (20-21 June 2001)

and if it is considered necessary to decide if the carcass and the organs shall be condemned.

The organs and the omental fat are inspected visually, and the lungs, livers and spleens are palpated.

Lamb heads are not skinned and are only inspected visually.

In Iceland no diseases occur that are related to lamb heads and which could render the carcass or the offal unfit for human consumption and would not be discovered by inspection of the carcass and the offal.

Lamb heads are a national dish in Iceland. Skinning of the heads would destroy this national dish. Lamb heads have been collected and used in this manner for centuries, and since the first slaughterhouse in Iceland started operating in 1902, have only ever been inspected visually at ante- mortem inspection, except for a short period during the 1970s and 1980s at some export-approved slaughterhouses.

Carcasses and organs of cattle and pigs are inspected in the same way after the carcasses have been split.

As cysticercosis has never been found in Iceland, incisions are not made routinely in chewing muscles and the hearts of cattle. *Trichinella spiralis* has never been detected in Iceland routine control of trichinosis in pigs does not occur in Iceland. All horse meat for export is screened for trichinosis.

Human and bovine tuberculosis were not found in livestock in Iceland in screenings during the last century and therefore incisions of lymph nodes in meat inspection are not routinely made to examine for tuberculosis.

When slaughtering for the export market, the meat inspection is carried out in accordance with the relevant requirements of the exporting countries.

5.4.2.4 Initial experiences from pilot projects

In Sweden, visual inspection of pigs was introduced as a project in April 2006 and running for 6 months. The project involves four slaughterhouses, and the total number of pigs is estimated to at least 200 000. The Swedish Animal Health Service is conducting assessment and certification at farm level. Possible findings of pathological lesions are investigated and documented at the point of de-boning of carcasses. After the project period, an evaluation will be made of the findings at post-mortem control, possible improvements in the efficacy of inspection, and the ergonomic conditions for the control personnel.

A Dutch project on visual inspection of slaughter pigs has been operating in one slaughterhouse since April 2006. Although the experiences have not been officially documented yet initial reports indicate the following:

- Qualification of pigs for visual slaughter: Pigs must be raised under a Code of Practice system accepted by the slaughterhouse (company) and certified according to ISO EN 45011; additional control measures at the farm with respect to *Mycobacterium avium* is obligatory (18 blood samples must be negative); information concerning feed, and the feed supply if home mixing is applied, must be delivered to the slaughterhouse for each batch of slaughter animals; Food Chain Information (food safety matters observed at the farm and also administration of drugs during the last 60 days of production) must be supplied; status of post-mortem observations from previous slaughtering has to be in place before slaughtering.
- Staffing: At a common line-speed of 650 pigs per hour, the number of inspectors at post-mortem inspection are reduced from 12 to 6 inspectors, taking into account also the time that the inspectors are off the line for resting etc. (40 minutes inspection and 20 minutes off). In such an inspection cycle there is one inspector at the plucks and the intestines, and two inspectors at the carcasses. Additionally, there is one inspector at the rework platform and two inspectors off (resting 20 minutes). Two veterinary officers and one senior inspector must be present for supervision and for other hygiene inspections.

The Dutch authorities are planning an international seminar for interested organisations and countries this autumn (2006), where the results of the project will be presented and discussed.

5.4.3 *Trichinella status*

Another changed post-mortem inspection procedure is the possibility to derogate from the requirements on examination of all pig carcasses for *Trichinella* towards a risk-based surveillance. According to the “*Trichinella* legislation²²”, herds or regions can be classified as “*Trichinella*-free herds” or “regions with a negligible *Trichinella* risk” under certain conditions, and provided that the status can be documented and monitored. In Sweden a project is planned to start at the end of 2006 with *Trichinella* free herds. Preparation is already in place, with investigations of *Trichinella* prevalence among foxes and other wild species. The project will be a continuation of the ongoing project with visual inspection of pigs.

5.4.4 *Further adaptations of post-mortem inspection procedures*

It is important to realise that the Regulation of official control on products of animal origin provides the possibility to make further simplifica-

²² Commission Regulation (EC) No 2075/2005 of 5 December 2005 laying down specific rules on official controls for *Trichinella* in meat

tions and/or changes within ante- and post-mortem inspection procedures etc.

One example of further simplification or change of the post-mortem inspection procedures is removal of the unsplit pig head as early as possible in the dressing process.

Danish investigations have shown that removal of the unsplit pig head (including the tongue) as early as possible in the dressing process may improve the general microbiological status of the carcass, as compared with the traditional method, where the tongue is removed with the plucks and the head is inspected in accordance with the post-mortem inspection procedure. The consequences for human and animal health of the change from traditional meat inspection to a visual inspection of an unsplit head with the tongue left inside, or even not inspected, was evaluated in a Danish investigation in 1999 (Petersen et al., 2002). In a large-scale survey, more than 3.2 million pigs were inspected and the lesions found recorded. Approximately 0.11% of slaughter pigs were found to have lesions in the mouth, throat or tongue, but in 99% of these cases, these lesions did not influence the assessment of the carcass and viscera. A total of 37 carcasses were detained for further examination, but most of the lesions in the heads of these carcasses would not have been detected without splitting the head.

It is concluded that leaving lesions in the head undiscovered would be of negligible importance either for human health or for the overall supervision of animal health, compared with the impact on improved food safety.

5.4.5 Cutting plants

The frequency of official control in cutting plants must be as often as needed to ensure fulfilment of the legislation. In the former fresh meat directive, official inspections had to be daily. The official control of meat (e.g. cutting plants or cutting at slaughterhouses) is mainly based on audit of the own check systems, based on HACCP, instead of the previous more specific and direct day-to-day control. The nature and intensity of auditing tasks at the individual establishments is dependent upon the assessed risk. In Denmark and Finland, the competent authorities have developed a guideline on audit frequencies²³ due to the requirements laid down in the legislation of official control. This guideline is based on generic risk assessment and takes into account risk factors for determination frequencies of official control in different types of food establishments. A similar system will be established in Sweden.

²³ Danish Veterinary and Food Administration, Guideline to audit frequencies of 16 December 2005

5.5 Professional qualifications of meat inspection personnel training programmes for both veterinarians and technicians

The Regulation of official control on products of animal origin is based on risk assessment and science-based methods and includes a description of the important role of the official veterinarian in meat inspection. New and relevant training programmes for both veterinarians and technicians working in meat inspection must be proposed at the national level in order for them to achieve the relevant and necessary qualifications according to the above regulation.

In Denmark, a two-day course for the official veterinarians has been organised. The course will mainly address principles, concepts and methods of risk-analysis. In planning the two-day course, an evaluation of the existing veterinary education has been carried out, and the training programmes which are set up within the frame of competent authorities has also been included as part of the strategy for developing the necessary competence for official staff. A three-day course for the official auxiliaries (technicians) is planned and will mainly focus on primary production and visits to primary producers (farms).

The Finnish veterinary curriculum is strongly focused towards food hygiene and safety. The veterinary students receive wide knowledge in food safety from 'stable to table' (Korkeala et al., 2003; Lundén et al., 2006). Therefore the curriculum requires only minor adjustments in order to fulfil the requirements for official veterinarians. Further training of official veterinarians is organized annually for about 8–10 days. A new training programme was started for official auxiliaries in 2005.

In Iceland, all veterinarians are qualified from veterinary universities abroad, mainly in Norway, Denmark, Sweden, Germany, Austria and Scotland. The scope of education in the various universities may differ somewhat, and the need for improvement in the training of the veterinarians qualifying in the near future will depend on the degree to which the various universities meet the EU requirements.

Icelandic veterinary authorities have run a number of courses for veterinarians employed by the Icelandic Veterinary Services during the last few years, including courses in meat inspection, own control in food establishments with emphasis on meat establishments, methodology of auditing, and of supervision. This educational programme must be continued and an additional course is planned in risk assessment and epidemiology for veterinarians currently working in meat establishments.

In Norway, a two-week course has been launched for official veterinarians in slaughterhouses. The main focus of this course is the principles, concepts and methods of risk-analysis, population dynamics of infection and intoxication and diagnostic epidemiology. The existing veterinary education has also been evaluated.

In Sweden, all slaughterhouse veterinarians have attended a four-day course regarding the Regulation. The courses were held between August and December 2005. Two-day courses for auxiliaries were held during the first half of 2006. In 2004, courses in auditing and HACCP (2+2 days) were provided for all veterinarians and most auxiliaries.

5.6 Cost-effectiveness and cost-benefit aspects

It is important for society that resources, within both government and industry, are used optimally. Cost-effectiveness (CEA) and cost-benefit analysis (CBA) can be used as decision-support tools, since these are systematic approaches to illustrate the relationship between costs and their effects or benefits.

Such tools can be used, for example, before implementing new interventions or action plans for combating zoonoses, or when evaluating existing action plans or interventions.

In some countries (e.g. USA), use of CEA or CBA is already an integrated part of rule making, since economic consequences are evaluated in association with proposed rules. In the USA, for example, comparison of costs and benefits has been recommended since the Roosevelt administration²⁴. There is a large body of literature available dealing with CBA, some of which dates back to the 1920s, when large-scale engineering projects in the US required some degree of project evaluation (Wolff and Haubrich, 2006). Some Nordic examples are described below.

5.6.1 Cost-effectiveness study on Danish interventions on herd and slaughterhouse level

The overall goal for the current Danish *Salmonella* control programme is to reduce the *Salmonella* prevalence in pork from 1.7% in 2001, to a maximum of 1.2% in 2006. In order to achieve this, a new strategy needed to be developed and implemented. The Danish swine industry is covering the majority of the expenses of the control programme, and therefore the industry decided to conduct a cost-effectiveness study in order to achieve the optimal *Salmonella* reduction at the lowest possible costs.

A number of scenarios for measures along the food chain were established. For each of the scenarios, the effect on the total *Salmonella* prevalence in pork, as well as the feasibility and the costs were estimated. It was concluded that further pre-harvest initiatives would not be cost-effective, as compared with post-harvest measures. Furthermore, none of

²⁴ Executive order 12991, signed by President Reagan in 1981, later codified CBA as a requirement for agencies when conducting risk assessments in health, safety and environmental regulation (Smith 1984; PCCRA 1997; for the UK: HM Treasury 1997)

the pre-harvest scenarios would give a sufficient reduction in the *Salmonella* prevalence in pork by 2006 to attain the level agreed with the authorities (Nielsen et al., 2005).

5.6.2 Economy-wide effects of the Danish Salmonella control programmes

The total direct costs of the *Salmonella* Control Programmes have amounted to around 200 million euros over the last decade. In return, the number of human *Salmonella* infections has been reduced by around 200,000 calculated cases, where it is assumed that 10% of the total numbers of cases are registered. These are large numbers, and from a social welfare point of view it is important to assess the economic implications of this new public policy on food safety. The economic impact of the Danish *Salmonella* Control Programmes was evaluated; in particular it was attempted to:

- Provide a quantitative assessment of the economy-wide effects of the *Salmonella* Control Programmes, including direct and derived effects as well as long term economic consequences (thereby applying a new analytical tool to food safety research questions),
- Compare the economy-wide consequences with direct economic effects that are traditionally included in evaluations of public food safety policies (thereby evaluating the usefulness of the new analytical tool).

The overall implementation of the *Salmonella* Control Programmes caused direct net costs to society of close to 750 million DKK over the period 1995–2002. Among others, the analyses show large differences in the cost-effectiveness of the individual *Salmonella* Control Programmes for pig, poultry and table eggs, respectively, which indicates potential in optimisation in the formulation of the Danish food safety public policy, as perceived from an economic efficiency viewpoint. The analysis provides rough estimates of costs per avoided human infection as follows: 2,000 DKK per avoided infection from eggs; 10,000 DKK per avoided infection from poultry; and 16,000 DKK per avoided infection from pork. It has been stated that, based on further research, it will be possible to recommend concrete prioritisation in order to obtain the greatest benefit to human health (Andersen and Christensen, 2006).

*5.6.3 Cost-benefit aspects connected to a possible categorisation of *Y. enterocolitica* in pigs and *Toxoplasma* in sheep*

Possibilities for risk management by categorisation of *Y. enterocolitica* in pigs and *Toxoplasma* in sheep have been previously described (Section

5.3.3), but the frequent occurrence of these agents within their respective host species make such categorisation very expensive. However the effects of risk management for *Toxoplasma* in particular, may have such significant consequences for pregnant women and their foetuses that possible interventions, including categorisation and freezing of positive carcasses or meat products at risk, should be evaluated from a cost-benefit perspective.

In the case of *Y. enterocolitica* in pigs, one efficient intervention is probably at herd level, but interventions in the slaughterhouse (such as removal of the unsplit pig head as early as possible in the dressing process) and improved slaughter hygiene (such as sealing off of the rectum with a plastic bag immediately after it has been freed) are probably more cost-effective (Andersen, 1988; Nesbakken et al., 1994). The use of hot water or steam on whole carcasses would have an important impact on reduction or elimination of *Y. enterocolitica* on pig carcasses. In conjunction with good slaughter hygiene, this approach is probably the most efficient and cost-effective tool against *Y. enterocolitica* (Sofos et al., 1999).

5.7 Future needs

5.7.1 Risk assessment

In order for meat inspection to be more risk-based, risk assessments are needed to form the basis. One example is to discontinue traditional meat inspection, involving palpations and incisions, in favour of visual inspection combined with measures optimising the hygienic quality of the slaughter processes, and rapid tests for microbial contamination. This approach to meat inspection will definitely reduce cross-contamination, and thereby improve food safety by significantly reducing public health hazards.

Another example is the need to perform a risk assessment for visual inspection in order to investigate alternative procedures, serological or other laboratory tests, that provide guarantees at least equivalent to the specific post-mortem procedures in the current Regulations.

Additionally there is a continuous need to perform assessments on agents that cause human disease, and which can be controlled at the slaughterhouse, farm etc.

5.7.2 Development of diagnostics tools in meat inspection

Zoonotic agents can be tackled at more than one point in the meat chain. A combination of preventive measures at both farm and slaughterhouse levels would give a strong basis for elimination of zoonotic agents. Effective and reliable diagnostic tools designed for the slaughterhouse, would

improve the intervention capabilities at this level. Such diagnostic tools should include rapid methods for detection of zoonoses that are not diagnosed in slaughterhouses today. Rapid methodology is available in food hygiene, but relevant applications for slaughterhouses are not available. However, reliable and rapid methods for detection of zoonotic agents e.g. VTEC would be of high value in a risk management context.

5.7.3 Cost-effectiveness analyses and cost-benefit analyses to make optimal risk management

It is important for society that the available resources (authorities and industry) are used optimally. Therefore risk management should be based on cost-effectiveness or cost-benefit analyses. In some countries (e.g. USA), use of CE or CBA is already an integrated part of rule making.

The use of CE and CBA should be supported in Europe and Nordic countries in order to make these tools a more integral part of decision making in the years to come.

5.7.4 Responsibilities of authorities and industry

The legislation of hygiene and official control applying from 1 January 2006 allows company staff to assist the official veterinarian with specific inspection tasks under certain conditions when slaughtering poultry.

In the years to come it can be expected that there will be an increasing interest for similar models to be used when slaughtering other species, like pigs or cattle, to optimise the use of available resources to gain an efficient system for food safety.

5.7.5 Automated methods to detect abnormalities in meat

In pigs, automated methods have been used primarily for assessment of some specific meat quality related parameters (e.g. grading, measurement of fat tissue or colour). In the future, alternative systems (e.g. computerised image analysis, data programmes connected to video screening at post-mortem inspection) might be able to replace some of the current post-mortem procedures. Such tools might detect abscesses and wounds, and other abnormalities connected to the suitability of the carcass.

5.8 Conclusions and recommendations

The concept of, and elements, in risk-based meat inspection are addressed and the future needs for pilot projects etc. are assessed.

Conclusions:

- The role of meat inspection as the most important risk management procedure in the meat chain, and also the possibility for cost-efficient risk management in the meat chain, has been assessed. In this context categorisation of herds and the use of other risk management options are discussed
- Risk-based meat inspection should have a food safety and food chain perspective, focusing on “table to farm” i.e. the relationship between those agents causing disease in humans with food products, processes etc.
- Risk-based meat inspection should include the use of practical risk management tools chosen on the basis of a cost-effective approach, in contrast to traditional meat inspection, which is based on the zoonotic diseases predominant 100 years ago
- In Nordic countries systems/registers, which cover the requirements for Food Chain Information between primary producer and slaughterhouse, are available, with the exception of information on use of veterinary medical products. Central registration on the use of veterinary medicinal products only occurs in Denmark.
- In general provision of all the information 24 hours before arrival of the animals at the slaughterhouse is not needed in Nordic countries. Some of the information will already be present (from animal health register, monitoring of zoonoses and monitoring of residues). Other information like herds of origin, number of animals, transport vehicle etc. will be detailed on the document that accompanies the animals.
- Visual post-mortem inspection should be implemented on slaughter pigs
- The cost-effectiveness study on Danish interventions at the herd and slaughterhouse level is important in this context. Another issue from this perspective is the possible implementation of hot water or steam on whole carcasses for reduction/elimination of emerging agents in comparison to intervention at herd level.
- New, reliable and rapid methods for detection of zoonotic agents, e.g. VTEC, would be of high value in a risk management context

Recommendations:

Cost-effectiveness analyses and cost-benefit analyses should be an integrated part of decision making to optimise risk management. Risk management should be considered from the “table to farm” perspective e.g. the relationship between those agents causing disease in with products

(processes etc.), and where in the entire chain it would be most beneficial to intervene.

