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QUALITATIVE RISK ASSESSMENT

The Spread of Classical Swine Fever into and within Finland

KVALITATIIVINEN RISKINARVIOINTI

Klassisen sikaruton maahantulo ja leviäminen Suomessa

EELA

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A qualitative risk assessment of the spread of classical swine fever into and within Finland

KUVAILULEHTI

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Tiivistelmä

Tämä kuvaileva riskinarviointi klassisen sikaruton leviämisestä Suomeen ja Suomessa on osa Maa- ja metsätalousministeriön rahoittamaa (MAKERA 4255/502/2000) EELAn ja MTT taloustutkimuksen yhteistyöprojektia (tarttuvien eläintautien talous Suomessa).

Kuvaileva riskinarviointi tehtiin kaksiosaisena. Ensimmäisessä osassa arvioitiin riskiä klassisen sikaruton leviämisestä Suomeen vuosia 1998-2000 vastaavissa olosuhteissa. Lisäksi arvioitiin käytettävissä olleiden riskinhallintatoimepiteiden tehoa estää taudin tulo Suomeen elävien eläinten, sperman ja sianlihan sisämarkkinakaupan sekä sikaloihin tehtävien tilavierailujen kautta. Toisessa osassa arvioitiin taudin leviämisen riskiä Suomessa vuoden 2001 olosuhteissa, ennen taudin havaitsemista maassa. Arvioinnissa käytettiin hyväksi tilastoja, kyselyillä kerättyjä tietoja ja asiantuntija-arvioita.

Riskinarvioinnissa kuvattiin:
1. Klassisen sikaruton tärkeimmät leviämisreitit Suomeen vuosina 1998-2000.
2. Klassiselle sikarutolle alttiit populaatiot Suomessa.
3. Klassisen sikaruton tärkeimmät leviämisreitit Suomessa vuoden 2001 tuotantorakenteessa.

Riskinarvioinnin tuloksena tehtiin seuraavat arviot:
1. Klassisen sikaruton maahantuloriskiä voidaan hallita tehokkaasti käyttämällä tärkeimpiä, hyvin tunnettuja riskinhallintatoimenpiteitä samanaikaisesti.
2. Tuoreen sianlihan sisämarkkinakaupan aiheuttamaa maahantuloriskiä pidettiin vaikeimmin hallittavana.
3. Klassisen sikaruton maahantuloriski oli vuosien 1998-2000 olosuhteissa olematon tai alhainen.
4. Suurin maahantuloriski liittyi vuosien 1998-2000 olosuhteissa tuoreen sianlihan tai sianlihaa sisältävien tuotteiden tuontiin, sellaisista maista, joissa oli todettu sikaruttoa. Tämä riski kohdistui yhdistelmä- ja lihasikaloihin, villisikatarhoihin sekä minisikojen pitopaikkoihin.
5. Vuoden 2001 olosuhteissa sikarutto leviäisi tehokkaimmin, jos se leviäsi ensimmäiseksi keinosiemennysasemalle.
6. Klassisen sikaruoton leviäminen porsastuotantotilalle aiheuttaisi myös suuren edelleenleviämisriskin.
7. Jos klassinen sikarutto leviäisi Suomeen ensin lihasikalaan tai villisikatarhaan, edelleenleviämisen riski olisi alhainen.
8. Klassisen sikaruton leviäminen ensin minisikapopulaatioon olisi vain vähäinen riski muille sikapopulaatioille.

Tarkempi arvio sikaruton leviämisestä Suomessa ja arvio siitä miten kauan sikaruton havaitseminen Suomessa kestäisi edellyttää laskennallista mallia. Laskennallista mallia varten on kerättävä lisää tietoa suorien ja epäsuorien kontaktien määristä, sikaruton oireiden havaitsemisesta sikaloissa sekä todetun tautitapauksen seurauksena käytettävissä olevista hallinnollisista toimenpidevaihtoehdoista.

KUVAILULEHTI

Avainsanat	Klassinen sikarutto, leviämisen arviointi, altistuksen arviointi, kotisika, villisika, minisika.
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DESCRIPTION

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Title A qualitative risk assessment on the spread of classical swine fever into and within Finland

Abstract

This qualitative risk assessment of the spread of classical swine fever (CSF) into and within Finland is a part of a joint project: Economics of infectious animal diseases in Finland, of the National Veterinary and Food Research Institute and the Agrifood Research Finland. The project was funded by the Ministry of Agriculture and Forestry (MAKERA 4255/502/2000).

The qualitative risk assessment consisted of two separate parts. In the first part, the risk of release of CSF into Finland in circumstances similar to those in 1998-2000 was assessed. In addition, the effectivity of risk management measures to prevent CSF release into Finland (by intra-community trade of live animal, semen, fresh pork and by human contacts) were assessed. In the second part, the risk of exposure of the swine population within Finland to CSF was assessed until the disease will be detected, in circumstances of year 2001. Official statistics, data gathered by questionnaires and expert opinions were used.

In the risk assessment the following topics were described:

1. The main release routes of CSF into Finland in 1998-2000.
2. The susceptible swine populations at risk to CSF in Finland.
3. The main exposure routes of CSF within Finland in the pork production structure of 2001.

The following risk assessments were concluded:

1. The risk of release of CSF into Finland can be effectively managed if major well known risk management measures are applied concurrently.
2. The risk management related to fresh pork imports were assessed to be the most difficult.
3. The risk of release of CSF into Finland in circumstances similar to 1998-2000 was assessed to be negligible or low.
4. The highest risk of release was connected to intra-community trade or imports of pork and pork products from countries experiencing CSF outbreaks in 1998-2000. The risk was highest in the farrowing-to-finishing herds, finishing herds, farmed wild boars and miniature pigs.
5. In a production structure similar to that in 2001, the release of CSF into an artificial insemination centre would cause the highest risk for further spread within Finland.
6. The release of CSF into a herd producing piglets would cause a high risk of further spread of CSF.
7. The estimated risk for further spread of CSF from finishing pigs or farmed wild boars was assessed to be low.
8. The release of CSF into the miniature pig population possess a low risk of further spread to other susceptible populations.

A quantitative model is required for even more detailed assessment of the spread of CSF within Finland during an outbreak. In order to build such a model, more information should be collected on direct and indirect contacts between the Finnish swine populations, on the detection of clinical signs, and on risk management before and during an outbreak.

DESCRIPTION

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1 DEFINITIONS AND ABBREVIATIONS

Abbreviations:

AD	Aujeszky`s disease
AHU	Animal Health Unit
AI	Artificial Insemination centre
BD	Border Disease
BDV	Border Disease virus
BIP	Border inspection post
BSE	Bovine spongiform enchephalopathy
BVD	Bovine Viral Diarrhoea
BVDV	Bovine Viral Diarrhoea Virus
CA	Competent Authority
CSF	Classical Swine Fever
CSFV	Classical Swine Fever Virus
CVO	Chief Veterinary Officer
EB	Elite breeding herd
EELA	National Veterinary and Food Research Institute
ELISA	Enzyme-linked immunosorbent assay
ETT	Association for Animal Disease Prevention
EU	European Union
EVI	National Food Administration
F	Farrowing herd
FABA	The Finnish Animal Breeding Association
FAT	Fluorescent antibody test
Fi	Finishing herd
FMD	Foot and Mouth Disease
F to Fi	Farrowing-to-finishing herd
FW	Farmed wild boar
GIS	Geographical Information System
KTTK	Plant Production Inspection Centre
LDCC	Local Disease Control Centre
MAD	Median absolute deviation
MH	Multiplying herd
MP	Miniature pig
MPN	Most probable number
MAF DFH	Department of Food and Health of the Ministry of Agriculture and Forestry
MTT	Agrifood Research Finland
MVO	Municipal Veterinary Officer
NDCC	National Disease Control Centre
NPLA	Neutralising peroxidase-linked antibody assay
OIE	World Organisation for Animal Health
PVO	Provincial Veterinary Officer
PRRS	Porcine Reproductive and Respiratory Syndrome
RKTL	The Finnish Game and Fisheries Research Institute
RT PCR	Reverse Transcription - Polymeras Chain Reaction
SVC	Standing Veterinary Committee
SVD	Swine Vesicular disease
SI	Swine Influenza
TGE	Transmissible Gastroenteritis
TIKE	Information centre of the Ministry of Agriculture and Forestry
TSE	Transmissible Spongiform Enchephalopaty
UK	United Kingdom
VN	Virus Neutralisation
WB	Feral wild boar

Definitions:

Case of CSF
: An individual animal affected by Classical Swine Fever

Consequence assessment
: Description of the relationship between specified exposures to a biological agent and the direct or indirect consequences of those exposures (OIE 2002b).