- The use of hot water or steam on whole carcasses would have an important impact on reduction/elimination of agents such as VTEC on beef and sheep carcasses, *Y. enterocolitica* on pig carcasses and Salmonella on carcasses of all species. Such a tool might be used when it is not possible to solve an emergent human health problem only by intervention at herd level and/or by general slaughter hygiene.
- A risk-based approach should be used when assessing the tasks and staffing for officials at slaughterhouses
- Existing resources within the competent authorities and industry should be as targeted as possible in order to obtain the most cost-effective risk management
- The routine exchange of information between competent authorities, slaughterhouses and organisations, in case of suspicion and/or presence of zoonotic agents, should be continuously assessed and improved. This work should be carried out in cooperation between the competent Nordic authorities and the organisations.
- Pilot studies on Food Chain Information should be initiated to gain experience on the system
- The proposed paradigm as a common Nordic model to fulfil the requirement for Food Chain Information where inter and intra community trade has been developed
- Based on risk assessment, visual inspection should also be possible in the future for cattle and lambs, including documentation of the effect on food safety
- Risk assessment of visual inspection should be conducted and compared with alternative procedures, including serological or other laboratory tests that provide guarantees at least equivalent to the specific post-mortem procedures in the current Regulation of official control of products of animal origin.
- The model for poultry inspection (responsibilities of authorities and industry) should be investigated and the use of a similar model considered for when slaughtering other species like pigs or cattle; this approach may maximise the effective use of available resources and provide optimal food safety
- Alternative systems (e.g. computerised image analysis) may be able to replace some of the current post-mortem procedures should be investigated

6. National projects

6.1 Food Chain Information, National project, Denmark, 2005 to date

In Denmark an internal working group was established in 2004 with the overall aim to formulate a report to be used as the basis for handling the requirements on Food Chain Information as laid down in the Regulation on food hygiene and official control²⁵. The purposes of the project were, among others, to clarify:

- Which relevant information needed to be provided
- How the procedures for exchange of information were to operate

The working group was also to consider and provide inputs to the Nordic projects on Food Chain Information.

Regulations on implementing measures, and transitional arrangements for Food Chain Information, have been issued, giving a four-year period for full implementation of the Food Chain Information system.

The experience gained within the working group on Food Chain Information, as well as the work on this subject as part of the Nordic project, has been discussed on an ongoing basis within an informal working group on modernisation of meat inspection. The group is established within the Danish Veterinary Administration and representatives from the meat industry are members as well as the competent authorities.

A draft report on Food Chain Information, handling and possibilities in a Nordic context, was drafted in close association with the discussion within the Danish working groups.

At the very beginning of the project on Food Chain Information, it was decided that pilot projects should be conducted in order to obtain some practical experience on how the proposed Nordic model was working in practice. Meanwhile, however, it was decided within the EU to make transitional arrangements with respect to Food Chain Information.

The Nordic model for Food Chain Information, as presented in 5.3.1 and Annex B of this report will be used as a basis for implementing Food Chain Information in Denmark. Further instructions to both food estab-

²⁵ Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 Regulation on hygiene of foodstuffs; Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin; (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption

lishments and competent authorities (official veterinarians) are in progress. In 2006 Denmark will initiate implementation of the system in specified establishments for both slaughter pigs and cattle in slaughterhouses approved for export (i.e. slaughterhouses which were approved for export according to the previous legislation). The emphasis will be on making the proposed model operational and practical, by using the existent information systems as much as possible.

Experience obtained will be used for further adjustment and be part of the report which Denmark has to provide to the Commission at the end of each year.

6.2 Food Chain Information project on lambs, National project, Iceland, 2005

6.2.1 *Project group*

Sheep farmers, slaughterhouse managers, local and central meat inspection authorities.

6.2.2 *Aim*

To test the efficacy of the following steps in the Food Chain Information system: a) identification of individual lambs on a sheep farm; b) documentation of necessary Food Chain Information on the farm; c) sending of the necessary information to the slaughterhouse; d) registration of the lambs at the slaughterhouse into the computer system; e) traceability of the product in the slaughterhouse, in cutting, and in shipping the product abroad.

6.2.3 *Farms and animals*

Sheep farms participating in the Sheep Farmers' Quality Management System.

6.2.4 *Identification of animals*

The lambs are identified with earmarks with individual numbers.

6.2.5 Documentation

- The farmers and the veterinarians register diseases of lambs and any treatment of them.
- Results of any samples relevant for food safety for instance *Salmonella*
- Results of the previous year's meat inspection

6.2.6 Sending of lambs to the slaughterhouse

A declaration was sent with the lambs to the slaughterhouse stating the following:

- Number of lambs sent and their individual numbers,
- Name and address of farm,
- Name of farmer.

The farmer signed a declaration stating that *Salmonella* had not been found in the flock, that the withdrawal period of any medical treatment had passed for all the lambs being sent to the slaughterhouse, and that any remarks of meat inspection in previous shipments and results of any samples relevant for the safety of the meat, had been declared.

6.2.7 Slaughterhouse

On arrival at the slaughterhouse, the slaughterhouse operator and the veterinary officer evaluated the information from the farmer. The lambs were registered in the slaughterhouse computer system in the restrainer before stunning.

On quality classification of the carcasses, a label was printed out with the individual number of the lamb registered into the computer at stunning. These numbers followed the carcasses in the slaughterhouse and in the cutting, thereby enabling the individual carcasses to be traced.

6.2.8 Time

The project ran at the sheep slaughterhouse in Husavik in Iceland from late August until late October 2005.

6.2.9 Conclusions

The recording of the ear tag numbers of the lambs required one extra employee on the slaughter line.

The use of ear tags that could be scanned into the computer system in the slaughterhouse would reduce errors in the reading and registering of the ear tag numbers.

An electronic system for registering the required data on the farm would be beneficial.

6.3 Food Chain Information, National project, Mid- and South-Rogaland, Norway, 2005

Within the scope of the main project and the “Hygiene Package”, representatives from the Norwegian Food Safety Authority and the meat industry have conducted a small-scale pilot project on Food Chain Information.

The Food Chain Information pilot project had the following members:

Norwegian food Safety Authority:

Ole Aamodt,
Eyolf Bakke-Erichsen,
Asbjørn Dalane.

Meat industry:

Terje Wester (Fatland)
Leif Grindheim (Gilde)
Gunnar Undheim (Matiq)

Project manager:

Jorunn Vormeland Dalen (Norwegian Food Safety Authority)

6.3.1 Food Chain Information – legal background

Food Chain Information is defined in the Regulation of hygiene for animal products:

“Food Chain Information” means all the information of relevance for the food business operator to contribute to hygienic slaughter conditions, to minimise cross contamination during the production process and to reduce risks for the consumer as well as all the information for the official veterinarian to properly assess the health, welfare and inspection requirements of the animals intended for slaughter. It includes the communication of inspection results back to the holding where the animals were raised before slaughter.

6.3.2 Aim of the pilot project

The aim of the project was to test the possibility of obtaining relevant Food Chain Information using simple means already in place, that is,

without using electronic information from the veterinarian and other relevant actors. Much information already exists; the challenge was to make it available in a useful and appropriate way.

Originally, the project was supposed to gather basic information that might be used to categorise the herds in addition to the information mentioned in H2. Such information would include, for example, the health status of the herd, animal welfare status etc. Categorisation based on such data, might, perhaps, considering the transport time to slaughter, increase the efficiency of both the plant and the authorities, because some herds would need less control. Such a scheme would presuppose certain control programmes on, for example, wild fauna. However, the project group concluded that this would be impossible within the limited timeframe of the pilot project.

6.3.3 Scale of the project

The project was carried out in one region of a Norwegian county, and comprised three slaughterhouses and all species normally slaughtered in Norway (cattle, sheep, goats, horses and pigs).

6.3.4 Project period

The project was intended to start in May/June 2005 and continue until 31st December 2005.

6.3.5 Information flow

6.3.5.1 Information from the farmer to the slaughterhouse

The project had a short timeframe, and it was therefore necessary to have a limited scope that was possible to implement within these constraints. Therefore, the project group decided not to survey herds regarding certain diseases. Furthermore, the group decided to take advantage of the following facts:

- The basic information regarding the farmer already exists in the slaughtering plants
- Information regarding feed and keeping of the animals exists at the farm (The Agricultural Quality System - KSL), and may be provided when/if needed
- It is the discrepancies from the normal that are of interest to the slaughterhouse management and the authorities, only these should therefore be reported

Given the above, answers to the following questions were obligatory in the project:

- Is the herd under official restrictions of any kind?
 - If yes, why?
- Have any of the animals intended for slaughter been ill during the last 60 days?
 - If yes, what kind of illness?
- Have any of the animals been treated for diseases during the last 60 days?
 - If yes, what kind of treatment? (name of the drug)
 - How long is the withdrawal period?

The project group did not want any more documentation than necessary, and the information is supposed to be given in the document that already accompanies the animal to the slaughterhouse or at registration before slaughtering, either by phone or electronically.

6.3.5.2 Information from the meat inspection/the authorities to the farmer

The relevant information was given by existing systems:

- Included in the accounts from the slaughterhouse,
- Herd Health Control System,
- Notes from the meat control on discarded meat.

6.3.6 Conclusions

The plants taking part in the project reported that asking for Food Chain Information at registration for slaughtering entails a great deal of extra work. In addition, it is challenging to explain to the farmers why it is necessary to have this kind of information.

Three slaughterhouses were involved in the project from the beginning, and were supposed to start asking for the Food Chain Information simultaneously (May/June 2005). However, one of the plants did not start the project until late autumn 2005, and this led to discontentment among the others, who stopped asking for the information for a period.

Due to these problems, the project was even less successful than expected. Only a few notes have been obtained from the farmers. Furthermore, the information is only occasionally forwarded from the slaughterhouse management to the official veterinarian. This may be due to the information appearing to be quite anonymous on the registration paper.

Despite these difficulties, the project provided some useful information, as follows:

- At least once information on diseases which are obligatory to report (like “ringworm” – *Trichophyton verrucosum*) was obtained, which provided the slaughterhouse with the possibility to collect animals from this farm at the end of the collecting route.
- It is important to have the information *before* the animals are collected at the farm, or arrive at the plant, in case, for example, the withdrawal period has not yet expired.
- There are substantial difficulties in obtaining the name or category of drugs and the withdrawal time, because this information is written by hand on the animal’s health card by the practitioner. Therefore, the information regarding treatment has been of minor usefulness. This information should be provided electronically by the veterinarian.
- The information on the note following the animals to the slaughterhouse is not possible to use statistically. This must be further developed when the Food Chain Information is fully implemented.

6.3.6.1 Factors necessary to achieve a successful Food Chain Information system

- Good dialogue between the farmers, the slaughterhouse and the authorities
 - Before this system is implemented for red meat (2007 and onwards), it is absolutely necessary for an information campaign to be conducted addressed to all the stakeholders, not least to show the benefits.
- An updated register for farmed animals (“Husdyrregisteret”)
 - The existing register is not optimal with regard to a future Food Chain Information system
 - The project group wishes that the official authorities, together with the farmers and the industry, develop an electronic system where all involved parties have access to both submit and receive the relevant information as follows:
 - The feed mill submits the feed that is delivered to the farm,
 - The veterinarian submits data on diseases, medical treatment, vaccination etc.,
 - The farmer submits data on parturition, moving of animals to or from the holding etc.
 - The system presupposes that all relevant information is submitted continuously (not allowing for a delay of up to several days in some instances)
- The Food Chain Information must, when possible, be at the slaughterhouse at least 24 hours before the arrival of the animals

(preferably when the lists are ready the week before), and any relevant information given to the official authority together with the lists of the animals for slaughter the following week. This will allow for the management and the competent authority to assess if it is necessary to take any precautions at collecting and slaughtering the animals, prepare sampling etc.

- An effective system for notifying diseases
 - The existing system for notifying animal diseases and zoonoses can be improved
- An effective system for notifying the use of veterinary drugs at farm level
 - The practitioner's writing on the animal's health card is often unreadable. The farmer will usually know which disease the animal has, and the withdrawal period of the drug. However the drug in question, will often be difficult to decipher
 - Further, it is burdensome to be obliged to have to go and check the health cards when the animals are registered for slaughter
 - Food Chain Information demonstrates the need for an electronic system which provides all relevant the information (including on feed, treatment etc) directly and at one place. Until such a system is in place, farmers and meat processors should demand from the practitioners that veterinary treatment is registered electronically.

6.4 *Toxoplasma* in lamb. National project in Iceland, 2004–2006

The aim of the project was to measure the prevalence of *Toxoplasma gondii* in lambs at slaughter, in order to estimate the risk of acquiring *Toxoplasma* infection from the consumption of lamb meat.

Furthermore the project was intended to investigate if the prevalence data gathered one year could be presumptive, i.e. whether data from one year could be used to estimate the risk of acquiring *Toxoplasma* infection from the same farm the second year.

In order to estimate of how presumptive the data could be from one year to the next, the same farms were to be tested in 2004 and 2005.

A total of 30 herds were selected randomly from farms that were slaughtering 50 lambs or more.

Blood samples were taken from lambs at slaughter, 15 samples per farm (12 samples from 1 farm). However, due to unforeseen problems in the second year samples were only received from 5 out of 30 farms.

Serum was collected and tested at the Institute for Experimental Pathology, Keldur, University of Iceland, for *Toxoplasma gondii* antibodies by the CHEKIT-Toxotest enzyme immuno-assay (EIA, Bommeli diagnostics TXT1135T).

Test results for individual samples were calculated and expressed as a % value. The results were interpreted as; *negative* (% value <20), *ambiguous* (% value 20–30), *weak positive* (% value 30–100) and *positive* (% value >100).

In 2004, 447 samples from 30 farms were tested, and in 2005, 75 samples from 5 farms were tested.

The results are shown in Table 1, both weak positive and positive animals are classified as positive in the table.

Table 6.1. Prevalence of antibodies to *Toxoplasma gondii* in slaughter lambs in Iceland

Year	Number of positive animals/total number tested (%)	Number of herds with at least one positive animal/total number tested (%)
2004	3/447 (0.67)	3/30 (0.1)*
2005	0/75 (0)	0/5 (0)

*Only one positive/weak positive animal per herd

The prevalence of *Toxoplasma gondii* in slaughter lambs in Iceland appears to be very low. In 2004, only 0.1% of the herds (3 herds) were positive, with only one sero-positive animal per positive herd. In 2005 we found no sero-positive herds, but unfortunately only 5 out of 30 herds tested the previous year were retested in 2005.

With so few repetitive tests it is not possible to assess whether information gathered one year can be presumptive and used to estimate the risk on the farm in the subsequent year.

There does not appear to be any geographic associations in prevalence of *Toxoplasma gondii* in slaughter lambs in Iceland as the farms tested were from different geographic regions.

A surveillance study in 1988 using haemagglutination inhibition tests to detect antibodies to *Toxoplasma gondii* in adult sheep gave very different results.

In that survey 417 adult sheep from 53 farms were tested for antibodies. The results showed that 32% of the animals and 45% of the farms were seropositive.

There is no information available on the prevalence of *Toxoplasma gondii* in adult sheep today and comparison of prevalence data for slaughter lambs and for adult sheep is problematic. In Iceland sheep are free ranging in the wilderness during the summer, and the risk of exposure of

lambs to *Toxoplasma gondii* during their first summer is likely to be very low.

It could be speculated that the majority of infected sheep in Iceland acquire their infections during their first winter when housed together with other adult sheep. The risk of acquiring *Toxoplasma* infection from the consumption of lamb meat should thus be low.

These are, however, only speculations and more research is urgently needed on the prevalence of *Toxoplasma gondii* in lambs and adult sheep in Iceland.

Vala Friðriksdóttir, Institute for Experimental Pathology, Keldur, University of Iceland (valaf@hi.is) was responsible for this investigation.

6.5 Categorisation of *Toxoplasma* in lambs based on historical data. National project in Norway, 2004–2006

Toxoplasma in lambs is used as an example of categorisation based on historical data. Of the 117 herds sampled in 2004, 98 were also sampled in 2005 to investigate how reliable historical data could be in this context.