Disease free area
: A country is considered free from CSF when it has been shown that CSF has not been present for at least the past 2 years (OIE 2002b).

Detection time
: The time between the occurrence of clinical signs of CSF and the diagnosis of CSF in the primary outbreak.

Endemic disease
: The constant presence of a disease within a given population or a geographical area.

Elite breeding herd
: Herds producing breeding animals for the domestic market as well as for export. The herds participate actively in the national pig breeding program by sending animals to the performance test stations and producing AI boars. An elite breeding herd must comply with the requirements of the National Health Scheme for domestic swine breeding herds.

Epidemic
: Introduction of a highly contagious pathogen into a susceptible population followed by a rapid increase in the number of cases in time.

Exposure assessment
: Describing the biological pathway necessary for exposure of the population at risk to CSF, released from a given risk source, and qualitatively or qualitatively estimating the probability of the exposure occurring.

Farrowing herd
: Herds producing piglets to be sold to finishing herds.

Farrowing-to-finishing herd
: Herd producing piglets and raising all or part of the piglets until slaughter.

Finishing herd
: Herd purchasing piglets from farrowing or farrowing-to-finishing herds and rearing them until slaughter.

Hazard identification
: The process of identifying the pathogenic agents which could potentially be introduced in the commodity considered for importation.

High risk period
: The time period between the release of CSF virus into the susceptible population and the execution of the first preventive measures due to a suspicion or confirmation of disease. The high risk period includes the incubation period and the detection time.

Incubation period
: The period which elapses between the introduction of the pathogen into the animal and the occurrence of the first clinical signs of the disease (OIE 2002b).

Intra-community trade
: Trade within the countries of the European Union.

Monitoring
: On-going programmes to detect changes in the prevalence of disease in a given population (OIE).

Multiplying herd
: Herds producing young crossbred or purebred breeding gilts for distribution to farrowing or farrowing-to-finishing herds.

Neighbourhood spread
: Transmission of CSF between herds in close proximity (less than 1 km), where no other means of transmission of the disease can be identified.

OIE List A
: A list of transmissible diseases which have the potential for very serious and rapid spread, irrespective of national borders, which are of serious socio-economic or public health consequence and which are of major importance in the international trade of animals and animal products.

OIE List B
: A list of transmissible diseases which are considered to be of socio-economic and/or public health importance within countries and which are significant in the international trade of animals and animal products.

Outbreak of CSF
: An occurrence of CSF in a population in a certain area or certain agricultural establishment, breeding establishment or premises, including all buildings and all adjoining premises, where domestic swine, farmed or feral wild boars or miniature pigs are present (OIE 2002b).

Qualitative risk assessment
: An assessment where the outputs on the likelihood of the outcome, or the magnitude of the consequences are expressed in qualitative terms such as "very high", "high", "medium", "low" or "negligible" (OIE 2002b).

Release assessment
: Describing the biological pathways necessary for an importation activity to release (introduce) pathogenic agents into a particular environment, and estimating the probability of that complete process occurring, either qualitatively or quantitatively (OIE 2002b).

Risk
: The likelihood of the occurrence and the likely magnitude of the consequences of an adverse event on animal or human health in the importing country during a specified time period (OIE 2002b).

Risk analysis
: The process composed of hazard identification, risk assessment, risk management and risk communication (OIE 2002b).

Risk assessment
: The evaluation of the likelihood and the biologic and economic consequences of entry, establishment, or spread of a pathogenic agent within the territory of an importing country. The risk assessment is composed of a release assessment, exposure assessment, consequence assessment and risk estimation (OIE 2002b).

Risk estimation
: The integrated results of the release assessment, exposure assessment, and consequence assessment to produce overall measures of risks associated with the hazards identified at the outset (OIE 2002b).

Risk management
: The process of identifying, selecting and implementing measures that can be applied to reduce the level of risk (OIE 2002b).

Screening	Diagnostic tests carried out systematically, either within the framework of a control programme for the disease, or for qualifying herds/ flocks as free of the disease in all or part of the national territory (OIE 2002b).
Stamping-out	Killing of CSF infected herds and/or other herds which have been exposed to infection by direct animal to animal contact, or by indirect contact likely to cause the transmission of CSF. All carcasses of killed animals are destroyed by burning or burial, or by any other method which will eliminate the spread of infection through the carcasses or products of the animals killed (OIE 2002b).
Surveillance	Continuous investigation of a given population to detect the occurrence of disease for control purposes, which may involve testing a part of the population (OIE 2002b).
Third country	Countries which are not members of the EU.
Zoning	Delineation (by regulatory means) of free, surveillance and/or buffer and Infected zones within the country for disease control purposes (OIE 2002b).

2 SUMMARY

Classical swine fever (CSF) or Hog Cholera is a highly contagious viral disease of swine. In Finland, the last outbreak of the disease was recorded in 1917. At present, according to the definition of the World Organisation for Animal Health (OIE), Finland is regarded as free of CSF. Recent changes, however, in the structure of pork production and in the risk management practices at import of live animals, semen and pork, might have changed the risk of release of CSF into Finland. Moreover, the pace of these changes has increased since Finland joined the European Union. In 2001, the Department of Food and Health at the Ministry of Agriculture and Forestry (MAF DFH) ordered a risk assessment on the risk of spread of CSF into and within Finland from the Department of Risk Assessment at the National Veterinary and Food Research Institute (EELA).

This risk assessment consisted of two separate parts. In the first part, the risk of release of CSF into Finland in circumstances similar to those in 1998-2000 was assessed. In addition, risk management measures in force were also scored. In the second part, the risk of exposure of the population at risk to CSF during the high risk period, in circumstances similar to those in the pork production structure of 2001, was assessed. The risk assessment was performed according to the principles of the OIE. Neither the risk of exposure after transmission from the primary outbreak, the risk of exposure after detection of the disease nor the assessment of the possible length of the high risk period in Finland was the scope of this project. In the final risk estimation we however used an assumption of a high risk period of 8 weeks. This assumption was based on literature published from actual outbreaks elsewhere.

Data from official statistics, and from the main slaughterhouses in Finland, the Association of Animal Disease Prevention (ETT) and the Finnish Animal Breeding Association (FABA), gathered by questionnaires were used in the risk assessment. Expert opinions were also used in the assessment.

The risk management of intra-community trade of live animals, semen and fresh pork as well as the management of human contacts after herd visits was scored by a group of experts. According to the expert opinion, it is possible to manage risks effectively, if major well-known risk management measures are applied concurrently. Intra-community trade of fresh pork was regarded as the most difficult to control.

The risk of release of CSF into the domestic swine population in Finland, in circumstances similar to those in 1998-2000, was assessed to be negligible to low. Intra-community trade and imports of pork and pork products from countries with outbreaks of CSF were assessed as the release routes with the highest risk. The populations most at risk of release of CSF through imported pork and pork products were farrowing-to-finishing herds, finishing herds and farmed wild boars. Illegal imports of live animals or pork would pose the highest risk to the miniature pig population.

According to the results of this assessment, the worst case scenario of exposure, in a production structure similar to that in 2001, would be the release of CSF into an Artificial insemination (AI) centre. This is due to the high risk of further spread within Finland through semen. The release into herds producing piglets would also be serious, but the number of farms subsequently affected is estimated to be smaller compared to release into an AI centre. The estimated risk of further spread of CSF from finishing herds and farmed wild boars was low and the disease would spread only slowly to other

populations. The release of CSF into the miniature pig population would be less serious compared to CSF release into the domestic swine population, as spread from the miniature pig population would probably be slow.

The possible length of the high risk period in Finland was not assessed in this project but the events necessary for detection of an outbreak were described. The detection of a case of CSF in Finland is depending on the observation and identification of clinical signs leading to notification of the sign to the veterinary authorities with subsequent testing for CSF. The current serologic monitoring and surveillance, which was also practised in 1998-2000, is capable to detect CSF at the AI centres, at the performance test stations, representing elite breeding herds in Finland, and in a part of the wild boar farms. Other populations at risk are not covered by the program.