Harald Waldeland, Wenche Torsteinbø, Eivind Smith, Eyolf Bakke-Erichsen and Truls Nesbakken have collaborated with this project.

6.5.1 Methods

Methods are described in Skjerve et al. (1998b).

6.5.2 Results

Table 6.2. Occurrence of antibodies against *Toxoplasma gondii*

Year	Number of positive animals/ total number tested (%)	Number of herds with at least one positive animal/total number tested (%)
2004	406/1123 (36)	102/117 (87)
2005	215/978 (22)	76/99 (77)

Table 6.3. Comparison of antibodies against *Toxoplasma gondii* in the same herds, tested in 2004 and 2005

Combination of serological data*		Number of herds (%)
2004	2005	
-	-	8 (8)
+	-	16 (16)
-	+	16 (16)
+	+	58 (59)
All		98

* herds with at least one positive sample is characterised as positive

In total, 59% of the herds had antibodies against *Toxoplasma gondii* in at least one animal both in 2004 and 2005. In 2004, 16% of the herds were characterised as positive, but were negative the following year.

6.5.3 Conclusion

There are a large number of positive herds in this region, and therefore the possibility for a wrong categorisation is high. Accordingly, a categorisation based on antibodies against *Toxoplasma gondii* in lambs is probably not a practical risk management tool in this region.

6.6 Pork quality. National project in Finland

Although most slaughter pigs in Finland are of good quality, some are of unacceptable quality suffering from arthritis, abscesses and weight loss. These animals are condemned in ante-mortem or post-mortem inspection. Poor quality of slaughter pigs affects the functions of the slaughterhouse in many ways, impinging on slaughter and meat hygiene, animal welfare and meat inspection. Slaughter pigs of poor quality can make the implementation of visual meat inspection difficult. Improved quality leads to improved slaughter hygiene and meat hygiene, possible reductions in staff numbers on the slaughter line and meat inspection, and improved animal welfare. The project aims were to produce criteria for animals that are not fit for transportation or human consumption. The material collected includes pictures of animals that will be condemned in ante-mortem inspection. The material will be used for educational purposes and distributed to slaughterhouses, official veterinarians, animal transporters, farmers and practitioners.

6.7 Conclusions

The national projects carried out under the Nordic umbrella have provided valuable information related to practical issues, such as use of historical data as a basis for categorisation of animals and dissemination of Food Chain Information at the regional level.

7. Pilot projects and future work

This project on modernising meat inspection in a Nordic context has in many aspects reached the goals, as described in chapter 1. However, more work is needed in order to utilise the possibilities within the EU Regulation so that a risk-based meat inspection system can be developed and instigated.

The project group included participants from both industry and authorities, and this has been beneficial to both industry and government. Since experiences from on-going pilot projects were exchanged during the project period, it was possible to adjust these projects continuously. Additionally, the individual Nordic countries did not each have to perform every pilot project, but every country could benefit from each other's experiences. Also, experiences from the Nordic project were continuously used in the finalisation of the EU legislation in this area.

It is therefore strongly recommended that this network, or a similar one, should be maintained. The network could be valuable and useful if or when more projects are initiated within the EU Regulation and will enable the participating countries to divide different pilot projects between each other, whilst continuing to participate in the open exchange of knowledge and experiences during the projects. Furthermore, for a variety of reasons, such as export status etc., it is unnecessary for all pilot projects to be run in every country.

7.1 Needs and interests in the different Nordic countries

7.1.1 Denmark

7.1.1.1 Visual meat inspection of cattle

The most important goal in modern meat inspection is to prevent transmission of zoonotic infections and other contaminants to the consumer. The overall principle is that meat inspection must be risk-based.

In a modern meat inspection system based on risk assessment, it is also important that those diseases which an individual country is declared free from (according to international Regulations) and which can be detected by incision, are being addressed.

Furthermore, traditional meat inspection involving palpation and incision increases the risk of cross-contamination with different pathogenic microorganisms. The traditional meat inspection was invented more than

100 years ago and was originally focused on the detection of tuberculosis and cysticercosis.

Nowadays, traditional meat inspection seems to be more related to detecting animal health-related conditions, than to the detection of the most important public health hazards. This is because bovine tuberculosis has been eradicated from Nordic countries, and traditional meat inspection has a low sensitivity at detecting cysticercosis. As such, traditional meat inspection more resembles a ritual act than a food safety act.

A more realistic way of performing risk-based meat inspection is to discontinue the traditional meat inspection, involving palpations and incisions, in favour of visual inspection combined with measures optimising the hygienic quality of the slaughter processes and rapid tests for microbial contamination. This approach to meat inspection will definitely reduce cross contamination and significantly improve food safety by reducing public health hazards.

There is a need and interest to perform a pilot project on visual inspection of cattle.

7.1.1.2 Risk assessment of visual inspection and further adaptation of the inspection to a risk-based approach

The EU legislation of hygiene and official control supports visual inspection of slaughter pigs on certain conditions and provides the possibility for pilot projects to further adapt inspection to a risk-based approach. It is suggested that a Nordic project focusing on a general evaluation of this new inspection of pigs and cattle should be initiated (see suggestion for a project for visual inspection of cattle). The experiences should form the basis of a risk assessment of visual inspection. The aim of this project should be to investigate alternative procedures, including serological or other laboratory tests, which provide guarantees at least equivalent to the specific post-mortem procedures in the current Regulations.

7.1.1.3 Company staff for meat inspection

The Regulation of hygiene and official control provides the possibility of using company staff for inspection tasks under certain conditions, when slaughtering poultry. There is an interest for investigating similar models to be used when slaughtering pigs or cattle, e.g. use of the Dutch model (third-party employed technicians). There is also an interest in investigating the possibility of reintroducing technicians who can be employed by the company and the authorities under certain conditions. Because of the export of pork to third countries such pilot projects are difficult to perform in Denmark. In case such pilot projects should be actual it is supported that they are carried out in, for example Norway or Sweden.

7.1.2 Finland

The development and improvement of meat inspection requires intensive research. Pilot projects can be performed based on such research. Pilot projects performed without any scientifically-produced background data may not lead to interpretable and useable results. The pilot projects carried out in Europe should be followed up; pilot projects on altered meat inspection procedures are particularly of interest.

7.1.3 Iceland

No projects have been planned in Iceland. As trichinosis and cysticercosis have never been found here it is important for Iceland to be exempted from examining carcasses routinely for trichinosis in pigs and horses, and for bovine cysticercosis. The same applies to tuberculosis in all species.

7.1.4 Norway

7.1.4.1 The Agreement on the European Economic Area (EEA Agreement)

The EEA Agreement entered into force on 1 January 1994. It presently applies between Iceland, Liechtenstein and Norway on the one side and the 25 Member States of the European Union on the other, forming together the 28 EEA States. The European Community is also a contracting party to the Agreement.

All EEA-relevant EC acts have to go through the procedures for the incorporation of EC act into the EEA Agreement. The Standing Committee does the approval of adoption. All the EEA EFTA States have to be in agreement for the EEA Joint Committee to take a decision. Such agreement is reached by consulting within the Standing Committee all through the decision-making process.

The decision-making process regarding the implementation of the hygiene Regulation (hygiene package) has been delayed and depends on how rapidly the EEA States can reach agreement on the relevant acts. Current forecasts suggest agreement will be reached by approximately 1 January 2007. The Norwegian Government is therefore presently unable at this stage to set a date of entry.

7.1.4.2 Visual post-mortem inspection of pigs and *Trichinella*-free categories

As soon as possible following implementation of the hygiene Regulation into national acts investigations will be initiated on new approaches concerning the post-mortem procedures for fattening pigs in 3–4 slaughterhouses. Fattening pigs housed under controlled housing condition in integrated production systems, since weaning, can undergo visual inspection.

Holdings that are members of the Norwegian quality system in the primary sector (KSL) will fulfil the condition for visual inspections laid down in the Regulation of official control on products of animal origin²⁶. The pig database could be a system to provide the necessary information to the official authorities. Results and experiences from the pilot project in Sweden (spring 2006) will be used in planning this pilot project.

The Regulation laying down specific rules of official controls for *Trichinella* in meat provides the opportunity for exemption from *Trichinella* examination. Categories of holdings free from *Trichinella* is one of the options be most relevant for Norway. The conditions regarding the food business operators are already set in the Norwegian quality system in the primary sector, and nearly 95% of all herds will fulfil these requirements. *Trichinella* has not been recorded in domestic pigs in Norway since 1994 (two cases). The National Veterinary Institute has received an application from the Norwegian Food Authority to draw up a risk-based wildlife-monitoring programme to ascertain the most appropriate indicator animals for *Trichinella* in Norway. Depending on the conclusions of this programme, a cost-benefit analysis will be required.

7.1.4.3 National pilot projects that challenge the established hygiene Regulations in EU

“To offer all assistance needed to ensure that official controls carried out by the competent authority can be performed effectively”

To achieve this goal there is a need to transfer more tasks and responsibility to the company staff, and to involve company staff as much as possible in assisting the official veterinarian. There will be some discussion regarding which tasks should be performed by the industry. By using a slightly approach in 2 or 3 different slaughterhouses it should be possible to investigate the following:

- Assistance of the official veterinarian in specific sampling
- A more efficient organising of the Food Chain Information
- Ante- and post-mortem inspection (assistance of the official veterinarian in removing condemned material under supervision)
- Assistance during registration of remarks regarding ante- and post-mortem inspection and testing procedures

7.1.4.4 Visual post-mortem inspection of lambs

The same approach used for fattening pigs will be potentially applicable for lambs, such that they also can undergo visual post-mortem inspection. There is a need to establish an information flow from the herd level to

²⁶ Regulation (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation for official controls on products of animal origin intended for human consumption

slaughterhouse. This will be possible when the database for small ruminants becomes functional and is approved.

7.1.5 Sweden

In Sweden, visual inspection of pigs was introduced as a project from April 2006 and running for 6 months. The project involves four slaughterhouses and at least 200000 pigs. The Swedish Animal Health Service is carrying out assessment and certification at farm level. Possible findings of pathological lesions are investigated and documented at the point of de-boning of carcasses. After the project period an evaluation will be made of the findings at post-mortem, possible improvement of the efficacy of inspection, and the ergonomic conditions for the control personnel.

7.2 Pilot projects with a common interest

From the needs and interests in the different countries, it can be concluded that most Nordic countries wish to develop projects in:

1. visual inspection of beef carcasses
2. further adaptation of the inspection based on risk assessment
3. use of company staff for meat inspection

Therefore it is obvious to suggest common Nordic pilot projects on these specific issues. This also corresponds to some of the future needs described in chapter 5.8.

7.2.1 Conclusion

Many pilot projects have been planned in the various Nordic countries, some of which have already been started. Since Iceland and Norway are members of EEA and not members of EU, the launching of pilot projects depends on how rapidly the EEA States agree on the relevant acts in the Regulation.

7.2.2 Recommendation

To suggest common Nordic pilot projects on the following issues:

- visual inspection of beef carcasses
- further adaptation of the inspection based on risk assessment
- use of company staff for meat inspection

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Norsk sammendrag med konklusjoner og anbefalinger

Prosjektets visjon er «Risikobasert kjøttkontroll basert på bærekraftig nordisk primærproduksjon med sunne dyr som grunnlag for trygg mat for forbrukeren».

Hovedmålet i prosjektet er effektivisering av kjøttkontrollen i de nordiske land ved å undersøke og teste løsninger basert på muligheter i et risikobasert EU-regelverk og som samtidig tar høyde for fornuftig forvaltning av økonomiske ressurser og drar nytte av profesjonell kompetanse.

I en slik sammenheng defineres risikobasert kjøttkontroll som basert på risikovurdering, «praktisk» risikohåndtering og risikokommunikasjon i kjeden fra bås til bord, i hvert fall fra besetning til slaktet forlater slakteriet. Kjøttkontrollen bør også ta hensyn til risiko videre langs kjøttkjeden. Kontroll med hygiene, bruk av kvalitetssystemer, revisjoner utført av andre enn det offentlige tilsynet bør tas i betraktning for å effektivisere kjøttkontrollen. Dette kan kalles «integreert risikobasert kjøttkontroll» og bør kunne forenkle risikohåndteringen og risikokommunikasjonen langs kjøttkjeden. Dette kan også forbedre informasjonsflyten fra besetning, mellom operatører i kjøttindustrien og personale i kjøttkontrollen. Det understrekes at det ikke må være tvil om ansvars- og rollefordeling mellom kjøttindustri og kjøttkontrollen. Dette er beskrevet i *kapittel 1* som også inkluderer en beskrivelse av bakgrunnen for dagens kjøttkontroll og en kortfattet versjon av historien om kjøttkontrollen.

Etter at «Kontrollforordningen for animalske næringsmidler²⁷...» ble vedtatt av EU parlamentet i april 2004, har det siden ikrafttredelsen 1. januar 2006 vært mulig å gjennomføre pilotprosjekter f. eks. når det gjelder post-mortem kontrollen uten å måtte foreta tradisjonell post-mortem kontroll i tillegg. Fordi forordningen trådte i kraft så sent i prosjektperioden for det nordiske prosjektet, er det gjennomført færre pilotprosjekter enn det man trodde ville være mulig i vår prosjektperiode. Som en konsekvens av dette, har det nordiske prosjektet resultert i en rapport som i større grad overveier mulighetene for risikobasert kjøttkontroll mer basert på litteratur enn på grunnlag av praktiske resultater fra pilotprosjekter. Likevel har konseptet og elementene i risikobasert kjøttkontroll blitt diskutert og definert, og flere pilotprosjekter har startet eller er planlagt for framtida. Det fins også eksempler på nasjonale prosjekter som er initiert i

²⁷ Forordning (EF) nr. 854/2004 av 29. april 2004 om fastsettelse av særlige regler for gjennomføringen av offentlig kontroll av produkter av animalsk opprinnelse beregnet på konsum

det nordiske hovedprosjektet og som har oppnådd resultater og konklusjoner som har brakt kjøttkontrollen framover i vår del av verden (Kapittel 6).

Kapittel 2 beskriver nasjonalt og internasjonalt rammeverk i form av EUs regelverk når det gjelder offentlig kjøttkontroll og Codex Alimentarius «Code of Hygienic Practice for Meat». I prinsippet baserer både EU og Codex seg på prinsippet om risikobasert kjøttkontroll og omfatter hele kjøttkjeden.

Konklusjoner – kapittel 2

Intensjonene i «Kontrollforordningen for animalske næringsmidler...» (EU) er at denne skal dekke alle aspekter som er viktig når det gjelder mattrygghet, dyrehelse og dyrevelferd. Tilsynet skal basere seg på all tilgjengelig informasjon og kunnskap.

Kjøttkontrollen skal være basert på risikovurdering både når det gjelder mattrygghet, dyrehelse, dyrevelferd og prosesser ved produksjon av kjøtt og kjøttprodukter.

I Kontrollforordningen er det gitt muligheter som visuell post-mortem kontroll av slaktegris, og kategorisering i form av *Trichinella*-frie besetninger evt. regioner med nærmest 0-risiko for *Trichinella* i slaktegris. Dette er muligheter som har særlig interesse for og bør kunne utnyttes i de nordiske land. I tillegg inneholder Kontrollforordningen muligheter for oppstart av pilotprosjekter for å evaluere andre former for kontrollordninger når det gjelder kjøtt.

Forslaget til «Code» fra Codex er mer fleksibel enn Kontrollforordningen siden dette rammeverket ikke tar stilling til hvem som er ansvarlig eller hvem som skal utføre de forskjellige arbeidsoppgavene i kjøttkontrollen.

Kapittel 3 beskriver organiseringen av kjøttkontrollen med fokus på bemanning og finansiering av kjøttkontrollen i de nordiske land i tillegg til erfaringer fra noen andre land.

Kjøttkontrollen er en integrert del i de nasjonale mattilsynene og er noe forskjellig organisert i de enkelte nordiske land. Betydelige ressurser brukes på kjøttkontroll i disse landene og det er et stort behov for å gjøre kjøttkontrollen mer effektiv uten at fokuset på mattrygghet blir borte. Dette er spesielt viktig for en fremtidig konkurransedyktig nordisk kjøttindustri. Annex A beskriver finansieringsopplegg for kjøttkontrollen, og bemanningsnormer for de enkelte land.

Gjennom forskjellige systemer gjennomfører landene ”subsidiert” av kjøttkontroll-omkostningene for de små slakteriene. Danmark opererer med en «Regeringens konkurrenceevnepakke» med en årlig bevilgning på 10 millioner DKK. Norge har en maksimal støtte på kjøttkontrollgebyret på NOK 1,00 per kg godkjent slakt. De andre landene

opererer med en timebasert kjøttkontrollavgift for de minste slakteriene, som også innebærer en viss subsidiering.