Stamping out of the infected populations as well as movement restrictions in affected areas would be applied as a consequence of release of CSF into Finland. The economic consequences to the industry and the government would be considerable, consisting both of direct and indirect costs and losses. There would also be environmental consequences related to the disposal of carcasses and other contaminated materials.

An more detailed estimate of the risk of spread of CSF after detection, the extent of the total spread in Finland and assessment of the length of the high risk period requires a quantitative model. In order to build such a model, more information should be collected on direct and indirect contacts between the populations at risk in Finland, the detection of clinical signs in the herds and the risk management during an outbreak.

2.1 YHTEENVETO

Klassinen sikarutto on sikojen herkästi tarttuva virustauti, jota on todettu Suomessa viimeksi vuonna 1917. Kansainvälisen eläintautijärjestön (OIE) määrittelyn mukaisesti Suomi on vapaa sikarutosta. Riski klassisen sikaruton leviämiselle Suomeen on saattanut muuttua niiden viime aikaisten muutosten seurauksena, jotka ovat tapahtunut sianlihan tuotantorakenteessa ja elävien sikojen, sperman ja sianlihan tuontiin liittyvässä riskinhallinnassa. Muutostahti on kiihtynyt Suomen liityttyä EU:n jäseneksi vuonna 1995. Vuonna 2001 Maa- ja metsätalousministeriön elintarvike- ja terveysosasto tilasi Eläinlääkintä ja elintarviketutkimuslaitoksen riskinarvioinnin tutkimusyksiköltä riskinarvioinnin sikaruton leviämisestä Suomeen ja Suomen sisällä.

Riskinarviointi tehtiin kaksiosaisena. Ensimmäisessä osassa arvioitiin riski klassisen sikaruton leviämisestä Suomeen vuosia 1998-2000 vastaavissa olosuhteissa. Lisäksi pisteytettiin käytettävissä olleiden riskinhallintatoimenpiteiden teho estää taudin tuleminen Suomeen. Toisessa osassa arvioitiin taudin maassa leviämisen riskiä vuoden 2001 olosuhteissa. Arviointi tehtiin OIE:n tuontiriskinarviointia koskevien ohjeiden mukaisesti. Arvioinnissa tehtiin seuraavia rajauksia: arviointi päätettiin siihen hetkeen, jolloin ensimmäinen sikaruttotapaus tulisi maassa ilmi; kontakteista määritettiin ainoastaan primääriset kontaktit, primäärisiä kontakteja seuraavia sekundäärisiä kontakteja ei arvioitu; ns. korkean riskin ajanjakson pituutta ei arvioitu, korkean riskin ajanjakson pituudeksi valittiin 8 viikkoa muissa maissa saatujen kokemusten perusteella. Korkean riskin ajanjaksolla tarkoitetaan sellaista aikaa, joka kuluisi taudin maahan leviämisestä siihen hetkeen, jolloin tauti tunnistettaisiin maassa ensimmäisen kerran.

Arvioinnissa käytettiin hyväksi julkaistuja tilastoja sekä suurimmilta teurastamoilta, Eläintautien torjuntayhdistykseltä ja Suomen kotieläinjalostusosuuskunnalta kyselyillä kerättyä tietoa. Riskinarvioinnissa käytettiin myös asiantuntija-arvioita.

Elävien sikojen, sperman ja sianlihan sisämarkkinakaupassa on käytettävissä erilaisia riskinhallintatoimenpiteitä. Sellaisia liittyy myös sikaloihin tehtäviin tilavierailuihin. Ryhmä asiantuntijoita pisteytti eri riskinhallintatoimenpiteiden tehon estää sikaruton maahantulo. Näin saadun asiantuntija-arvion mukaan

leviämisen riski on mahdollista hallita tehokkaasti, mikäli käytetään kaikkia tärkeimpiä, hyvin tunnettuja riskinhallintatoimenpiteitä samanaikaisesti. Asiantuntijoiden mukaan riski oli vaikeimmin hallittavissa tuoreen sianlihan sisämarkkinakaupassa.

Riski klassisen sikaruton leviämisestä Suomeen vuosia 1998-2000 vastaavissa olosuhteissa arvioitiin olemattomaksi tai alhaiseksi. Asiantuntija-arvion mukaan suurin riski leviämiselle liittyi tuoreen sianlihan sekä sianlihaa sisältävien tuotteiden tuontiin, sellaisista maista, joissa oli todettu sikaruttoa. Herkimmät populaatiot tämän tyyppiselle leviämiselle Suomessa olisivat yhdistelmäsikalat, lihasikalat ja villisikatarhat. Elävien eläinten mahdollisen laittoman tuonnin arvioitiin muodostavan suurimman riskin minisikapopulaatiolle.

Tämän riskinarvioinnin perusteella pahin uhkakuva olisi sikaruton leviäminen suomalaiselle keinosiemennysasemalle, koska riski taudin leviämiselle muualle Suomeen olisi keinosiemennysten välityksellä suuri. Seuraukset olisivat vakavat myös, jos tauti leviäisi porsastuotantotilalle. Erotuksena edelliseen, tässä vaihtoehdossa taudille altistuvia sikaloita olisi kuitenkin vähemmän. Jos sikarutto leviäisi lihasikalaan tai villisikatarhaan, taudin edelleen leviäminen olisi hidasta. Taudin leviäminen minisikoihin aiheuttaisi todennäköisesti vain vähäisen riskin muulle sikapopulaatiolle, koska taudin leviäminen olisi todennäköisesti hidasta.

Tässä työssä ei arvioitu korkean riskin ajanjakson pituutta Suomessa. Taudin tunnistamiseen johtava tapahtumaketju kuitenkin kuvattiin. Sikaruton tunnistamiseen tarvittava aika Suomessa riippuu ajasta, joka kuluu kliinisten oireiden havaitsemiseen sikalassa, tautiepäilystä ilmoittamiseen eläinlääkintäviranomaisille ja eläinten testaamiseen klassisen sikaruton varalta. Nykyinen, myös vuosina 1998-2000 toteutettu, klassisen sikaruton serologinen valvontaohjelma kattaa molemmat keinosiemennysasemat, kantakoeasemat ja osan villisikatarhoista. Kantakoeasemat edustavat maan jalostussikaloita. Ohjelma ei kata muita osia sikapopulaatiosta.

Mikäli sikarutto leviäisi Suomeen, tartunnan saaneista sikaloista hävitettäisiin kaikki siat ja suoja- ja valvontavyöhykkeillä rajoitettaisiin sikojen siirtoja ja muita sikaloiden välisiä kontakteja. Elinkeinolle ja yhteiskunnalle aiheutuisi huomattavia suoria ja epäsuoria kustannuksia ja taloudellisia menetyksiä. Raatojen ja muun saastuneen materiaalin hävittäminen voisi vaikuttaa myös ympäristön tilaan.

Tarkempi arvio sikaruton leviämisestä Suomessa ja korkean riskin ajanjakson pituudesta edellyttää laskennallista mallia. Sellaista varten on kerättävä lisää tietoa suorien ja epäsuorien kontaktien määristä, sikarutto oireiden havaitsemisesta sikaloissa sekä todetun tautitapauksen seurauksena toimeenpantujen hallintotoimien vaikutuksista.

3 INTRODUCTION

3.1 HISTORY

Classical Swine Fever (CSF) is a highly contagious viral disease of swine. Outbreaks of the disease are associated with considerable indirect and direct costs for industry, government and for the society as a whole. Finland is regarded as free of CSF according to the definition of the World Organisation for Animal Health (OIE): the last outbreak of the disease was recorded in 1917 (MAF DFH 2001a).

Finland joined the European Union (EU) in 1995, adopting the policy on the free movement of goods which allowed the industry to participate in the trade of live pigs, semen, pork and pork products within the EU without national legal requirements (Council Directive 64/432). Many major pig pathogens, including CSF, are either absent or very rare in the Finnish pig population (Table 1). There are several reasons for this: before joining the EU in 1995, Finland had restrictive import controls; Finland has had many long-term animal disease eradication programs; and finally, Finland is geographically isolated and does not have densely-populated livestock areas (MAF DFH 2001a).

3.2 OBJECTIVES

There are several routes through which CSF could be released into Finland, though the risks associated with these routes have not been scientifically assessed before. In 2001, The Food and Health Department at the Ministry of Agriculture and Forestry (MAF DFH) submitted a formal request for a risk assessment of CSF to the Department of Risk Assess-

Table 1
The last occurrences of certain contagious diseases of swine in Finland (MAF DFH 2001a).

Disease	Last recorded	OIE-code
African Swine Fewer	Never	A 120
Athrophic Rhinitis	1999	B 251
Aujeszky´s disease (AD)	Never	B 052
Porcine Brucellosis	Never	B 253
Classical Swine Fever (CSF)	1917	A 130
Cysticercus cellulosae	Never	B 252
Foot and Mouth Disease (FMD)	1959[A]	A 010
Porcine reproductive and respiratory syndrome (PRRS)	Never	B 257
Porcine respiratory corona virus	Never	NL
Swine Influenza (SI)	Never	NL
Swine Vesicular Disease (SVD)	Never	A 030
Teschen disease	Never	B 256
Transmissible Gastroenteritis (TGE)	1981	B 254

[A] Bovine

NL Not listed by the OIE

ment of the National Veterinary and Food Research Institute (EELA). EELA, together with Agrifood Research Finland (MTT), initiated a risk assessment including both the health and economic implications of CSF in Finland. The project is funded by EELA and by a grant issued by the MAF (MAKERA 4255/502/2000). This qualitative risk assessment is the first part of this project.

This qualitative risk assessment of the release of CSF into Finland and the exposure of the susceptible population is mainly based on data accumulated in 1998-2000, and will provide:

1. An overview of the main risk routes for release of CSF into Finland in circumstances similar to those in 1998-2000, and of the routes for exposure of the susceptible population to CSF before detection of the disease.

2. A description of the Finnish swine populations at risk of release and of exposure to CSF.

3. A qualitative description of the risk of release of CSF into Finland in circumstances similar to those of 1998-2000, and of the risk of exposure through different types of contacts with the population at risk.

The aim of this project was also to gain valuable experience both in gathering data and in creating an example for future animal disease risk assessments in Finland. These results can be used in decision making and policy planning during suspicions and actual outbreaks of CSF, as well as in setting target populations for monitoring and surveillance for CSF. Data presented in this report will also be used in the next phase of the project to plan a quantitative risk assessment model for CSF.

3.3 ASSESSMENT METHOD

The qualitative risk assessment was performed according to code of the OIE, including hazard identification and risk assessment (OIE 2002b). The risk estimate was obtained using both expert opinions and data. The risk assessment consisted of two separate parts: a release assessment and exposure assessment.

3.3.1 Release assessment

The risk of release assessed was the risk of CSF spreading into Finland through various release routes if conditions remain similar to the conditions in 1998-2000.

The CSF situation in the countries of origin as well as the risk management of different release routes were taken into account. However, the release assessment did not include evaluations of veterinary services or of differences in the risk management of CSF in different countries of origin which differs from the guidelines given in the OIE code (OIE 2002b).

3.3.2 Exposure assessment

The second part of the assessment examined the risk of exposure of the population at risk to CSF before detection of the disease in a pork production structure similar to that of 2001. The length of the high risk period was not assessed but based on experiences from actual outbreaks published in the literature a high risk period of eight weeks was used in the final estimate. The assessment was performed separately for:

- The possibility of the population at risk being exposed to CSF from an infected source and

- CSF spreading further from an infected part of the population at risk to other parts of the population at risk.

4 HAZARD IDENTIFICATION

4.1 CLASSICAL SWINE FEVER

Classical swine fever is a contagious animal disease caused by the Classical swine fever virus (CSFV). The virus infects domestic swine, miniature pigs and wild boar under natural conditions. The virus has not been documented to replicate in species other than swine, even if some other species have been experimentally infected with CSFV. (Dahle et al.1992).

4.1.1 Virus characterisation

The CSFV, an enveloped RNA virus belonging to the genus *Pestivirus,* is a member of the family *Flaviviridae.* Border Disease Virus (BDV) of sheep and Bovine Viral Diarrhoea Virus (BVDV) of cattle are other members of this genus (Van Oirschot et al.1989). Although it has been shown that CSFV differs from BVDV and BDV on a genetic and antigenic

Table 2
Reported inactivation and/or survival times and temperatures of CSFV in different matrix.

Matrix	Inactivation		Survival		Source
	Temperature	Time	Temperature	Time	
Raw pork or organs					
Frozen liver			-4°C and -6 °C	226 days	Farez *et al.* 1997
Frozen meat				4.5 years	Farez *et al.* 1997
Intestinal castings			42.2 °C	30min	Farez *et al.* 1997
Neck, lard, bone marrow				70 days	Farez *et al.* 1997
Pork products					
Salt-cured pork				1 month	Farez *et al.* 1997
Bone marrow of salt- cured pork				2 month	Farez *et al.* 1997
Canned and cured ham	67 °C				Edwards *et al.* 2000
Cubes of ham (2mm^3)	71 °C	1 min			Farez *et al.* 1997
Ham				90 days	Mebus *et al.* 1997
- Iberian ham				252 days	Mebus *et al.* 1997
- Iberian shoulder				40 days	Mebus *et al.* 1997
- Iberian loin				126 days	Mebus *et al.* 1997
- White serrano ham				140 days	Mebus *et al.*
- Parma ham				189 days	McKercher *et al.* 1987
Salami				90 days	Farez *et al.* 1997
Italian salami				75 days	
Other					
Cell culture fluid	60 °C	10 min			Edwards *et al.* 2000
Defibrinated blood			68 °C	30 min	Edwards *et al.* 2000
Liquid manure	60-67°C,	3 min			Turner *et al.* 2000.
			20 °C	2 weeks	Haas *et al.* 1995
			4 °C	6 weeks	Haas *et al.* 1995

level, many antigenic similarities within the genus of *Pestiviruses* exist. The antigenic differences between *Pestiviruses* occur mostly in the E2 protein of the viral envelope. CSFV strains have been divided into two major subgroups by nucleotide sequence analysis and monoclonal antibodies. (Van Rijn et al.1997).

Like many other enveloped viruses, CSFV can be regarded as moderately sensitive to environmental conditions. Survival of the virus in the environment is affected by at least temperature, humidity, pH, the presence of organic matter, as well as by exposure to various chemicals and to ultra-violet light. CSFV is very resistant at temperatures below 0 °C but is inactivated at high temperatures and by rapid temperature variations (Edwards et al. 2000, Farez et al.1997). The stability of the infectivity of CSFV over time and its thermal stability are at least partly dependent on the matrix (Table 2). A difference in the thermal stability of infectivity has been shown between different strains of CSFV (Edwards et al. 2000). In pork and pork products the virus can remain infective for months, with the critical factors being the storage time and temperature. The infectivity of the virus is generally stable at a pH range of 5-10 but is rapidly inactivated at a pH below 3 or above 10 (Edwards et al. 2000).

Lipid solvents, such as ether and chloroform and detergents as well as a wide range of chemicals, including chlorine-based disinfectants, detergents, phenolics, quaterary ammonium compounds and aldehydes inactivate the virus (Edwards et al. 2000).

4.1.2 Clinical disease and pathology

The OIE recognises four forms of CSF: *acute, chronic, mild* and *congenital* (OIE 2002b). A variety of clinical signs have been described, including sudden death without preceding clinical signs, anorexia, decreased activity, convulsions, dyspnoea, coughing, hyperaemia followed by petecchial or extensive haemorrhages and/or cyanosis of the skin and ears, conjunctivitis with accompanying swelling of the lower eyelid, diarrhoea, constipation and vomiting (Van Oirschot 1999). A severe drop in the total leucocyte count has been noted at the time of the temperature rise (Summerfield et al. 2001).

The clinical picture of *acute* CSF is usually characterised by a febrile disease with high morbidity and mortality. Mortality in young pigs can reach 100%, with death occurring 5-15 days after onset of the disease. The *chronic* form of the disease is usually characterised by a span of one month and apparent recovery with eventual relapse and death. Transient pyrexia and anorexia are often the only signs of the disease in pregnant sows suffering from the *mild* form of CSF (Van Oirschot 1999). In sows with the *mild* form of CSF, the virus can cross the placental barrier resulting in either abortion of foetuses or mummified, stillborn and/or weak piglets (Dewulf et al. 2001b). Piglets with the *congenital* form of CSF have a runting growth and suffer from tremors, and die after a short period of time. (Van Oirschot et al.1977).