Konklusjoner – kapittel 3

De nordiske landene har i større eller mindre grad utviklet velfungerende systemer for vurdering av om innkrevd avgift dekker de faktiske kostnadene til kjøttkontrollen. For Danmark, Sverige and Finland ser disse systemene ut til å fungere tilfredsstillende, og det er godt samsvar mellom innbetalt avgift fra slakteriene (de store slakteriene), og myndighetenes omkostninger i forbindelse med kjøttkontrollen. For Island and Norge synes ikke disse systemene å være fullt ut tilfredsstillende for denne oppgaven. I Norge dekkes også en vesentlig del av kjøttkontrollkostnadene (for de generelle og administrative oppgavene) gjennom en generell matproduksjonsavgift. Det er ikke mulig å kontrollere om nivået på denne avgiften står i forhold til de omkostningene den er ment å dekke.

Muligheter og begrensninger for risikovurdering er debattert i nordisk sammenheng i kapittel 4.

I dette kapitlet diskuteres verdien av risikovurdering i relasjon til zoonotiske smittestoffer som *Toxoplasma gondii*, *Salmonella* og *Y. enterocolitica*.

Konklusjoner – kapittel 4

Modernisering av kjøttkontrollen i retning av et risikobasert system forutsetter at systemet er følsomt overfor endringer f. eks. i det zoonotiske sykdomspanorama. Kvantitative teknikker fra epidemiologiske studier og risikovurderinger bør benyttes.

De nordiske land har en forholdsvis lang tradisjon når det gjelder kontroll med enteropatogene agens på besetningsnivå i kombinasjon med god slaktehygiene. En nyere dansk studie har utfordret denne tilnærmingen og konkluderer med at med det lave nivået av enkelte zoonotiske agens både hos forbrukere som følge av innenlands smitte og det lave nivå som fins i dyrepopulasjonen vil ofte tiltak lenger ut i kjeden kunne ha en større effekt dersom kost-nytte aspektet legges til grunn. Dekontaminering av slakt på slutten av slaktelinja med varmt vann/damp kan f. eks. være et slikt tiltak (diskutert under risikohåndtering).

I kapittel 5 er konseptet og elementene i forbindelse med risikobasert kjøttkontroll behandlet og fremtidig behov for pilotprosjekter er evaluert

Konklusjoner – kapittel 5

Følgende viktige aspekter er diskutert:

- Kjøttkontrollens rolle når det gjelder risikohåndtering
- Kost-nytte i forhold til risikohåndtering i kjøttkjeden
- Kategorisering på besetningsnivå og andre former for risikohåndtering

Risikobasert kjøttkontroll skal både ha et mattrygghets- og kjøttkjedeperspektiv der sammenheng mellom smittestoff som forårsaker sykdom hos menneske ses i relasjon til forekomst i primærleddet og produksjonsprosess.

Risikobasert kjøttkontroll skal bruke praktiske risikohåndteringsverktøy basert på dagens sykdomspanorama med grunnlag i kost-nytte vurderinger.

I de nordiske land fins systemer/registre som dekker forutsetningene i Food Chain Information (som er kommunikasjonsleddet mellom besetningsnivå og slakteri). Med unntak av Danmark fins det imidlertid ikke tilgjengelige sentrale registre for veterinær behandling i de nordiske land.

I de nordiske land vil det ikke være nødvendig at all informasjon er tilgjengelig 24 timer før slaktedyrene kommer til slakteriet. Mye av den aktuelle informasjonen vil allerede være tilgjengelig i husdyrregistre, via generell overvåking av zoonoser og reststoffer. Resten av informasjonen som besetningens identitet, antall dyr, transportbil m.v. vil gå fram av dokumentet som følger slaktedyrene under transporten.

Visuell post-mortem kontroll bør implementeres når det gjelder slaktegris.

Kost-nytte studien som vurderte tiltak på besetningsnivå og i slakteri i Danmark er viktig i kjøttkontrollssammenheng. Et viktig tema er muligheten for implementering av dekontaminering ved overrisling av varmt vann eller bruk av vanndamp på hele slakt for å redusere zoonotiske smittestoff sammenlignet med tiltak på besetningsnivå.

Å utvikle nye hurtigmetoder for påvisning av zoonotiske smittestoff som f. eks. VTEC (Verocytotoxigenic *E. coli*), i kjøttkontrollen bør gis prioritet.

Nasjonale prosjekter som er utført i nær tilknytning til det nordiske prosjektet er oppsummert i kapittel 6.

De nasjonale prosjektene som er utført under det nordiske hovedprosjektet har bidratt med verdifull informasjon relatert til praktiske problemstil-

linger som kategorisering av besetninger basert på historiske data og distribusjon av Food Chain Information på regionnivå.

Konklusjon – kapittel 6

Det norske prosjekt som omfattet Food Chain Information på regionnivå viste nødvendigheten av å etablere et elektronisk system som kan levere all relevant informasjon.

Planer for etablering av pilotprosjekter i Norden fins i kapittel 7.

I 2003 var det store forventninger knyttet til at «Kontrollforordningen for animalske næringsmidler...» ville bli vedtatt allerede samme år og implementert tidligere enn 1. januar 2006. Det var likeledes forventninger om at slakteriansatte kunne bidra i større grad ved kjøttkontrollen av sau og lam, gris og storfe. I tillegg har det vært lange diskusjoner i EU om hvordan Food Chain Information skulle kunne etableres.

«Kontrollforordningen for animalske næringsmidler...» gir muligheter for å gjennomføre pilotprosjekter f. eks. når det gjelder post-mortem kontrollen uten å måtte foreta tradisjonell post-mortem kontroll i tillegg. Siden forordningen trådte i kraft så sent i prosjektperioden i det nordiske prosjektet, er det gjennomført færre pilotprosjekter enn det man trodde ville være mulig i vår prosjektperiode.

Konklusjon – kapittel 7

Flere pilotprosjekter har startet eller er planlagt for framtida. Siden Island og Norge er medlemmer av EØS og ikke medlemmer av EU, vil oppstart av felles pilotprosjekter være avhengig av når det er enighet i EØS om å innføre EUs regelverk på kjøttkontrollområdet.

Anbefalinger

Kapittel 3

Det er viktig å dra nytte av mulighetene som fins i «Kontrollforordningen for animalske næringsmidler...» for å optimalisere bruken av ressursene og øke kjøttkontrollens effektivitet i de nordiske landene.

Kapittel 4

Det er viktig å understreke at det ikke alltid er nødvendig å gjennomføre alle stegene i en risikovurdering. Dersom f. eks. måling av eksponering viser en risiko som man nærmest kan se bort i fra, bør risikovurderingen

avsluttes. Det er også slik at en sammenligning av forskjellige tiltak ofte ikke trenger en fullstendig risikovurdering, men at en vurdering av effekten av eksponering kan være tilstrekkelig.

Kapittel 5

Kost-nytte analyser bør være med i beslutningsprosessen for å optimalisere risikohåndteringen. Risikohåndtering bør vurderes i «bord til bås» perspektivet d.v.s. human sykdom relatert til matvare og produksjonsprosess, og hvor i kjøttkjeden tiltakene gir størst effekt.

Anvendelse av varmt vann eller damp som dekontaminering av hele slakt vil ha stor betydning for reduksjon av smittestoff som *VTEC* på storfe- og lammeslakt, *Y. enterocolitica* på griseslakt og *Salmonella* på alle former for slakt. En slik prosedyre kan brukes for å løse et humant helseproblem der tiltak på besetningsnivå eller generell slaktehygiene ikke nytter.

Det bør benyttes en risikobasert tilnærming når det foretas en vurdering av bemanning av kjøttkontrollen.

Eksisterende ressurser hos kjøttkontroll og slakteri bør benyttes for å oppnå en mest mulig kost-effektiv risikohåndtering.

Den rutinemessig utveksling av informasjon mellom kjøttkontroll, slakteri og organisasjoner i forbindelse med mistanke om zoonotiske agens bør hele tida evalueres og forbedres. Dette bør utføres i et samarbeid mellom myndigheter og slakteriorganisasjoner.

Pilotstudier med fokus på Food Chain Information bør initieres for å få erfaring med systemet.

Den foreslåtte modell (se også Annex B) når det gjelder å tilfredsstille intensjonene med Food Chain Information foreslås benyttet på nordisk plan.

Basert på risikovurdering bør visuell post-mortem kontroll være mulig også for slakt av sau/lam og storfe i framtida.

Det bør foretas en risikovurdering av visuell post-mortem kontroll og sammenligne denne formen for kontroll med alternative prosedyrer som serologiske undersøkelser eller andre laboratorietester for å finne ut om disse prosedyrene kan oppfylle bestemmelsene i «Kontrollforordningen for animalske næringsmidler...»

Modellen for kontroll med fjørfe (ansvarsdeling mellom kjøttkontroll og slakteri) bør evalueres og testes også i forhold til kjøttkontroll for firbeinte slaktedyr. En slik modell kan trolig utnytte tilgjengelige ressurser i større grad, og det bør undersøkes om denne modellen gir tilstrekkelig grad av mattrygghet når det gjelder kontroll med firbeinte slaktedyr.

Alternative systemer (f. eks. bruk av «computerised image analysis») som kan utfylle eller erstatte eksisterende prosedyrer i kjøttkontrollen bør undersøkes.

Kapittel 7

Felles nordiske pilotprosjekter bør initieres innenfor følgende tema:

- Visuell post-mortem kontroll av storfeslakt
- Tilpasning av kjøttkontrollen basert på risikovurdering
- Anvendelse av slakteriansatte i kjøttkontrollen

«Kontrollforordningen for animalske næringsmidler...» åpner mulighetene for å supplere evt. erstatte eksisterende metoder i kjøttkontrollen med nye prosedyrer basert på ny vitenskapelig og teknisk kunnskap og skreddersy kjøttkontrollen til å ivareta risiko knyttet til bestemte besetninger, regioner eller land ved å bruke prinsippene for risikovurdering i tillegg til å ta hensyn til tilgjengelige ressurser.

Det er viktig å ta i bruk de mulighetene som fins i «Kontrollforordningen for animalske næringsmidler...» for å utvikle kjøttkontrollen i en retning som er mer risikobasert, og utnytte ressursene for å effektivisere kjøttkontrollen.

Annexes

Annex A	Staffing and financing of meat inspection in the Nordic countries (in Nordic languages)
Annex A-DK	Denmark
Annex A-F	Finland
Annex A-I	Iceland
Annex A-N	Norway
Annex A-S	Sweden
Annex B	A report on Food Chain Information in the EU Regulations – handling and possibilities in a Nordic context
Annex C	Suggestion for a paradigm to be used from 1 January 2006 in case of inter- and intracommunity trade
Annex D	Example of a method to designate food safety hazards in relation to the primary producer (in Nordic languages)

Annex A. Staffing and financing
of meat inspection in the Nordic
countries (in Nordic languages)

Annex A-DK Denmark

Kødkontrolomkostninger i Danmark

Baggrund

Reglerne om finansiering af udgifter i forbindelse med kontrollen med fersk kød (kødkontrollen) er fastsat i Rådets Direktiv 85/73/EØF af 29. januar 1985 (med senere ændringer) om finansiering af veterinærundersøgelse og -kontrol. Direktivet lægger op til at det enkelte slagteri enten betaler en fast kontrolafgift pr. slagtedyr eller betaler for de faktiske udgifter i forbindelse med tilsyn og kontrol. Hertil skal lægges fælles udgifter til administration af kødkontrollen samt sociale udgifter til kontrolpersonalet.

I Danmark er bestemmelser i ovennævnte direktiv gennemført ved bekendtgørelse om betaling for kontrol af fødevarer og levende dyr m.v. (avgiftsbekendtgørelsen)²⁸. Bekendtgørelsen er bl.a. som følge af de nu gældende forordninger om hygiejne og kontrol under revision. For slagterier betyder det en ændring i betaling af styktakst for slagting i små slagterier, da begrebet »hjemmemarkedsautorisation« pr. 1. januar 2006 er bortfaldet.

Finansiering af kontrolomkostningerne

Inddeling af slagterier

I Danmark inddeles slagterierne i 2 kategorier; små og store slagterier, som kører hvert deres separate regnskab. I alt findes ca. 130 små slagterier og ca. 40 store slagterier, heraf er 14 svineslagterier godkendt til eksport til USA.

Ad. små slagterier – hvad er omfattet af kontroludgifterne

Begrebet hjemmemarkedsautoriserede slagterier er med anvendelsen af hygiejne- og kontrolforordning bortfalder, ligesom der ikke længere i EU-regelsættet eksisterer en definition på små slagterier. I Danmark vil man i fremtiden ved små slagterier forstå slagterier, som på et år slagter under 15.500 dyreenheder (forventes at få effekt fra 1. juli 2006). Eksempler på omregning af slagtetotal til dyreenheder fremgår af nedenstående:

²⁸ Bekendtgørelse nr. 289 af 21. april 2005 om betaling for kontrol af fødevarer og levende dyr m.v., med senere ændringer

Dyreart	Antal dyreenheder
kvæg < 150 kg + heste	4
får og geder	1
søer og orner	2
Øvrige svin	1
kyllinger	0,0067
hjorte og strudse	1

Hvert kvartal opgøres antallet af dyreenheder slagtet in en virksomhed gennem de seneste fire kvartaler. Et slagteri, som i de seneste fire kvartaler har haft en produktion, der overstiger grænsen på de 15.500 dyreenheder vil fra det efterfølgende kvartal, blive betragtet som et stort slagteri.

De små slagterier betaler kun eurosatsen for selve slagtedyrskontrollen, hvilket ikke dækker de samlede omkostninger ved slagtedyrskontrollen.

Forskellen mellem det opkrævede gebyr og de reelle omkostninger i forbindelse med kødkontrollen finansieres af en bevilling, som kaldes regeringens »konkurrenceevnepakke«. Bevillingen er på 10 millioner dkr. årligt og indgår fødevaremyndighedernes budget – altså et tilskud til erhvervet.

Udover slagtedyrskontrollen er de små slagterier underlagt kravet om 4–6 audit pr. år, hvilke der ikke opkræves gebyr for. Audits og anden kontrol finansieres således over Fødevarestyrelsens bevilling.

Ad. store slagterier – hvad er omfattet af kontroludgifterne

Store slagterier er virksomheder med permanent tilstedeværelse af veterinærkontrollen; dvs. dagligt eller mindst en gang ugentlig. I Danmark opkræves for disse store slagterier et gebyr, der svarer til samtlige udgifter til kontrollen. Det vil sige, at de betaler samtlige *direkte* kontroludgifter. Disse udgifter omfatter løn m.v. til kontrolpersonalet, herunder den slagtedyrskontrol der udføres på slagteriet, samt udgifter til laboratorieundersøgelse, befording og administrationsudgifter i forbindelse med kontrollens gennemførelse på det enkelte slagteri.

Derudover betaler de store slagterier *fælles* kontroludgifter til administration og ledelse, uddannelse af kontrolpersonalet, ekstraudgifter ved erstatningspersonale mm. De fælles kontroludgifter – der udgør ca. 10% af de direkte udgifter - fordeles mellem virksomhederne i forhold til deres direkte kontroludgifter.

Kødvirksomheder, der er godkendt til eksport til USA, betaler udover de førnævnte direkte kontroludgifter og fælles kontroludgifter *også* for omkostninger forbundet med driften af den særlige »USA-auditenhed«. Betalingen herfor fordeles på direkte og fælles auditudgifter.

Styring af kontroludgifterne

Budgetter og budgetopfølgning

I Danmark fastsætter Fødevarestyrelsen budgettet for det kommende års afgifter på baggrund af de faktisk afholdte udgifter året før og de faktiske udgifter i første kvartal i regnskabsåret tillagt fællesomkostningerne. Budgetprocessen startes i første halvår af regnskabsåret før budgetåret; dvs. primo maj. Fødevarestyrelsens regionale kontorer indkalder oplysninger fra de enkelte slagterier om forventede antal slagtninger, sæsonudsving, produktionsplaner mm. for det kommende år, hvorefter de regionale kontorer udarbejder budgetforslag for de enkelte slagterier i regionen. Der holdes regionale budgetmøder med slagteriledelsen i løbet af maj/juni – dette er obligatorisk for de store slagterier.

Regionerne meddeler inden 1. juli slagterierne de endelige budgetter til de store slagterier, herunder á conto opkrævningen.

Inden 1. september meddeler regionerne de øvrige slagterier de endelige budgetter for de følgende år, herunder á conto opkrævningen.

Det er ikke obligatorisk med budgetmøder for de små slagterier. Hvis disses virksomhedsledere ønsker det, indkalder regionerne til en drøftelse af budgettet.

Der foretages ved udgangen af hvert kvartal opfølgning på det enkelte slagteris budget med henblik på at afdække overensstemmelse mellem de faktisk afholdte udgifter og indtægter i forhold til det budgettede.