4.1.3 Epidemiology and immunology

Swine *(Sus Scrofa),* both domestic swine and wild boars, are the natural hosts of CSF (Dahle et al.1992). Direct contact between infected and susceptible animals is the principal means of viral transmission within a herd. The virus has experimentally been transmitted by oral, intranasal conjunctival, genital and various parenteral routes, but the oral and intranasal routes are probably the most common under natural conditions. (Van Oirschot et al.1999).

The incubation period is 2-14 days (OIE 2002b). Shedding of the virus starts before the onset of clinical signs and continues throughout the infection. Pigs that recover from CSF shed the virus until specific antibodies have developed (Van Oirschot 1999). Chronically infected animals shed the virus continuously or intermittently until death (Van Oirschot et al.1977). A pregnant sow can transmit the virus vertically to its progeny (Dewulf et al. 2001b). Piglets congenitally infected by a low virulent strain of CSFV, and born healthy, might act as a continuous source of virus in the population. Virus particles are shed in the oronasal and lachrymal secretes, faeces, urine and semen of infected swine. Large quantities of the virus may disseminate at the farrowing of an infected pregnant sow (Van Oirschot 1999). Embryo transfers are not regarded as an important route of transmission, as they are not widely used and the risk of transmission of CSF is regarded as low (Harris & Alexander 1992, Bouma et al. 2000). Viraemia can

be detected in pigs from two to four days after infection (Van Oirschot 1999). Antibodies are detectable in the serum of infected pigs from 20-24 days post infection (Laevens et al.1998). Swine that survive an infection of CSFV either develop immunity and no longer shed the virus or suffer from a chronic infection and excrete the virus continuously or intermittently until death (Van Oirschot 1999). The congenital form of CSF can result in clinically normal, immunotolerant piglets with a persistent viraemia (Van Oirschot et al.1977).

Movements of infected pigs, contaminated transport vehicles, swill-feeding, personnel and equipment have all been reported to have caused the spread of CSF between herds in different outbreaks (Elbers et al.1999,Gibbens et al. 2000, Koenen et al.1996, Van Oirschot 1999). Pets, rodents, birds and arthropods may act as mechanical vectors for the virus between herds in close proximity (neighbourhood spread) but have not been shown to transmit the disease (Dewulf et al. 2001a, Terpstra 1988). Airborne spread has been demonstrated experimentally, and might occur if the number of infected pigs in a herd is large, but is limited to herds in close proximity to the infected herd (Dewulf et al. 2000). During the 1997-1998 CSF epidemic in the Netherlands, neighbourhood spread was considered to be the source of infection if no other source could be identified and there was an infected herd within 1 km of the herd in question (Elbers et al.1999). No CSF outbreaks caused by contaminated compound feedstuff have been reported.

Exposure of the feral wild boar population to CSFV is typically by accidental or deliberate feeding of contaminated swill or by contact with infected carcasses or the manure of domestic swine. The virus is transmitted within the wild boar population by direct contact between animals or by contacts with infected carcasses or manure. Wild boar populations have been shown to act as a virus reservoir and a source of infection for domestic pigs (Scientific Committee on Animal Health and Animal Welfare 1999).

There is no treatment for CSF available. The main control options available are prevention of the transmission of the virus as well as vaccination. Vaccination against CSF with a modified live vaccine is used in many countries where the disease is enzootic to prevent losses due to an outbreak (OIE 2002b).

4.2 THE GEOGRAPHICAL DISTRIBUTION OF CSF

4.2.1 Domestic swine

Since 1992, the EU has implemented a non-vaccination policy, with stamping-out of the disease including zoning of infected areas (Council Directive 80/217/EEC). Major outbreaks in the EU have been reported in 1993-1994 in Germany and in 1997-1998 in Germany, the Netherlands, Belgium, Spain and Italy. Germany, Great Britain, Austria and Luxembourg reported outbreaks of the disease in 2000. In 2001-2002 there were an outbreak reported in Spain. France, Luxembourg and Germany reported outbreaks in 2002 (OIE 2002a).

Countries geographically close to, but not bordering on Finland, are Estonia, Latvia, Lithuania, Poland, Germany and Denmark, with only the Baltic sea in between. The CSF situation in these countries is of some importance, as lorries returning to Finland from Central European Countries use roads and harbours in these countries on their way to Finland. The last outbreak of CSF in domestic swine in Estonia was recorded in 1994. The risk management measures applied by Estonia in 1998-2000 included border control and screening for the disease. Vaccination of swine for CSF was prohibited. In 1996, Latvia reported 4 outbreaks of CSF in wild boar to the OIE. Risk management measures in 1998-2000 included vaccination, screening and monitoring. Lithuania reported 11 outbreaks to the OIE in 1992. Risk management measures in 1998-2000 included vaccination and border control. The last outbreak in domestic swine in Poland was reported to the OIE in 1994. Risk management measures in 1998-2000 included a prohibition on vaccination and border control. Risk management measures during an outbreak would include movement control and stamping out. Germany has experienced outbreaks of CSF annually in 1998-2000. Risk management measures in both countries in 1998-2000 included stamping out and movement control. Preventive vaccination was prohibited. Denmark has not reported any outbreaks of CSF since 1933. (OIE 2002a).

Of the countries bordering Finland, Sweden and Norway both implemented a non-vaccination policy and were free of CSF in 1998-2000. Both countries are officially free of the disease according to the OIE. The last outbreak of the disease in Sweden was re-

Table 3

The CSF situation in countries trading live domestic swine, miniature pigs or semen of domestic swine, pork or pork products with Finland in 1998-2000, or which are geographically close (FABA 2001, Finnish Customs Information Service 2001, MAF DFH 2001b, MAF DFH 2001e, OIE 2002a, Statistics Finland 2002, Scientific Committee on Animal health and Animal Welfare 2002).

Country	Last reported outbreak	Number of outbreaks reported in live domestic swine			Vaccination policy	Suspicion or confirmed cases of CSF in feral wild boars	Import of live domestic swine	Import of semen	Import of miniature pigs	Import of pork	Import of pork products	Export of domestic swine	Bordering	In close proximity[A]	Import of non-food products[B]
	Before 1998	**1998**	**1999**	**2000**	**1998-2000**	**Until 1999**	**1998-2000**								
Australia	1962	0	0	0	-	-	-	-	-	+	-	-	-	-	+
Austria	1996	0	0	0	-	+	-	-	-	+	+	-	-	-	-[C]
Belgium	1997	0	0	0	-	-	-	-	-	+	+	-	-	-	-[C]
Brazil	1997	1	1	4	+/-	-	-	-	-	+	+	-	-	-	-
Canada	1963	0	0	0	-	-	-	-	-	-	-	-	-	-	+
China	1997	72	672	45	+	-	-	-	-	-	-	-	-	-	+
Costa Rica	1997	0	0	0	+	-	-	-	-	-	+	-	-	-	-
Denmark	1933	0	0	0	-	-	-	-	-	+	+	-	-	+	-[C]
Estonia	1994	0	0	0	-	-	-	-	-	-	-	+	-	+	+
France	1993	0	0	0	-	+[D]	-	-	-	+	+	-	-	-	-[C]
Germany	1997	11	6	2	-	+	-	-	-	+	+	-	-	+	-[C]
Greece	1985	0	0	0	-	-	-	-	-	-	+	-	-	-	-[C]
Greenland	Never	0	0	0	-	-	-	-	-	-	-	-	-	-	+
Hungary	1993	0	0	0	-	-	-	-	-	+	+	-	-	-	-
Iceland	1953	0	0	0	-	-	-	-	-	-	-	-	-	-	-
Ireland	1958	0	0	0	-	-	-	-	-	+	+	-	-	-	-[C]
Italy	1997	18	9	3	-	+[D]	-	-	-	+	+	-	-	-	-[C]
Japan	1992	0	0	0	-	-	-	-	-	+	-	-	-	-	+
Latvia	1996	0	0	0	+	-	-	-	-	-	-	+	-	+	+
Lithuania	1992	0	0	0	+	-	-	-	-	-	-	-	-	+	+
Luxembourg	1987	0	0	0	-	+	-	-	-	-	-	-	-	-	-[C]
Netherlands	1997	5	0	0	-	-	-	-	-	+	+	-	-	-	-[C]
New Zealand	1953	0	0	0	-	-	-	-	-	+	+	-	-	-	+
Norway	1963	0	0	0	-	-	+	+	+	-	-	+	+	+	+
Pakistan	Never	0	0	0	-	-	-	-	-	-	-	-	-	-	+
Poland	1994	0	0	0	-	-	-	-	-	-	-	-	-	+	-
Spain	1997	21	0	0	-	-	-	-	-	+	+	-	-	-	-[C]
Sweden	1944	0	0	0	-	-	-	+	+	+	+	+	+	+	-[C]
Russia	1997	11	14	16	+	-	-	-	-	-	-	-	+	+	+
Taiwan	1997	5	3	2	+	-	-	-	-	-	+	+	-	-	-
Thailand	1996	0	18	53	+	-	-	-	-	-	-	+	-	-	-
UK	1987	0	0	16	-	-	-	-	-	+	+	-	-	-	-
USA	1976	0	0	0	-	-	-	-	-	-	+	+	-	-	+