Loft over de styrbare fællesomkostninger

Fællesudgifterne til kontrol er opdelt i de styrbare og ikke styrbare udgifter. De *ikke* styrbare udgifter omfatter bl.a. udgifter i forbindelse med barsel, flytteomkostninger og BST, vikardækning i forbindelse med frihed til fagligt arbejde, udgifter i forbindelse med arbejdsskader mm.

De styrbare fællesomkostninger dækker over udgifter til administration i de enkelte regioner, vikardækning i forbindelse med kursus og kurser for kødkontrollens personale i den enkelte fødevareregion. I forhold til virksomhederne, må de styrbare fællesudgifter maksimalt udgøre 5,12 % af de direkte udgifter.

Kontrolplanlægning på slagterier og kødvirksomheder

Fødevarestyrelsens vejledning om frekvenser for auditering – indeholder vejledende frekvenser for auditering i de forskellige brancher af fødevarer virksomheder, fastsat på baggrund af et risikovurderingssystem for virksomhederne på branche-niveau.

Denne vejledning indeholder bl.a. retningslinier for planlægning af kontrollen på slagterier og kødvirksomheder. Formålet med disse retningslinier er:

- at sikre, at planlægningen af kontrollen sker på et ensartet grundlag og på en behovsorienteret måde,
- at medvirke til sikring af en systematisk planlægning af og opfølgning på kontrolaktiviteterne, som tager højde for, at alle regler skal auditeres i løbet af et år
- at skabe gennemsigtighed i kontrollen med slagterier og kødvirksomheder inden for de enkelte regioner og på tværs af regionerne med hensyn til planlægning og løbende opfølgning
- at skabe grundlag for dokumentation af de omkostninger, der er forbundet med kontrollen på slagteri- og kødvirksomheder, således at dette kan indgå i den årlige budgetdialog

Kontrolplanlægningen indebærer at de enkelte fødevareregioners kontrolafdelinger udarbejder en samlet kontrolaktivitetsplan for hvilke kontrolområdet og med hvilken frekvens, der skal auditeres på de enkelte slagterier og kødvirksomheder, inden for kontrolafdelingens område.

På det enkelte slagteri/kødvirksomhed indebærer kontrolplanlægningen, at der udarbejdes en kontrolplan, som beskriver hvilke områder og med hvilken frekvens, der skal auditeres. I tilknytning til kontrolplanen udarbejdes på den enkelte virksomhed, en plan der viser, hvordan kontrollen er planlagt hen over kalenderåret på de enkelte kontrolområder; herunder angivelse af behovsvurdering, antal audits, antal øvrige kontrolbesøg samt kontroltimer. Kontrolplanlægningen bruges til løbende at følge op på, om målsætningerne nås.

Kød-controller

Fødevarestyrelsen har i forbindelse med den seneste strukturændring oprettet en særlig kød-controller funktion som på styrelsens vegne skal bidrage til en fortsat udvikling af kontrollen af kødvirksomheder. Et af formålene med kød-controller funktionen er at understøtte udviklingen i de initiativer, der er iværksat til forbedret styring af udviklingen i omkostninger i kødkontrollen og en evaluering af effekten af regelændringer.

En af hovedopgaverne for kød-controlleren er at effektivisere og følge op på udviklingen i enhedsomkostninger, kigge på arbejdsmiljøet og vurdere og justere bemandingsmodeller.

Enhedsomkostninger – kødkontrol – 2005

Nedenfor følger opgørelse over kødkontrolomkostninger for dyrearterne svin, kreaturer og fjerkræ – opgjort som dkr. pr. kg slagtet vægt.

Opgørelserne er opgjort på baggrund af aktuelle slagtetal for 2005 og omfatter de 11 største svineslagterier, 6 største kreaturslagterier og 5 største fjerkræslagterier i Danmark.

Kødkontrolomkostninger i Danmark 2005 - fordelt på dyrearter

Species	Omkostning (dkr/dyr)	Omkostning (dkr./kg slagtet vægt)
Slagtesvin	10,06 – 15,56	0,13 – 0,19
Kreatur	43,60 – 71,04	0,17 – 0,28
Fjerkræ	0,14 – 0,19	0,11 – 0,15

Bemanding

Baggrund og regelgrundlag

Kontrolforordningen for animalske fødevarer²⁹ pålægger medlemsstaternes kompetente myndigheder at sørge for en tilstrækkelig bemanding til at foretage den offentlige kontrol med slagterier, vildthåndteringsvirksomheder og opskæringsvirksomheder og at der skal anvendes en risikobaseret metode til at fastsætte den offentlige bemanding, der er nødvendig på slagtelinien på et givet slagteri.

Derudover stiller forordningen krav til embedsdyrlægens tilstedeværelse i forbindelse med ante- og post-mortem inspektion og muligheder for på baggrund af en risikovurdering i visse situationer at fravige dette.

Grundbemandingsmodeller i Danmark

Modeller for bemandingen af offentligt kontrolpersonale på svine- og kreaturslagterier (= grundbemandingsmodeller), baserer sig på regneark, der udregner det samlede bemandingsbehov i forhold til antal slagtelinier, slagtetider, slagtehastigheder, pauseafholdelse, samt andre indretningsmæssige forhold herunder elektronisk sygdomsregistrering. I opgørelsen er også taget højde for ekstra bemanding til at dække ind for ferier, sygdom og kurser.

På *svine- og kreaturslagterier* med kontinuerlig slagtning bemandes AM-kontrollen som hovedregel med én embedsdyrlæge (der med faste mellemrum afløses af en anden embedsdyrlæge). På større slagterier med flere ramper til aflæsning, kan der være behov for mere end én embedsdyrlæge.

På *svineslagterier*, vil bemandingen af efterkontrollen afhængig af indretningen, normalt være 1–2 dyrlæger assisteret af tilsynsteknikere. Hertil kommer personale til afløsning, hvis der ikke er periodiske pauser i slagtningen.

Grundbemandingen på et *fjerkræslagteri* vil normalt bestå af 1 dyrlæge og 2 tilsynsteknikere. På slagterier med 2-holdskift forøges bemandingen tilsvarende; dvs. i alt 2 dyrlæger og 4 tilsynsteknikere. Embedsdyrlægen kan efter behov og når slagtehastigheden tilsiger dette, indsætte 1-2 oplærte og godkendte slagteriansatte til at assistere veterinærkontrollen.

²⁹ Europaparlamentets og Rådets forordning (EF) 854/2004 af 29. april 2004 om særlige bestemmelser for tilrettelæggelsen af den offentlige kontrol af animalske produkter til konsum

Båndhastigheden er det antal dyr (svin, kreaturer, fjerkræ (kyllinger)), som i løbet af en time har passeret et givet punkt på slagtelinien.

I Danmark er der fastsat normer for, hvor mange slagtedyrlæge en embedsdyrlæge må undersøge i løbet af et døgn. F.eks. må antallet af voksent kvæg må ikke overstige 100 dyr og der må maksimalt undersøges 200 stykker ungvæg, eller 400 svin i døgnet.

Når det gælder slagtesvin, så er der fastsat normer for, hvor mange svin der må undersøges i timen. På svineslagterier, hvor slagtebåndet kører med en konstant hastighed, kan 1 embedsdyrlæge foretage den rutinemæssige båndkontrol efter slagtingen (alternerende mellem krop-, pluks- og tarmkontrol) af indtil 55 svin. Er der tale om et svineslagteri, hvor sygdomsregistreringen foregår elektronisk efter et af Fødevarestyrelsen godkendt system, kan 1 embedsdyrlæge foretage den rutinemæssige kontrol efter slagtingen af indtil 60 svin.

Bemandingsnormer på svineslagterier er fastsat ud fra simple studier på et par udvalgte slagterier. De anførte normer gælder også for tilsynsteknikere.

Nedenstående tabel angiver de aktuelle bemandingsnormer alt afhængig af hastigheden på båndet:

Båndhastighed – svin pr. time		Bemanding**
Manuel registrering af kødkontrolfund	Elektronisk registrering af kødkontrolfund	
< 55	< 60	1
120 < 55	130 < 60	2
195 < 120	210 < 130	3
255 < 195	280 < 210	4
325 < 255	350 < 280	5
360 < 325	400 < 350	6
420 < 360	460 < 400	7

**Kan være en embedsdyrlæge eller tilsynstekniker

På fjerkræslagterier er fastsat tilsvarende normer for båndkontrollen. Den maksimale slagtehastighed må ikke uden særlig tilladelse fra fødevareregionen overstige 9.000 kyllinger pr. time. Ved en slagtehastighed på >8.000 kyllinger i timen vil der være krav om, at slagtelinien deles efter organudtagningen, således at der ved organkontrollen maksimalt passerer 4.500 kyllinger forbi den enkelte kontrollør pr. time.

Annex A-F Finland

Beräkning av kostnader för köttkontroll och tillsyn i Finland

Evira övervakar de stora slakterierna i Finland. Avgifterna för köttkontroll och tillsyn i slakterierna grundar sig på faktiska kostnader. Evira uppstår avgiften, vilken består av besiktningens personalens lönekostnader och socialkostnader, av slakterierna. Kostnaderna för köttkontrollen och tillsynen är nettobudjeterade. Evira tar ut besiktningens personalens lönekostnader + 69 % tillägg för andra utlägg (varav c. 6 % beräknas att gå till administrativa kostnader såsom utbetalning av lönerna). Eviras genomsnittliga köttbesiktningensavgifter är för:

Tamboskap 1,61 cent / kg
 Fjäderfä 0,78 cent / kg (besiktningens assistenterna är anställda av industrin och ingår inte i avgiften)

Eviras avgifter omfattar följande uppgifter:

- Ante-mortem kontrollen
- Post-mortem kontrollen
- Provtagning för officiella undersökningar
- Övervakning av märkningen av kött
- Undersökning av självdöda djur
- Tillhörande documentation.
- Hygienkontroll
 - Godkännande av
 - anläggningens egenkontrollplan och förändringar i denna
 - nötköttets märkningsplan
 - Kontroll av fullföljandet och uppdaterandet av egenkontrollen
 - Slakt- och ythygien
 - Övervakning av fullföljandet av nötköttets märkningsplan
 - Övervakning av framställandet och marknadsföringen av ekologiskt producerade produkter
 - Övervakning av avlägsnandet av TSE-riskmaterial
 - Kontroll över främmande ämnen
 - Salmonellakontroll
 - Övervakning av att nötkreaturens renlighetskrav uppföljs
 - Övervakning av vattenhalten i fjäderfä

- Övervakning av att de olägenheter som har påvisats åtgärdas inom utsatt tid
- Utfärda vid behov föreskrifter och förbud
- Övervakning av djursjukdomar
- Övervakning av djurvälstånd
- Personaladministration
- Dokumentation
- Skolning
- Handledning

Övriga kostnader (ingår inte i köttbesiktningssavgifterna)

- Undersökningskostnader
 - köttbesiktningssundersökningar
 - främmande ämnen (1,45 euro/ton slaktkött)

Under åren har kostnaden/kg ökat lite främst pga. övrig utveckling inom branschen och statsekonomin. Det finns också behov att höja köttbesiktningsskostnaderna under året 2006.

Länsstyrelsernas (övervakar renslakterierna) avgifter regleras av Inrikesministeriets förordning om avgifterna för länsstyrelsens prestationer (959/2005).

Kommunerna (övervakar småskaliga slakterier) har självstyre och de får bestämma sina avgifter själva. De småskaliga slakterierna har betydligt högre kostnader/kg än de stora slakterierna vilka övervakas av Evira. Kostnaderna för småskaliga slakterier är i genomsnitt 5 till 10 gånger högre än i de stora slakterierna.

Bemanningsnormer

Bemanningsnormerna grundar sig på slaktlinjens hastighet dvs. antal djur per timme och djurart. Bemanningsnormerna för svin och nötkreatur har tillkommit genom mätning av den tid som krävs för att utföra köttkontrollen per slaktkropp. Dyliga mätningar har inte gjorts vid fjäderfäslakt. Normeringen tar inte ställning till hur ofta och hur långa besiktningssassistentens och -biträdets pauser bör vara.

Normering inom svin och nötkreaturslakt

En besiktningssassistent kan inspektera maximum 60 svin eller 15 nötkreatur per timme. När slaktlinjen har upp till 5 till 6 besiktningssassistenter kan antalet djur per assistent per timme stiga något. Dessa normer är riktgivande och kan frångås enbart efter värdering av enskild slaktlinje.

Normering inom fjäderfäslakt

Normeringen av bemanning inom fjäderfäslakt är inte lika detaljerad som inom rött kött. Besiktningsbiträden är anställda av företaget och har ofta andra uppgifter än enbart inom köttkontroll. Praxisen varierar mellan företagen både gällande antal biträden och biträdens uppgifter. Av dessa orsaker är det svårt att veta hur stor andel av biträdenas tid slutligen används till köttkontroll. Denna något oklara situation medför regelbundet förfrågningar från företag och besiktningsveterinärer gällande antalet och behovet av biträden i fjäderfäslakt. Det finns således ett behov att ta ställning till bemanningen inom fjäderfäslakt. För närmare detaljer se bilaga 5.3:

- Nöt
 - 1 köttbesiktningsassistent /15 djur / h
- Svin
 - 1 köttbesiktningsassistent / 60 djur / h
- Vid slaktlinjer med 5-6 assistenter kan man höja något på antalet djur per assistent

Behov av besiktningsveterinär

Enheter	Besiktningsveterinär
30000–100000	1 heltidsvet.
100000–300000	1,5–2
300000–500000	2,5–3
över 500000	4
1 nöt =	3 enheter
1 svin =	1 enhet

Bemanning inom fjäderfäslakt

- Besiktningsveterinär
- Besiktningsbiträden
- Två kontrollpunkter
 - Efter fjäderborttagning
 - Vid tarmuttagning
- Exempel, 9000 broiler / h
 - 2 biträden vid 1. kontrollpunkten
- Linjen delar sig efter första kontrollpunkten
 - 1-2 biträden vid 2. kontrollpunkten (4500 broiler / h)

- Exempel, 5000 broiler / h
 - 1 biträde vid 1. kontrollpunkten
 - 1 biträde vid 2. kontrollpunkten
- Exempel, 500 kalkoner / h
 - 1 biträde enbart inom köttbesiktning
 - 1 biträde med också andra uppgifter en köttbesiktning
- Exempel, 500 kalkoner / h
 - 2 + 2 biträden
 - Också andra uppgifter
- Antalet besiktningsbiträden / fågel / h varierar i slakterierna
- Variation pga att biträden kan också ha andra uppgifter en enbart köttbesiktning
- Svårt att jämföra
- Ställningstagande och normering viktig

Annex A-I Iceland

Kjøttkontroll og finansiering i Island

Avgift

Kjøttkontrollen er finansiert gjennom avgifter som er lovbestemte. For å forandre avgiftene må loven revurderes av tinget slik at det er lite fleksibilitet til å forandre avgiften. Nå har det vært lagt frem et forslag til forandring av loven slik det blir landbruksdepartementet som kan forandre tariffen. Produsentene skal ifølge forslaget dekke praktisk talt alle kostnader ved kontrollen beregnet pr produsert mengde kjøtt.

Avgiften skal inkludere:

1. Lønn og reiseutgifter for veterinærer og kontrollassistenter
2. Prøvetaking og undersøkelse av prøver (mikrobiologi, medisiner og andre reststoffer)
3. Etterutdanning og kurser for veterinærer og kontrollassistenter
4. Koordinasjon av kontrollen
5. Lokaler og instrumenter for kontrollen

Kontrollen består av ante-mortem, post-mortem, etterkontroll, systemrevisjoner og dokumentkontroll.

Den 30. mai 2006 var avgiften følgende:

Dyreart	Avgift ISK pr kg	Avgift NOK pr kg
Hest	2,90	0,29
Storfe	2,20	0,22
Svin	3,00	0,3
Sau	2,10	0,21
Fjørfe	6,50	0,65

Utgifter

Avgiftene dekker ikke i dag alle utgiftene til kjøttkontroll og nødvendige prøveundersøkelser. I praksis er det vanskelig å skille imellom veterinærenes oppgaver ved kjøttkontroll og andre plikter. På saueslakteriene er det spesielt vanskelig å skille mellom veterinærenes oppgaver ved kjøttkontroll og overvåking av smittsomme sykdommer og innsats ved prøvetaking p.g.a. dette, som kan være stor men kan variere.

Beregning av utgiftene på forskjellige typer slakterier i Sør-Island kan man finne i følgende tabell:

Type slakteri	Inntekter ISK	Utgifter ISK	Inntekter %
Storfe, hest og gris, lite	2.005.535	4.046.000	50
Storfe, hest og gris, stort	4.374.200	9.818.600	45
Sau, stort	3.869.340	8.007.200	48
Fjørfe, stort	12.285.507	10.176.764	120

I tabellen går man ut fra at timelønn for en veterinær er ISK 5000 og en kontrollassistent er ISK 2500. Det må presiseres at disse tallene er baserte på estimat.