\+ practised or present

\- not practised or present

+/- Vaccinations used in at least part of the country

[A] Geographically close and through traffic (less than 48 hours by sea vessel or lorry)

[B] Proportion of products of porcine origin not known

[C] EU Member State, intra-community trade, imports of non-food products not recorded.

[D] Reference: Scientific committee on animal health and welfare 1999

ported in 1944 and in Norway in 1963 (OIE 2002a). In contrast to these countries, the Russian Federation experienced outbreaks of CSF annually in 1998-2000. Risk management measures in 1998-2000 included control of wildlife reservoir, border controls, a modified stamping out policy, screening for the disease and vaccination. In 1998-2000, there were 11-16 annual CSF outbreaks reported in domestic swine in the Russian Federation and in 2000, 28,600,000 domestic swine were vaccinated against the disease (OIE 2002a). Disease outbreaks were reported in 5 regions, in the counties of Voronej, Leningrad and Samara and in the Republics of Udmurtia and Bashkorthostan, none of which are close to the Finnish-Russian border region (OIE 2000).

4.2.2 Feral wild boar

There has been serologic or virologic evidence of the presence of CSF in parts of the wild boar population in several regions of the Member States of the EU, i.e. France, Germany, Austria, Italy and Luxembourg. Outbreaks of the disease in wild boars have also been reported by several Eastern European countries including Latvia, the Czech Republic, Poland and Slovakia. Switzerland has also reported outbreaks in wild boars (Scientific Committee on Animal health and Animal Welfare, 1999).

Sweden has a wild boar population of some 10,000 boars but the area where the wild boar population can be found does not border Finnish territory. CSF has never been reported in the wild boar population of Sweden. Norway has not reported having a feral wild boar population (Scientific Committee on Animal health and Animal Welfare, 1999).

The size of the population of wild boars in the Russian Federation in the regions bordering Finland is not known. The Russian Federation has not reported any outbreaks of CSF in wild boars but there were outbreaks of the disease in the domestic swine population in 1998-2000. These outbreaks were not detected in the area bordering Finland, however (OIE 2000, OIE 2002a). Risk management of CSF in the Russian Federation includes control of the wildlife reservoirs of CSF (OIE 2002a).

4.2.3 CSF in countries relevant for release of CSF into Finland

In 1998-2000 CSF outbreaks were not reported in any of the countries from which Finland imported live domestic swine, miniature pigs or semen. Pork was imported to Finland from 6 countries in which CSF outbreaks were reported in 1998-2000.Vaccinations were used in some parts of one of these countries. Pork products were imported from eight countries which reported CSF outbreaks in 1998-2000. Vaccinations were used in three countries exporting pork products to Finland, and CSF was present in two of these countries. Non-food products were imported from two countries where CSF was present in at least some of the regions. In 1998-2000, Finland exported domestic swine to three countries were CSF outbreaks where reported during that time. Of the three neighbouring countries CSF was recorded in one, but the outbreaks were not located close to the Finnish border. Of the countries in close geographical proximity or with a traffic connection (less than 48 hours) through harbours, two countries experienced outbreaks in 1998-2000 and vaccinations were used in two (OIE 2002a).

4.3 FACTORS INFLUENCING THE DETECTION AND ERADICATION OF CSF

4.3.1 Factors influencing the course of infection

Several factors have been reported to influence the course of a CSF infection. The virus strain properties are thought to play a role and a differentiation has been made between high-, moderate- , low- and avirulent virus strains (Van Oirschot 1988). Other factors reported to influence the severity of the disease are age, breed, immune competence and nutritional conditions of the infected pigs along with the dose of the virus (Van Oirshot 1988, Liess 1988, Depner et al.1997). Host related factors appear to influence the outcome of infection with moderately virulent CSF virus strains, whereas the outcome of infections with a low or highly virulent strain have been reported to be unaffected by host factors (Van Oirschot 1999).

4.3.2 Detection of CSF

The length of the high risk period, i.e. the time during which the disease can spread freely within the susceptible population, is important for the magnitude of the outbreak at the time of detection. Shedding of the virus starts before the onset of clinical signs (Van Oirschot 1999). A large portion of the susceptible population could be exposed to CSFV if there is a considerable number of contacts between herds between the onset of the shedding of the virus, the discovery of the signs of disease, the notification of a suspicion of CSF and the detection and implementation of disease eradication measures.

The high risk period appears to vary widely in outbreaks in different countries. The estimated high risk period of the outbreak in the Netherlands in 1997-1998 was six weeks. It was estimated that approximately 39 herds were already infected before the first measures of the eradication campaign were implemented (Elbers et al.1999). The initial investigation of the CSF outbreak in the UK in 2000 suggested that the pigs of the primary outbreak were initially exposed to the virus in early June, whereas the outbreak was not confirmed until the 8th of August (Gibbens et al. 2000).

The clinical signs of CSF are usually evident. Therefore, the length of the high risk period will not be shortened by continuous sero-surveillance (Crauwels et al. 1999). However, the interval between the recording of clinical signs of CSF by the farmer, and the notification of a suspicion to the veterinary authorities can vary considerably, even when an outbreak has already been detected in a country. In a survey of the epidemiologic characteristics of a CSF outbreak in the Netherlands, the interval between the occurrence of clinical signs of CSF in a herd and notification of the signs to a veterinary practitioner was longer in a breeding herd (signs detected an average of 18 days before notification) than in a fattening herd (Koenen et al. 1996). In the 1997-1998 epidemic in the Netherlands, a total of 429 outbreaks were detected. Ten percent of these outbreaks were detected via pre-emptive slaughter. Seventy-five (322) of the outbreaks were detected by clinical signs (including 32% detected by the farmer, 25% detected by the veterinary practitioner, 10% detected by the tracing teams and 8% detected by the screening teams of the veterinary authorities). In 76% of the 322 infected herds that were detected by clinical signs, the farmer reported having seen clinical symptoms for less than one week before detection of an outbreak, in 22% for 1-4 weeks before detection, and in 4 herds (1%) for more than 4 weeks before detection. (Elbers et al.1999).

4.3.3 Factors influencing the success of eradication programs

Several interrelated factors have been reported to influence the success and speed of the eradication of CSF in various outbreaks. These factors are either related to the source of infection, to the virus strain involved, to the pork production or the feral wild boar population structure, or to the risk management measures of CSF and their implementation (Table 4). Vaccination is not regarded as a highly effective way to completely eradicate the disease (OIE 2002b).

Table 4
Factors reported to decrease the success and speed of control and eradication programs of CSF in the domestic swine and feral wild boar populations.