Forskjellen mellom inntekter og utgifter kan i stor grad forklares ved at fast ansatte distriktsveterinærer og kontrollveterinærer som arbeider med kjøttkontrollen på heltid eller deltid er lønnet direkte av statens bevilgninger. Deres lønn er altså ikke beregnet inn i grunnlaget for gjeldende avgift. Derimot er kontrollveterinærer og assistenter som ansettes spesielt i saueslaktingen lønnet av avgiftsinntektene.

Høye avgifter for kontroll av fjørfe kan forklares med at over 60 % av utgiftene går til undersøkelse av prøver i forbindelse med landets Salmonella og Campylobacter programme.

Konklusjon

Hvis det er myndighetenes ønske at avgiftene skal dekke alle utgiftene til kjøttkontrollen må tariffen baseres på en bedre estimering av den tid som brukes til kontroll av hvert dyreslag. Man må også skille bedre i mellom kjøttkontroll og prøver som blir tatt p.g.a. matvaresikkerhet og sykdomsovervåking og prøver som blir tatt p.g.a. smittsomme dyresykdommer.

Annex A-N Norway

Kostnader ved og finansiering av kjøttkontrollen i Norge

Beregningssystem og ressursforbruk

Opprinnelig ble det i Norge for kjøttkontroll betalt en fast avgift per kg slakt. Fra 1999 ble systemet for beregning av kjøttkontrollavgift i Norge endret, og en gikk over til en normbasert modell for å beregne avgiften. En forutsetning for en slik endring var at slakteriene skulle betale det kjøttkontrollen kostet. Det skulle være en konkret vurdering av hvert enkelt slakteri som skulle betale avgift for dekning av de utgiftene det offentlige hadde ved kjøttkontrollen i hvert enkelt slakteri, og det skulle ikke være noen kryssubsidiering.

Ved innføringen av det normbaserte systemet, var det viktig å få med alle elementene og aktivitetene i kjøttkontrollen, ikke minst for å sikre at alle elementene ble finansiert gjennom gebyret. Dette ga også de enkelte virksomhetene og bransjen bedre innsyn i grunnlaget for avgiften, og insitament til å redusere avgiften gjennom tiltak for å effektivisere slaktingen i forhold til bruk av kjøttkontrollressursene. Med utgangspunkt i at den innbetalingen hvert enkelt slakteri gjør skal representere en dekning av de faktiske kostnader som påløper ved tjenesten, benevnes dette heretter som gebyr og ikke avgift.

Det er bare slakterier med kontinuerlig drift som omfattes av dette normbaserte systemet for å beregne kjøttkontrollgebyret. Ved sesongslakterier, mobile slakterier, kontroll av rein, vilt, sel og hval rekvirerer virksomheten en tid forut for slaktingen nødvendig kjøttkontroll. Slik kjøttkontroll faktureres direkte etter forbruk av timeverk/dagsverk og en tilsvarende timeverk-/dagsverksats.

Grunnlag

Forskrift 27. desember 2005 nr 1726 om gebyr til dekning av utgifter ved kjøttkontroll gir grunnlaget for fastsettelse av gebyr som slakteriene skal betale for utført kjøttkontroll med henvisning til de elementene som er angitt foran.

For slakterier som har aktivitet hele året skal gebyret fastsettes på grunnlag av antall dagsverk kjøttkontroll, á 7,5 timeverk, i henhold til årsplan fra slakteriet, etter en dagsverksats på kr 3250,-. For arbeid utover Mattilsynets normalarbeidstid betales et tillegg på 40 % av en timeverksats på kr 433,35. For arbeid mellom kl. 21.00 og 06.00 fra mandag til

fredag, på lørdager, søndager og offentlige helge- og høytidsdager skal det betales et tillegg på 80 %.

Slakterier som har aktivitet hele året skal innen 20. november hvert år utarbeide årsplan for påfølgende års slakteaktivitet i virksomheten som oversendes Mattilsynets distriktskontor på stedet. Ved oppstart av nytt slakteri, eller gjenopptakelse av slakting ved tidligere nedlagt slakteri, skal årsplan oversendes senest 3 måneder før oppstart av slakting.

Årsplan skal oversendes på skjema fastsatt av Mattilsynet og inneholde opplysninger om:

- forventet slaktemengde fordelt på dyreart
- forventet gjennomføring av slakting på ulike slakteuker
- forventet slaktehastighet (antall slakt per time)
- antall slaktelinjer det skal slaktes på samtidig og
- start- og sluttidspunkt per dag for hver slaktelinje

Når slakteri får kunnskap om vesentlige avvik fra foreliggende plan, skal ny årsplan utarbeides og oversendes Mattilsynet straks. Avviket er vesentlig når det medfører minst 10 % endring i slaktemengde eller slaktehastighet eller når gjennomføring av slaktingen endres systematisk.

Gebyret for sesongslakteri og mobilt slakteri fastsettes på grunnlag av hvert påbegynt timeverk etter en timeverksats på kr 410,-. For arbeid utover Mattilsynets normalarbeidstid betales et tillegg på 40 % av timeverksatsen. For arbeid mellom kl. 21.00 og 06.00 fra mandag til fredag, på lørdager, søndager og offentlige helge- og høytidsdager utgjør tillegget 80 % og reiseutgifter skal betales etter statens satser. Gebyret for kjøttkontroll skal ikke for noen slakterier overstige kr 1,00 per kilo slakt.

Ressursbehov

Ut fra slakteplan for det enkelte slakteri og fastsatte normer for ressursbehov, beregner Mattilsynet hvor mye ressurser den gebyrbelagte kjøttkontrollen vil utgjøre ved hvert enkelt slakteri. Normene inneholder tabeller der en kan sette inn dyreart, slaktemengde og slaktehastighet og få ut antall kontrollpersoner på de forskjellige posisjonene. For hvert slakteri får en dermed et regnestykke over hvor mange dagsverk kjøttkontrollen regner med å bruke der for å kontrollere den oppgitte slaktemengden. Ved å multiplisere antallet dagsverk som er nødvendig for å gjennomføre kjøttkontrollen ved slakteriet med en forskriftsfastsatt dagsverksats får en størrelsen på gebyret som det enkelte slakteriet skal betale.

Ressursbehovet for kjøttkontrollen som grunnlag for kjøttkontrollgebyret blir beregnet på forhånd. Det har hele tiden vært intensjonen at denne forhåndsberegningen skulle kontrolleres mot reelt forbruk for eventuelt å foreta korrigeringer av ressursbehovet ved hvert enkelt slakteri eller den generelle dagsverksatsen. Først fra 2006 er det i Mattilsynet etablert

et system for registrering av faktisk ressursforbruk for hver enkelt kjøttkontroll som gjør en slik kontroll og korrigerende mulig.

Matproduksjonsavgift

Ved etablering av Mattilsynet og finansiering av dette ble det besluttet å ilegge blant annet kjøttomsetningen i landet en generell matproduksjonsavgift gjennom *forskrift 28. januar 2004 nr 221 om avgifter og gebyr i matforvaltningen*. Forskriften pålegger næringen avgifter som skal finansiere Mattilsynets oppgaver ved tilsyn og kontroll, bl.a. en matproduksjonsavgift på norskproduserte råvarer som skal nyttes til næringsmidler.

Denne avgiften skal dekke de mer generelle aktivitetene ved tilsyn med produksjon og omsetning av næringsmidler, også innenfor slakteri, så som:

- tilsyn
- revisjon
- tilsyn med virksomhetens egenkontroll
- dyrevelferdsarbeid
- arbeid i forbindelse med dyrehelse (deriblant utvidet sjukdomsregistrering på gris)
- prøvetaking og analyser (overvåkingsprogrammer) unntatt trikinkontroll
- opplæring
- overordnet strategisk styring

Denne generelle avgiften innkreves fra slakteriene, og denne avgiften utgjør nå for godkjent slakt NOK 0,48 pr kg slakt.

Kjøttkontrollgebyr

Ved innføring av den nye matproduksjonsavgiften på dette området ble det behov for en revisjon av hvilke elementer i kjøttkontrollen som skulle finansieres gjennom kjøttkontrollgebyret, ikke minst for å unngå en dobbel finansiering av deler av kjøttkontrollen. Ved denne revisjonen ble det besluttet at det spesifikke kjøttkontrollgebyret skulle finansiere:

- ante-mortem undersøkelse
- post-mortem undersøkelse
- etterkontroll av slakt
- kontroll av nødslakt
- trikinundersøkelse
- undersøkelse av slakt som mistenkes for å inneholde antibakterielle midler

- bakteriologisk kjøttkontroll
- administrasjon

Det vil si at dette spesifikke kjøttkontrollgebyret heretter bare dekker kontrollen av konkrete slakt og administrasjon av kontrollen. Tilsynsoppgavene er holdt utenom, det samme er det meste av prøvetaking og laboratorieundersøkelser. Det som er beholdt av prøvetaking under denne forskriften, er de tilfellene der en må ha prøveresultatet for å kunne bedømme et slakt. Mens prøvetaking i forbindelse med overvåkings- og kontrollprogrammer blir utført ut fra nasjonale eller internasjonale forpliktelser. Det er dermed et fellesansvar og bør dekkes over statsbudsjettet.

Fordeling av slakterier etter størrelse

Rødt kjøtt			Fjørfe kjøtt		
Slakteristørrelse	2006	2005	Slaktemengde	2006	2005
> 5000 tonn/år	17	15	> 5000 tonn/år	4	4
500 – 5000 tonn/år	24	19	500–5000 tonn/år	1	1
< 500 tonn/år	11	14	< 500 tonn/år	1	1

Beregnet kjøttkontrollgebyr

Rødt kjøtt 2006

Slakteristørrelse	Slaktemengde (tonn)	Ressursbehov	NOK/kg
> 5000 tonn/år	185 283	55 631 518	0,21 – 0,37 (0,30)
500 – 5000 tonn/år	43 773	18 347 810	0,27 – 0,96 (0,42)
< 500 tonn/år	1 115	1 375 889	1,00 (1,23)

Rødt kjøtt 2005

Slakteristørrelse	Slaktemengde (tonn)	Ressursbehov	NOK/kg
> 5000 tonn/år	168 248	65 337 317	0,39
500 – 5000 tonn/år	56 296	31 715 777	0,56
< 500 tonn/år	2 004	3 142 618	1,57

Fjørfe kjøtt 2006

Slakteristørrelse	Slaktemengde (tonn)	Ressursbehov	NOK/kg
> 5000 tonn/år	58 329	10 795 915	0,16 – 0,22 (0,19)
500 – 5000 tonn/år	4 000	1 081 308	0,27
< 500 tonn/år	3	13 975	1,00 (4,66)

Fjørfekjøtt 2005

Slakteristørrelse	Slaktemengde (tonn)	Ressursbehov	NOK/kg
> 5000 tonn/år	50 996	21 192 014	0,36 – 0,51 (0,42)
500 – 5000 tonn/år	56 296	31 715 777	0,46
< 500 tonn/år	2 004	3 142 618	4,75

Av disse tallene ser en at det er en betydelig reduksjon i gebyr for kjøttkontrollen overfor slakteriene i Norge etter omleggingen av beregningsgrunnlaget for gebyret fra 1. januar 2006. For de store slakteriene for rødt kjøtt er reduksjonen i gjennomsnitt ca. 23 %, mens for de store fjørfeslakteriene er reduksjonen i gjennomsnitt på 55 %.

Denne reduksjonen må først og fremst ses i sammenheng med at utgiftene til tilsyn med/revisjoner av slakteriene, opplæring mv. skal dekkes av den generelle matproduksjonsavgiften for kjøtt, men også som et uttrykk for at opprettelsen av Mattilsynet med statliggjøring av det lokale tilsynet har ført til en viss rasjonalisering og bedre utnyttelse av personressursene i kjøttkontrollen.

For de første månedene i 2006 har Mattilsynet også registrering av faktisk ressursforbruk for elementene i kjøttkontrollen som skal dekkes av kjøttkontrollgebyret. Ut fra denne registreringen er det gjort en beregning av totalt ressursforbruk for hele året, som grunnlag for en sammenligning mellom innbetalt gebyr og «faktisk» ressursforbruk.

Totalt ser det ut til at Mattilsynet vil bruke ressurser tilsvarende NOK 68 172 000 i løpet av 2006, mens slakteriene vil innbetale NOK 87 246 415 for den samme perioden. Med forbehold om at registreringen av ressursforbruket er riktige ser det altså ut til at det er rom for ytterligere reduksjon av normer eventuelt dagsverksatsen for beregning av gebyr for kjøttkontrollen i Norge.

Beregning av hvor mye ressurser som trenges for å utføre gebyrpliktig kjøttkontroll (dagsverk, analyser)

1. Ante-mortem undersøkelse

storfe og hest:	0,15 dagsverk pr 50 slaktedyr
gris, småfe og rein:	0,15 dagsverk pr 200 slaktedyr
fjørfe:	0,15 dagsverk pr 14 000 slaktedyr.

Som hovedregel skal antall dagsverk ante-mortem-undersøkelse maksimalt utgjøre 250 dagsverk pr år. Ved spesielle behov ved det enkelte slakteri kan det fastsettes et høyere antall dagsverk. For fjørfeslakteri med små slakteparti skal ante-mortem-undersøkelsen utgjøre minimum 1 timewerk pr parti.

2. Post-mortem undersøkelse:

Bemanning beregnet ut fra slaktehastighet:

Storfe:

< 25 skrotter/time:	1 person
25 – 50 skrotter/time:	2 personer
> 50 skrotter/time:	3 personer

Gris:

For gris oppgis to sett med intervaller. Det første forutsetter at stempelingen blir ivaretatt av slakteriet selv, og det andre forutsetter at kjøttkontrollen utfører stempelingen.

Stempling av slakteri:

< 80 skrotter/time:	1 person
80 - 160 skrotter/time:	2 personer
>160 skrotter/time:	3 personer

Stempling av kjøttkontrollen:

< 60 skrotter/time:	1 person
60 - 120 skrotter/time:	2 personer
120 - 180 skrotter/time:	3 personer

3. Etterkontroll*

storfe:	4 % etterkontrolleres, 0,1 dagsverk pr. stk
gris:	5 % etterkontrolleres, 0,02 dagsverk pr. stk

* etterkontroll rødt kjøtt = kompetent personale (veterinær, medhjelper) sin nærmere undersøkelse av frasortert slakt

Annex A-S

Sweden

Offentlig köttkontroll i Sverige

Den resursförbrukning (de kostnader) som krävs för att utföra den offentliga köttkontrollen finansieras helt via avgifter. Köttkontrollen är uppdelat i två resultatområden där "slakterier" är den stora delen och där "övriga köttanläggningar" är av betydligt mindre omfattning.

Slakterier

De aktiviteter som ingår är: Ante-mortem kontroll, post-mortem kontroll, Revisioner, inspektioner, Djurskyddskontroll vid levandedjursbesiktning, Sjukdomsregistrering, Provtagning och analyser i samband med kontrollprover, Resekostnader, kompetensutveckling, arbetsmiljö/ rehabilitering, fackligt arbete, Administration (ekonomi, personal), IT-stöd, övriga gemensamma kostnader etc.

Kostnaden för dessa aktiviteter har under de senaste tre åren legat runt 123 miljoner SEK. De stora slakterierna har betalat för kontroll som "del av tjänst" medan de små slakterierna har betalat på "timbasis". Antal tjänster som slakterierna betalat för, har beräknats utifrån ständig tillsyn dvs 2 000 timmars kontroll per tjänst och år. För att nå den aktuella avgiften per tjänst och per timme har våra totala kontrollkostnader (ca 123 miljoner SEK) dividerats med de totala antal timmar kontroll som vi utövar under året. Under 2005 var årsavgiften för en besiktningsveterinär 1 180 000 SEK och för en assistent 820 000 SEK. Motsvarande timavgift var under 2005, för en besiktningsveterinär 590 SEK och för en assistent 410 SEK.

Under 2006 har en bemanningsutredning genomförts vid de stora slakterierna. I denna har aktiviteterna vid kontrollarbetet tidsbestämts och därigenom har en kontrolltid per slakteri beräknats. Slakterierna betalar nu inte längre för ständig tillsyn utan de betalar för antal tjänster som faktiskt krävs för att utföra kontrollen. Detta utgår från att varje veterinär/assistent kan utföra 1447 timmars kontrolltid och avgiften under 2006 uppgår per besiktningsveterinär till 980 000 SEK och per besiktningsassistent till 660 000 SEK.

Kostnad per slaktat kilo (SEK)	2005	2004	2003
Kostnad samtliga slakterier	122 468 467	123 423 000	123 317 321

Vikt	2005	2004	2003
Rödt kött	418 700 000	436 600 000	432 200 000
Fjäderfä	102 280 383	94 645 818	100 719 577
Ren	1 420 689	1 309 193	1 687 625
Totalvikt besiktigat slaktkött	522 401 072	532 555 011	534 607 202

	2005	2004	2003
SEK (öre/kg)	23,44	23,18	23,07
NOK (öre/kg)	19,67	19,44	19,35

Avgift (SEK) per slaktat kg (öre/kg)	2005	2004
Rödt kött	27,60	24,20
Fjäderfä	11,70	10,90
Ren	73,60	75,70

Exempel

- Slakteri X beräknas under året slakta
 - 100 000 Svin
 - 22 500 Nöt
 - 12 500 Får
 - Total slaktvikt för detta är ca 17 600 ton
- Enligt ”bemanningsutredningen” krävs 1,8 veterinärer och 2,9 assistenter för att kontrollera detta på årsbasis
- Avgiften per veterinär uppgår till 980 000 kr och per assistent till 660 000 kr per år
- Total avgift för slakteriet 3,68 miljoner kr/år
- Avgift per slaktat kg = 21 öre/kg

Den svenska köttkontrollen och tillsynen på slakterierna är helt och hållet avgiftsfinansierad. Slakterierna betalar för de faktiska kostnaderna för dels den tillsynspersonal som krävs på plats, inkl. central administration,, dels för de kostnader som uppstår i samband med restsammans- och salmonellakontroller.

Beslut om bemanning och avgifter fattas på central nivå. Besluten baseras på av slakterierna lämnade uppgifter om slaktvolym och

bandhastighet. Bemanningsbehovet räknas ut med hjälp av en norm och med hänsyn tagen till lokala förhållanden på de enskilda slakterierna.

Sverige genomfördes 1996 det så kallade Elefantprojektet i vilket myndigheten och branschen tillsammans försökte fastställa bemanningsnormer för PM-kontrollen. Dock insåg man att förhållandena varierade väldigt mycket på de olika slakterierna och att de framtagna normerna inte kunde användas på alla slakterier då personalstyrkan skulle beräknas.

Under 2005 har en ny norm för beräkning av bemanningsbehov tagits fram. I denna norm tas hänsyn till samtliga förekommande uppgifter för kontrollpersonalen, inkl. tid för arbetsledning, administrativa uppgifter, arbetsmiljöarbete, fackligt arbete, obligatorisk provtagning m.m. Denna norm har legat till grund för den översyn av bemanningen som under våren 2006 har genomförts på samtliga slakterier i Sverige. Ingen ny bedömning av tidsåtgång för post-mortembesiktningen på slaktbandet har dock gjorts, då uppgifterna från Elefantprojektet fortfarande anses relevanta.

De bemanningsnormer som finns togs fram i projektet 1996 återfinns nedan. De angivna normerna gäller under förutsättning att de lokala förutsättningarna är optimala.

Bemanning vid svinslakt

Bandhastighet	Antal personer	Anmärkning
<80/90 per timme	1	Aktuellt vid vissa mindre slakterier
80/90 – 140/200	2	1 position på kropp, 1 på röda organ/tarm
180 - 220	3	2 på kropp, 1 på röda organ/tarm
200 - 360	4	2 på kropp, 2 på röda organ/tarm
360 - 400	5 eller mer	2 på kropp, 2 på röda organ, 1 på tarm

Bemanning vid storboskapsslakt

Bandhastighet	Antal personer
<15/20 per timme	1
15 – 30	2
30 – 60	3

Övriga Köttanläggningar utom slakterier

Kostnaden för kontrollen avseende detta resultatområde uppgick under 2005 till knappt 9 miljoner SEK. Avgiftsnivån och principerna för avgiftsberäkningen skiljer sig något från ”slakterier”, men är i stora drag ungefär detsamma. Fr.o.m. 2007 kommer behovet av kontrolltid att beräknas med utgångspunkt från en riskklassificeringsmodell.

Annex B. A report on Food Chain Information in the EU Regulations – handling and possibilities in a Nordic context

1. Introduction and scope

One of the specific objectives of the common Nordic project on modernisation of meat inspection concerns Food Chain Information:

The legislation on food hygiene and of official control on products of animals origin (hygiene package) assembles the requirements for Food Chain Information; i.e. information which must be provided to the slaughterhouse operators and competent authorities prior to arrival and slaughtering of the animals.

Within all Nordic countries, except for Iceland, much of the data relevant to husbandry production and slaughterhouses are already registered in the central husbandry register (CHR) and databases on movement of animals. Examples of data that are registered are treatment with veterinary drugs and results of surveillance of the zoonoses.

From a Nordic point of view, it is important that establishing a system for exchange of information is based on the existing electronic data systems and is related to food safety. In integrated production systems, based on contracts/agreements between the slaughterhouse and the primary producer, the producer is known by the slaughterhouse with respect to zoonoses, results from random testing for residues from veterinary drugs, and production data.

There is a need to establish a common Nordic understanding on the minimum requirements for this information, according to the legislation, and also how these requirements for exchange of information can be practically implemented with respect to the Nordic situation. This also includes the form in which the information has to be provided, and to the greatest extent possible electronically. According to the resources available, both as far as the competent authorities and the slaughterhouse are concerned, it is important to focus on Food Chain Information that is important for organising slaughtering and for conducting the meat inspection.

In relation to the points above a specific project group was established, with the objective to describe:

- The requirements on Food Chain Information, as related to the individual species.
- How the information must be provided and which information must be communicated between:
 - a. Primary producer (herd) and slaughterhouse,
 - b. Slaughterhouse and official veterinarian (competent authority),
 - c. Official veterinarian and primary producer,
 - d. Official veterinarian and slaughterhouse.
- Ideas and designs for testing in practice (pilot studies).

The following were members of the project group:

- Jorunn Vormeland Dalen, Norway
- Anne-Mette Olsen, Denmark
- Inge-Lis Kylløbæk Andersen, Denmark
- Susanne J. Jensen, Denmark

This report contains a description of handling of Food Chain Information from a Nordic point of view, based on the requirements laid down in the Regulation of food hygiene and official control, with respect to the Nordic production systems.

Introduction of Food Chain Information into the EU-legislation is based on the recommendation in the report of 24 February 2000 from the Scientific Committee on veterinary measures relating to public health on revision on meat inspection procedures³⁰. Food Chain Information is like that not based on a real risk assessment.

2. Conclusions and recommendations

The main conclusions from this work concern: a) EU Regulation for Food Chain Information; b) risk-based meat inspection; c) existing systems in relation to Food Chain Information; d) a survey of how each of the Nordic countries expects to fulfil the requirements; and e) identification of places where there might be missing links. The conclusions are as follows:

- In Norway, Sweden and Denmark zoonosis centres have already been established. In Finland, the zoonosis centre will be operational from January 2007. These centres contribute to the coordination, identification and control of relevant zoonoses.
- Description of information systems in the Nordic countries show that, on a national level, information between, primary producer,

³⁰ Section 5.2., 3. bullet point

slaughterhouse and competent authority is performed in association with surveillance programmes, e.g. for Salmonella (pigs, poultry, and cattle), Campylobacter (poultry) and BSE.

- Monitoring of residues of veterinary medical products is conducted, both as own check and as official control, including exchange of information in situations of non-compliance. Additionally the primary producer provides information concerning any matters of wrong treatment with veterinary medical products.
- In general, all the Nordic countries fulfil the requirements concerning registration at the primary producer, as they appear in the Regulation on food hygiene. However, electronic exchange of information does not occur, mainly because of lack of access or availability.
- In the Nordic countries systems/registers which cover the requirements for Food Chain Information between primary producer and slaughterhouse, are available, with the exception of on use of veterinary medical products. Central registration on the use of veterinary medicine products only occurs in Denmark.
- In general provision of all the information 24 hours before arrival of the animals at the slaughterhouse is not necessary in Nordic countries. Some of the information will already be present (from animal health registers, monitoring of zoonoses and residues). Other information such as herds of origin, number of animals, transport vehicle etc. will be detailed in the document, which accompanies the animals.
- In Nordic countries results from the meat inspection are reported to the primary producer in connection with account payment. Results feedback to the primary producer as also occurs in association with national surveillance programmes (e.g. for Salmonella). Furthermore, the official veterinarian is obliged to communicate results from the meat inspection in case of suspicion of presence of any disease or condition that might affect public health or compromise animal welfare, including notifying the competent authority in order to be ensure that all the necessary measures and precautions are taken.
- A proposal for a common Nordic paradigm to fulfil the requirements for Food Chain Information in cases of inter community trade has been developed.

Recommendations:

- The existing system for exchange of information should be used as much as possible, both between member states and within the same member state.
- The existing meat inspection (ante- and post-mortem) is not adapted to the actual zoonotic infection situation of today. When changing to a risk-based meat inspection, it must be based on risk assessments

focused on current food safety issues, animal health and animal welfare.

- The existing resources within the competent authorities and industries must be as targeted as possible in order to obtain the most cost-effective risk management.
- In the Nordic countries - routine exchange of information between competent authorities, slaughterhouses and organisations must be improved when there is suspicion of, and/or presence of, zoonotic agents. This work should be carried out in cooperation between the Nordic competent authorities and the organisations.
- Pilot studies on Food Chain Information should be initiated in the Nordic countries.

3. EU Regulation for Food Chain Information

3.1 Regulation of food hygiene and official controls of products of animal origin

The Regulation on food hygiene and of official controls on products of animal origin requires exchange of information in all parts of the food chain, from primary producer to slaughterhouse and competent authority, with respect to delivering animals for slaughter. Such information is a prerequisite for accepting the animals for slaughter and for further approval for human consumption.

Introduction of Food Chain Information in the EU-legislation is based on the recommendation in the report of 24 February 2000 from the Scientific Committee on veterinary measures relating to public health on revision on meat inspection procedures³¹.

The requirements for registration and flow of information is listed in every Regulation in the hygiene package, and concerns primary producer, slaughterhouse and competent authority (official veterinarian).

The requirements for primary producers appear in the Regulation on food hygiene³². For slaughterhouses, the requirements for Food Chain Information are listed in the Regulation on food hygiene for animal products³³. Finally, the obligation for the official veterinarian in relation to Food Chain Information appears in the Regulation of official controls on products of animal origin intended for human consumption.

The text in the Regulation on food hygiene indicates which information the primary producer must record, and if necessary provide for the

³¹ Section 5.2., 3. bullet (page 27)

³² Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on hygiene of foodstuffs

³³ Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin

competent authority. The information may also be used in relation to Food Chain Information.

The Regulation on food hygiene for animal products sets the requirements for the slaughterhouses (the food business operators) to request, receive, check and act upon the Food Chain Information for all animals, sent, or intended to be sent, to the slaughterhouse.

In principal, the relevant Food Chain Information must be provided to the slaughterhouse at least 24 hours before the arrival of the animals at the slaughterhouse. The Regulation on food hygiene for animal products contains a long list of the relevant Food Chain Information which should be covered, including, among others, information on treatment with veterinary medical products and information on withdrawal period, status of the holding of provenance, animal health status, and relevant reports about previous ante- and post-mortem inspections.

However information on the status of the holding of provenance, animal health status, reports about ante- and post-mortem inspections need not be provided to the slaughterhouse if the slaughterhouse is already aware of this information, e.g. through a standing arrangement or a quality assurance scheme. In such instances, the information may be provided using a form of a standardised declaration signed by the primary producer.

The Food Chain Information need not be provided as a verbatim extract but may be provided through electronic data exchange.

The Regulation of official control on animal products demands the official veterinarian to carry out audit and inspection with regard to Food Chain Information. This means that the official veterinarian must verify that animals are not slaughtered unless the slaughterhouse have received and checked the relevant Food Chain Information. However, the official veterinarian may allow animals to be slaughtered even though the relevant information is not available, on condition that the information is supplied before the carcass is approved for human consumption.

In principal, the official veterinarian must record and to evaluate the results of inspection. If the results from the inspection (both ante- and post-mortem inspection) reveal the presence or any condition that might affect public or animal health the official veterinarian must inform the slaughterhouse.

If the problem arose during primary production, the official veterinarian must inform the veterinarian attending the holding of provenance, the primary producer and, if relevant, the competent authority responsible for supervising the holding of provenance.

3.2 Implementing measures and transitional arrangements for Food Chain Information

The Commission has adopted a Regulation laying down implementation measures on certain issues and products in relation to the Regulation on food hygiene and official controls as part of the hygiene package³⁴, and which includes measures regarding Food Chain Information³⁵.

From this Regulation it appears that existing systems for information flow can be used as much as possible, and adopted on a national level in order to comply with requirements in the Regulation of official controls on products of animal origin. This applies to animals raised in one member state and slaughtered in another member state, as well as for animals that are raised and slaughtered in the same member state.

For feedback to the holding of provenance, in cases where results of ante- and post-mortem inspections indicate relevance, a model document has been developed. However, the information may be provided through electronic data exchange.

Providing and exchanging information about the food chain is a new requirement for food business operators to comply with. A period of four-years has been allowed for the food business operators to instigate full implementation of Food Chain Information, and is contained in the Commission Regulation on transitional measures³⁶ in relation to implementing the Regulations of food hygiene and official controls.

Within the transitional period, a 2-year period has been allowed to implement the Food Chain Information for pigs. By the end of 2008, Food Chain Information is expected to have been implemented in the horse and veal sector. For all other species to which the Food Chain Information applies, implementation should be completed by 31 December 2009.

During the implementation period the Member States must provide an annual report to document progression and any problems.

³⁴ Regulation (EC) No 2074/2005 of the Commission of 5 December 2005 on implementing measures concerning certain products in relation to Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for food of animal origin

³⁵ Regulation (EC) 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organisation of official controls on products of animal origin intended for human consumption and Regulation (EC) 882/2004 of the European Parliament and of the Council of 29 April 2004 on official controls performed to ensure compliance with the feed and food law, animal health and animal welfare rules, about derogation from Regulation of the European Parliament and of the Council (EC) 852/2004 of 29 April 2004 and about amending Regulation (EC) No 853/2004 and (EC) No 854/2004

³⁶ Regulation of the Commission (EC) 2076/2005 of 5 December 2005 about transitional measures in relation to implementing the Regulations of the European Parliament and Council (EC) 853/2004 and (EC) 854/2004 and (EC) 882/2004 and about changing the Regulation (EC) 853/2004 and (EC) 854/2004

3.3 Risk-based meat inspection

According to table 5.2, the existent meat inspection (ante- and post-mortem) is not adapted to the zoonotic infection situation of today. When changing to a risk-based meat inspection, the focus must be on current food safety issues and on optimal use of the authority and industry resources. Please refer to the report on risk-based meat inspection in a Nordic context for issues on risk-based meat inspection.

Based on finishers and pig meat, Annex D specifies a method to indicate hazards that the pig producer can detect/identify, in order to exchange information connected with Food Chain Information.

Denmark, Norway and Sweden have already established zoonosis centres that contribute to the coordination, identification and control of relevant zoonoses. In Finland, the zoonosis centre will be operational from January 2007.

3.4 Description of existent systems in the Nordic countries for Food Chain Information

Each of the Nordic countries have developed an overview of the present information flow from producer to establishment, establishment to producer, producer to authority, authority to producer, national surveillance programmes (human pathogens) etc.

Based on the existing information flow, a total overview has been described (Table 3.1). The overview solely provides information that is common for the Nordic countries.

In the Nordic countries, the producer routinely provides information about origin of animals and number of animals sent to the slaughterhouse. Besides this, information will be provided about zoonotic infection status, such as *Salmonella* status, or wrong medication.

The slaughterhouse provides information about the results of the zoonosis surveillance, residues of antibiotics, and findings at the ante- and post-mortem inspections. Exchange of information is at the herd level, or individually, depending on animal species etc.

When a producer suspects that his animals have contracted a notifiable disease, the producer must contact a veterinarian. The vet must confirm or disconfirm the suspicion and inform / notify the veterinary authorities.

When a notifiable disease has been diagnosed, the authorities will register the information, including possible trade restrictions.

The competent authorities provide information about the results of the public controls of residues, BSE, etc.

The Nordic countries have national surveillance programmes for zoonoses, which include all food chains from stable to table, such as *Salmonella* (pigs, poultry) and *Campylobacter* (poultry).

Additionally, controls of faecal contamination, microbiological surveillance of carcasses and trichinosis are performed.