Factor	Reported Consequence	Reference
Related to the source of infection		
Artificial insemination as the source of infection	Exposure of a large number of herds	Hennecken *et al.* 2000, Smit *et al.* 1999.
Virus circulation in the feral wild boar population	Transmission to the domestic swine population	Biagetti *et al.* 2001, Scientific Comittee on Animal Health and Animal Welfare. 1999.
Inability to trace the source of an outbreak	Tracing of possible contact populations not possible or prolonged	Elbers *et al.* 1999, Frizemeier et a. 2000
Related to the strain of virus		
Low virulence of virus strain	Late detection and exposure of a large number of herds before detection	Elbers *et al.* 1999, Paton & Done 1994.
Moderate virulence of virus strain	Endemic CSF in the wild boar population	SANCO/3639 1999, Scientific Comittee on Animal Health and Animal Welfare. 1999.
Related to the pork production structure		
High density of pigs and concentration of pork production	Exposure of a large number of herds and high costs of eradication	Elbers *et al.* 1999, Pluimers *et al.* 1999
Long distance movement of pigs	Exposure of a large number of herds and inability to trace the source	Elbers *et al.* 1999, Frizemeier et a. 2000
Long distance movement of pork and pork products	Inability to trace the source	Pluimers *et al.* 1999.
Insufficient rendering capacity	Prolonging of destruction of infective animals and pre-emptive slaughtering of susceptible animals	Pluimers et al. 1999.
Related to the structure of the feral wild boar population		
Large size of the population	A higher reproduction rate in the population which leads to a higher number of susceptible animals present and to the possibility of virus circulation in the feral wild boar population	SANCO/3639 1999, Scientific Comittee on Animal Health and Animal Welfare. 1999.
Hunting of feral wild boars	Migrating of possibly infected animals to new areas	SANCO/3639 1999, Scientific Comittee on Animal Health and Animal Welfare. 1999, Schnyder *et al.* 2002.
Related to control of CSF		
Late detection of the first case	Exposure of a large number of herds	Pluimers *et al.* 1999
Decreased sensitivity of detection of clinical signs during an outbreak by surveillance	Late detection of a case and exposure of a large number of herds	Pluimers *et al.* 1999
High costs of eradication for individual farmers	Decreased sensitivity of detection of clinical signs during an outbreak by surveillance teams and farmers	Pluimers *et al.* 1999.

5 RISK ASSESSMENT

5.1 RELEASE ASSESSMENT IN CIRCUMSTANCES SIMILAR TO 1998–2000

The results of this release assessment are applicable in circumstances where CSF in the countries of origin, the type and amount of imports, the risk management measures applied at import and the destination of the imports are similar to those in 1998-2000. The CSF risk managament in intra-community trade was evaluated in this assessment the effectiveness of CSF risk management was not evaluated for third countries. The organisation of veterinary services in the countries of origin were not evaluated.

5.1.1 Identification of possible routes of release of CSF

The release of CSF into Finland, firstly, requires import of CSF infected live animals or contaminated material. Secondly, the imported animals or the contaminated material must come into contact with the susceptible population in Finland before the inactivation of CSFV. In addition, risk management measures and their implementation have an affect on the possibility of release through a specific route. Thus, it is possible that CSF could be released into Finland through movement of live animals or semen, migrating feral wild boars, imported pork and pork products, transport vehicles and people returning to Finland as well as through feedstuff, non-food products of porcine origin, laboratory activities and any material contaminated with CSFV (Figures 1-6).

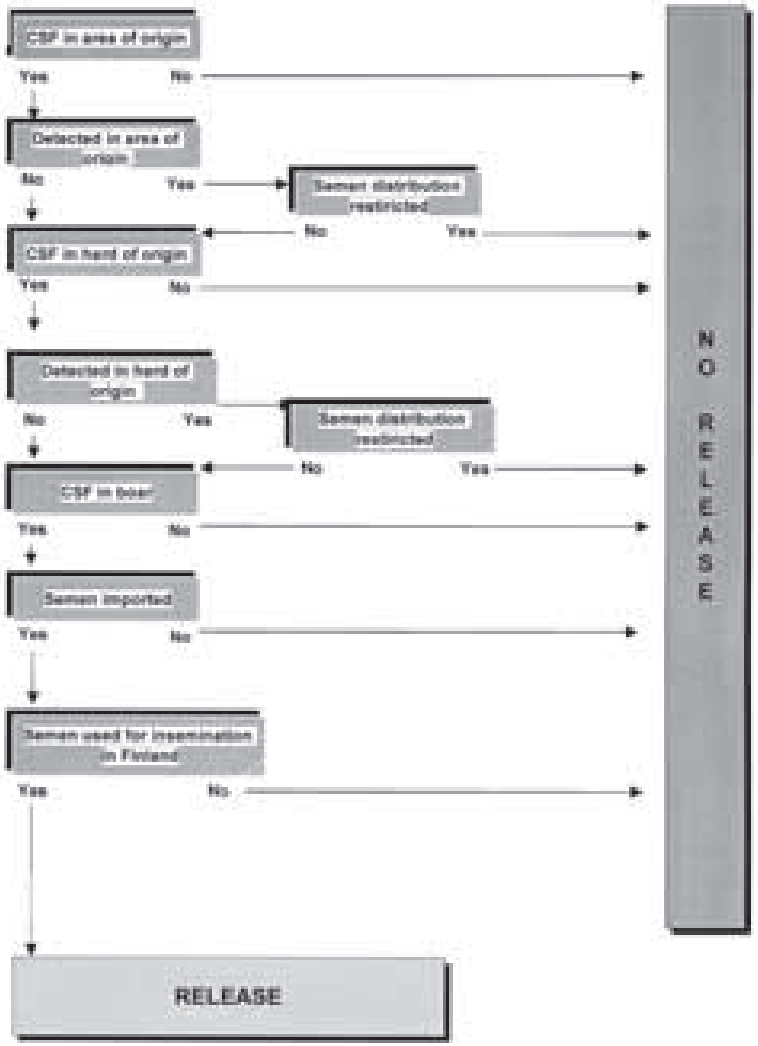
5.1.1.1 Risk classification of various routes

A group of eight experts were asked to assess the relative importance of possible routes of release of CSF into Finland without considering the risk man-

Table 5
The distribution of the risk of release of CSF through possible release routes estimated by experts (n=8), disregarding risk management measures.

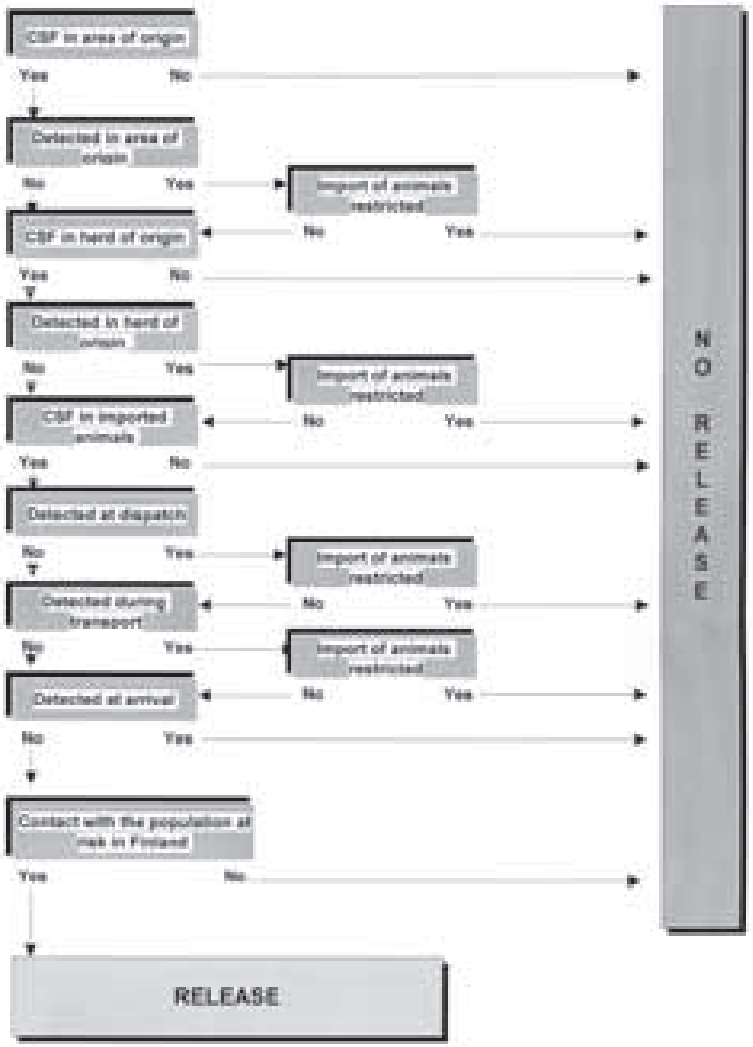
Release routes	Risk of release of CSF into Finland		
	Negligible	Exists, but low	Potentially high
Import of domestic swine	0	0	8
Import of semen	0	7	1
Import of farmed wild boar	0	1	7
Import of miniature pigs	0	3	5
Illegal import of live pigs and semen	0	0	8
Migration of feral wild boars into Finland	1	5	2
Import of pork	0	7	1
Import of pork products	1	6	1
Transport vehicles	0	7	1
Humans	2	5	1
Non-food products	6	2	0
Laboratory	8	0	0
Import of feed	5	3	0
Import of used production machinery or equipment	4	4	0