Table 3.1. Overview over existent food safety information flow in the Nordic countries

Info – flow	Content	Existent surveillance includes: Population, herd, or individual animal
Producer ⇒ establishment	<u>Specific information on deviations:</u> <i>Salmonella</i> , Other deviations with a consequence for meat inspection: e.g. wrong medication (withdrawal period not kept).	Herd (Nordic rules) Individual (Nordic practise)
	<u>Routine information:</u> Information on origin (number of animals for delivery, producer name and address, number of animals delivered, collecting time, age etc. for cattle and small ruminants).	Herd (Nordic and EU- rules)
Establishment ⇒ producer	<u>Specific information on deviations:</u> Results from <i>Salmonella</i> and <i>Campylobacter</i> surveillance, Results from antibiotic surveillance, own control.	Herd (Nordic and EU-rules) Individual (EU-rules)
	<u>Routine information:</u> Meat inspection data: information on meat inspection findings every weekly settlement (none of these are zoonoses).	Individual/herd (Nordic rules)
Producer ⇒ authorities	Animal registers ³⁷ contain information on herd of origin and movements, veterinarians, production system (housing) etc.	Herd (Nordic and EU rules)
	Suspicion of notifiable diseases (through veterinarian)	Herd (Nordic rules)
Authorities ⇒ pro- ducer	Results from residue surveillance of meat (deviations), authority control: In case of positive findings > MRL (maximum residue limits) ⇒ follow-up at producer level.	Individual/herd (EU-rules)
	Results from residue surveillance of feed (deviations), authority control: In case of positive findings ⇒ tracing.	Herd (EU-rules) - future
	Results from BSE surveillance (cattle).	Individual (EU-rules)
National surveillance (human pathogens)	<i>Salmonella</i> (pigs, poultry) <i>Campylobacter</i> (poultry)	Population
Other Food safety issues	Visual control for absence of faecal contamination of carcasses (including meat inspection).	Slaughter hygiene
	Microbiological surveillance: <i>E. coli</i> , <i>Salmonella</i> etc.	Slaughter hygiene (EU-rules)
	Samples for <i>Trichinella</i> control (horses and pigs, wild boars, bears) ³⁸ .	Individual/herd
	Visual control and incision for cysticerci (cattle) ³⁹ .	

As mentioned in Section 3.3, Denmark, Norway and Sweden already coordinate identification and control of relevant zoonoses in zoonosis

³⁷Iceland is developing an animal register at the individual level

³⁸Iceland does not perform 100% *Trichinella* control on pigs

³⁹Iceland does not perform control for cysticerci.

centres. In Finland, the zoonosis centre will be operational from January 2007.

Summary

A survey of information systems in the Nordic countries shows that information is exchanged nationally between producer, establishment and authorities in connection with control programmes for *Salmonella* (pigs, poultry), *Campylobacter* (poultry) and BSE.

Controls of residues of veterinary medicine are based on own check controls and official controls. Information is exchanged in cases of non-compliance. Additionally, the producer provides information specifically about mis-medication etc.

3.5 Survey of how the Nordic countries fulfil requirements, and identification of where shortcomings occur

3.5.1 Requirements as regards primary producers

The Regulation on food hygiene prescribes that the primary producer must record the nature and origin of feedstuffs, use of veterinary medical products, occurrence of diseases which have an impact on food safety, results of analyses from animals or samples, and relevant reports about the control of animals etc.

Table 3.2 provides an overview of how the Nordic countries fulfil these requirements, on the basis of existing systems

Table 3.2. The Nordic countries fulfilment of demands in the Regulation for food hygiene (EC/852/2004)

Demands - primary producers, according to 852/2004, Annex 1, part A, III, 8	Country				
	DENMARK	FINLAND	ICELAND	NORWAY	SWEDEN
(a) Nature and origin of feed	* See footnote ⁴⁰	As DK	As DK	As DK	As DK
(b) Veterinary medical products or other treatments administered to the animals, dates of administration and withdrawal period	VETSTAT – herd level ⁴¹ 1) Health advisory agreements ⁴² 2) Sow cards – marking of pigs ⁴³	As Norway	As Norway	1) Own notice ⁴⁴ 2) In case of deviation, certification from veterinarian to slaughterhouse	1) Djurägärförsäkrän (animal owner insurance) Evidence of treatment from veterinarian must reach the slaughterhouse, within withdrawal period
(c) Occurrence of diseases that may affect the safety of products of animal origin	National surveillance programmes for zoonoses. Suspicion samples according to legislation e.g. brucellosis	As DK	As DK	As DK	As DK
(d) Results of analyses carried out on samples from the animals, that have importance for human health	National surveillance programmes for zoonoses and residues	As DK	As DK	As DK	As DK
(e) Relevant reports on checks carried out on animals or products of animal origin	Results from meat inspection.	As DK	As DK	As DK ⁴⁵	As DK (e.g. reports from Svenska Djurhälso-värden

Summary

In practice all Nordic countries fulfil all aspects of their obligations. However, there is no electronic exchange of information. This is mainly due to lack of access or availability.

⁴⁰ At supplies from feed mills, pig producers receive a delivery note and an insert (=recipe). New regulations concerning information about the nature and type of feeds became effective in 2003. The feed mill company must retain copies of delivery notes. This makes it possible to compare a specific delivery and to trace the place of origin. For home-mixed feed, documentation of type and origin (such as plans for fields and crops) must be placed on file.

⁴¹ VETSTAT: Vetstat is a database system for collection and successive statistical and scientific collation concerning the use, prescription and consumption of veterinary pharmaceuticals available on prescription. It also includes registration on use of growth promoters and coccidiostatics in the Danish production of farmed animals; see http://www.foedevarestyrelsen.dk/Dyr/Til_dyrlaeger/Vetstat

⁴² Health Advisory agreements are voluntary agreements between veterinary practitioners and producers. Contracts, among other things, include registration of use of medicine, see http://www.foedevarestyrelsen.dk/Dyr/Til_dyrlaeger/Sundhedsraadgivningsaftaler/forside.htm

⁴³ Sow card: is a card per sow in which the producer, among other things, writes information about medication. Finishers that are medicated must be marked.

⁴⁴ Is used when circumstances are unusual.

⁴⁵ Possible information from "Helsetjenesten" / udvidet sygdomsregistrering

3.5.2 Requirements as regards slaughterhouses

In the Regulation on food hygiene for animal products, the slaughterhouses are obliged to ensure that they have relevant information from the primary producer including information about origin of herd, regional animal health status, health status of the animals, use of veterinary medical products, prevalence of diseases that might affect the safety of the meat, relevant test results of samples (zoonoses and residues), relevant report from previous inspections (herds), and, if relevant, production data.

It is possible to omit sending some parts of information if, for instance, through standing systems or quality assurance programmes, the slaughterhouse already has such information. This applies to information about the status of the herd of origin, animal health status and results from previous findings at ante- and post-mortem inspections.

It is not necessary to have the information on paper; it can be sent electronically or in special cases in the form of standard declarations.

An overview of requirements for information flow has been developed for slaughterhouses. The individual Nordic countries have assessed compliance with the requirements for information flow, (table 3.3).

Summary

The necessary information is available in all the Nordic countries, with the exception of information on use of veterinary medicine products, as only Denmark has central registration on the use veterinary medicine products. In general, provision of all the information 24 hours before arrival of the animals is not necessary in the Nordic countries. Some of the information is already provided by national systems (such as central husbandry registration, surveillance of zoonoses and residues), whereas other types of information such as origin of herd, number of animals, vehicle will be detailed in the document that accompanies the animals.

Table 3.3. The Nordic countries compliance with Regulation on food hygiene of food of animal origin (EC/ 853/2004)

Demands Slaughterhouses, according to (EC/853/2004), ANNEX II, Section III, 3	Countries				
	DENMARK	FINLAND	ICELAND	NORWAY	SWEDEN
a) Status of the holding or the regional animal health status	CHR (Centrale Husdyrbrug Register = central animal health register)	Finsk register over nötkreatur = animal health register	The Veterinary authorities are aware of the regional health status	Husdyrregisteret = animal health register ⁴⁶	CDB = animal health register
b) The animal health status	Only when deviations ⁴⁷	As DK	As DK	As DK	As DK
c) Veterinary medical products or other treatments administered to the animals within a relevant period, dates of administration and withdrawal period	No electronic systems exist, but the primary producer is obliged to inform in cases of non-compliance e.g. wrong medication, broken needles				
d) Occurrence of diseases that may affect the safety of meat	National surveillance programmes for zoonoses If deviations use of note (passérseddel) e.g. suspicion of brucellosis (herd level)	As DK	National Surveillance Programmes ⁴⁸	As DK	As DK

⁴⁶ Information on health, treatment etc. for cattle in an industry ("ku-kontrollen"), without access for the authorities

⁴⁷ Information from farm to slaughterhouses only in case of deviations e.g. brucellose, clinical salmonellosis etc.

⁴⁸ In Iceland there are surveillance programs for *Salmonella* in poultry and pigs, *Campylobacter* in poultry and monitoring of residues in fresh meat and poultry

Demands	Countries				
	DENMARK	FINLAND	ICELAND	NORWAY	SWEDEN
Slaughterhouses, according to (EC/853/2004), ANNEX II, Section III, 3					
e) Results, if relevant to protection of public health, of analyses carried out on samples from the animals that may affect the safety of the meat, including monitoring and control of zoonoses and residues	National surveillance programmes e.g.: <i>Salmonella</i> , <i>Campylobacter</i> , Residues.	As DK	National Surveillance programmes: <i>Salmonella</i> (poultry and pigs), <i>Campylobacter</i> (poultry).	As DK	National surveillance programmes: <i>Salmonella</i> .
f) Relevant reports on previous meat inspection of animals from the same holding, particularly reports from the official veterinarian	Results from meat inspection ⁴⁹	As DK	Results from meat inspection for regular deliveries, but not for non-regular deliveries	As DK	As DK
g) Production data, when this might indicate the presence of disease	Could, for example, be information on type of holding (outdoor) Herd inspection of poultry, not for Iceland Unclean animals (cattle/and sheep) Difficulty with examples on routine data				
h) Name and address of the private veterinarian normally attending the holding	Information in the central animal register	ETU www.etu.fi			

⁴⁹ Informations exist but are not exchanged between slaughterhouses

3.5.3 Exchange of information from authorities to primary producers

In the Nordic countries, relevant findings in connection with meat inspection are reported to the primary producer. The information will be provided in association with account payment. Additionally, results from the national surveillance programmes will be reported (e.g. Salmonella).

If, during the course of the meat inspection, the veterinary officer suspects residues to have been found, infectious animal diseases or animal welfare problems, the veterinarian is obliged to inform the respective veterinary authorities that are responsible for following up the matter and the establishment in question.

3.5.4 Information flow from authorities to slaughterhouses

The slaughterhouses and the organisations have both skills and a network that will contribute considerably to preventing the spread of zoonotic infections, OIE list A diseases, residues etc. Efficient information routines between the regulatory authorities (nationally, veterinary control, supervision of herds), the slaughterhouses and the farmers unions are a prerequisite for success.

Present Regulations on food hygiene and of official control on products of animal origin do not address this need satisfactorily. There is a need to improve the routine exchange of information between competent authorities, slaughterhouses and organisations in cases of suspicion and/or presence of zoonotic agents. This work should be carried out in cooperation between the competent Nordic authorities and the organisations.

3.6 Common Nordic suggestions for exchange of Food Chain Information, within the member state and between member states

3.6.1 Regular deliveries, i.e. the herd is known to the slaughterhouse

Regular deliveries mean that there is a written agreement between the producer and the slaughterhouse concerning deliveries. The producer may have a written agreement with several slaughterhouses. Accordingly, when the animals are delivered, the origin of the herd is already known to the recipient (slaughterhouse). Additionally, producers with regular deliveries are often obliged to follow a "Code of Practice" which, among other things, regulates how medicines are used.

When the producer delivers animals on a regular basis, he will either:

- Work out a general statement about compliance with withdrawal periods, and in case of deviations (such as broken needles, mis-medication etc.) he will notify the slaughterhouse, or
- Follow a “Code of Practice” which provides requirements for withdrawal periods, special information to the slaughterhouse in case of deviations etc.

A model to use in cases of regular supplies (Annex C) is appended.

3.6.2 Non-regular deliveries i.e. the herd is unknown to the slaughterhouse

A model to use in case of non-regular deliveries (Annex C) is appended.

3.7 Test of the Nordic model in practice - pilot studies

The Commission Regulation on implementing measures and transitional arrangements under Regulation laying down specific hygiene rules for food of animal origin a 4 year period before full implementation is laid down for all animal species, except poultry.

From 2006 the Nordic model will be tested and used as the basis for implementing Food Chain Information on selected species and in selected establishments.

It is important that the testing focuses on ensuring that the system is both operational and practical.

Discussion and coordination between establishments and competent authorities is necessary before testing the practical use of the suggested model.

The purpose of discussion and coordination is to ensure involvement of all the relevant parties (establishments and competent authorities), and if necessary to adjust the examples to be used, (presented in 3.6), including development of instructions/guidelines for industry and authorities.

Annex C. Suggestion for a paradigm to be used from 1. January 2006 in case of inter- and intracommunity trade

Food Chain Information models for exchange of Food Chain Information, within a member state and between member states

Example 1 concerning Food Chain Information needed for slaughter pigs originating from a herd, with a contract between herd and slaughterhouse

A contract between producer and slaughterhouse is a documented agreement between producer and slaughterhouse. This means that the herd is already known by the slaughterhouse before delivery of the pigs for slaughter, and the slaughterhouse has access to relevant farm data and vice versa (e.g. previous slaughter findings from ante- and post-mortem inspection, findings of antibiotic residues and *Salmonella* findings). National zoonosis surveillance already occurs in Nordic countries.

Concerning the use of medicine the producer must either:

- Give a statement “once and for all” that the withdrawal period will be kept and that the producer will inform the slaughterhouse in cases of wrong medication or a broken needles. In such cases a special notification will be sent with the animals, or
- Be registered to a “Code of practice” or equivalent, which contains procedures related to the use of medicine, including registration of medication used, compliance with withdrawal periods and actions to be taken in case of deviations.

In case of transport within a Nordic country, each batch is typically accompanied by a routine information document concerning:

1. Contact details
 - Farm of origin - address in full (including registration number)
 - Address of destination
2. Transport details

- Transport company name
- Truck number
- Time loaded
- Time unloaded
- Loading capacity

3. Identification details

- Number of animals for slaughter (batch size)
- Age group (slaughter pigs or sows/boars)

Example 2 concerning Food Chain Information needed for slaughter animals originating from a herd with no contract between herd and slaughterhouse

In cases of there being no contract between producer and slaughterhouse, the herd of origin is unknown by the slaughterhouse and no Code of Practice will exist. The following statement is a model for information to accompany the animals. Alternatively the information should be sent directly to the slaughterhouse:

1. Contact details

- Farm of origin - address in full (including registration number)
- Address of destination

2. Transport details

- Transport company name
- Truck number
- Time loaded
- Time unloaded
- Loading capacity

3. Identification details

- Number of animals for slaughter (batch size)
- Age group (pigs/poultry) / age (cattle)

4. Animal treatments

- Has the withdrawal period been kept? Yes? No?

5. Animal health

- Is the holding subject to restrictions for animal health reasons? Yes?No? If yes, what is the reason?

6. Zoonotic status

- Is the holding subject to restrictions for food safety reasons?
Yes? No? If yes, what is the reason?

7. Name (and contact details) of veterinarian in charge of the animals

8. Other relevant information, such as previous slaughter findings or broken needles, wrong medication etc.

9. Signature of owner or manager and Date

In case of trade between member states, only the information in 4, 5, 6, 7, 8, and 9 would need to be certified by the farmer/owner/manager, as details on the herd, transport, identification of animals etc. are stated in the veterinary certificate accompanying the animals.

Annex D. Example of a method to designate food safety hazards in relation to the primary producer (in Nordic languages)

Eksempel på metode til udpegning af hazards relevante for fødevarerikkerhed hos producent med henblik på info-flow til virksomhed samt relevans for kødkontrollen – svin og svinekød

A) Hazards med relation til svin og svinekød (fødevarerikkerhed) Biologiske hazards/Sygdom	B) Forekomst i levende svin i DK	C) Kan producenten opdage sygdommen, hvis den findes (+/-)	D) Er info-flow til virksomhed muligt, dvs. hvis C) = +(+/-)	E) Er hazards/ sygdommen relevant for udførelse af kødkontrollen (fødevarerikkerhed)
Trikiner	-	-	-	+
Bovin TB	-	+, anmeldepligt	+, passerseddel (giver sygdommen klinik i svin ?)	+
Aviær TB	+	-	-	- ?
Brucella abortus/melientis	-	+, anmeldepligt	+, passerseddel	+
Brucella suis, leporis mv	+	+, anmeldepligt	+, passerseddel	+
Rabies	-	(+, anmeldepligt)	(+)	
Teatanus	-	(+, anmeldepligt)	(+)	
Akut Salmonellose	+	+, anmeldepligt	+, passerseddel	+
Rødsyge	+	+	+	- (smitter ikke via kød)
Carriers <i>Salmonella</i>	+	+	+	-
		(kødsaft-overvågning)	(slagteristyret slagtning)	
Cysticerkose	-	-	-	+