Figure 2



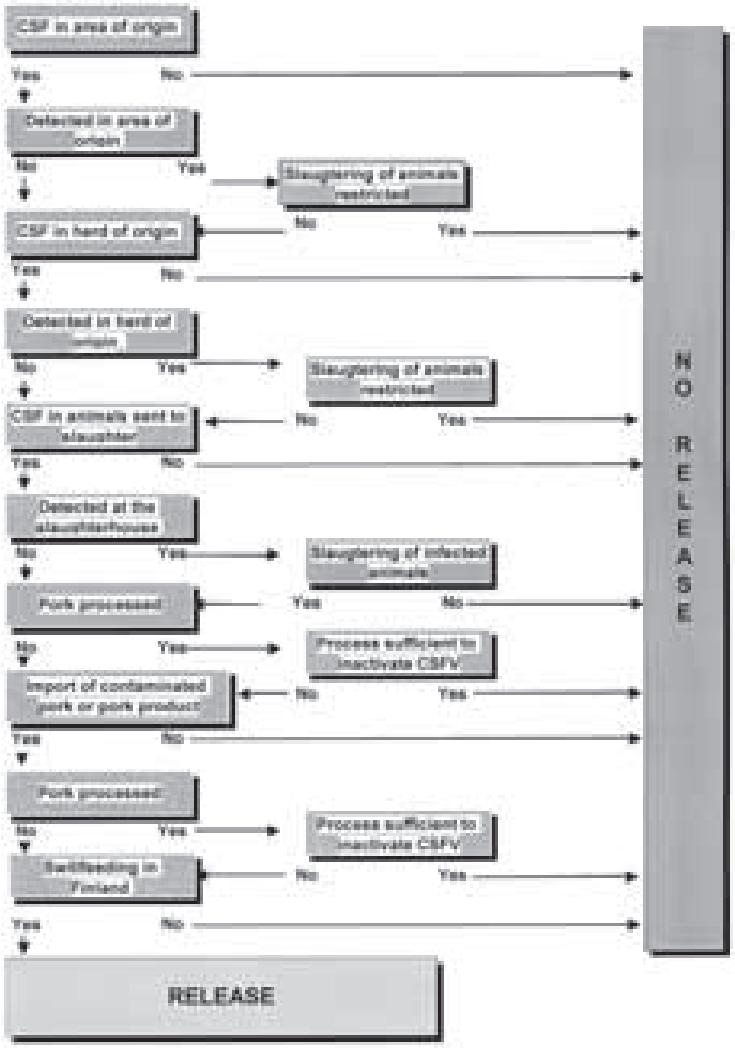
A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by legally or illegally imported semen.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles.

Figure 1



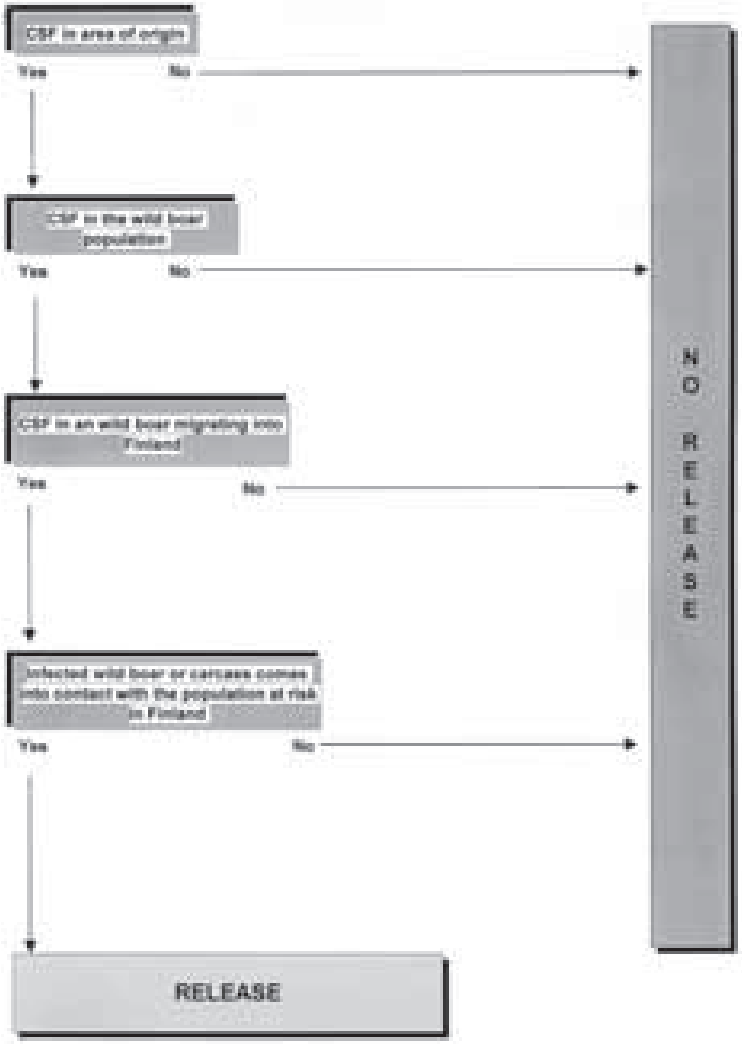
A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by legally or illegally imported domestic swine, farmed wild boar or miniature pigs.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles.

Figure 4



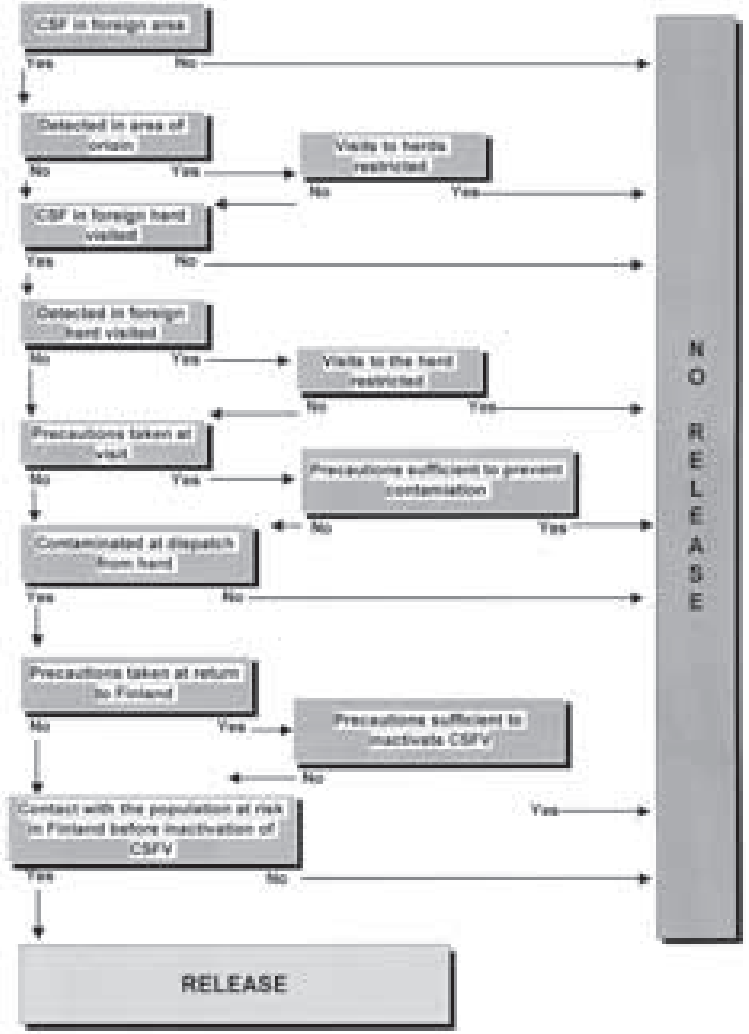
A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by legally or illegally imported pork and pork products.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles

Figure 3



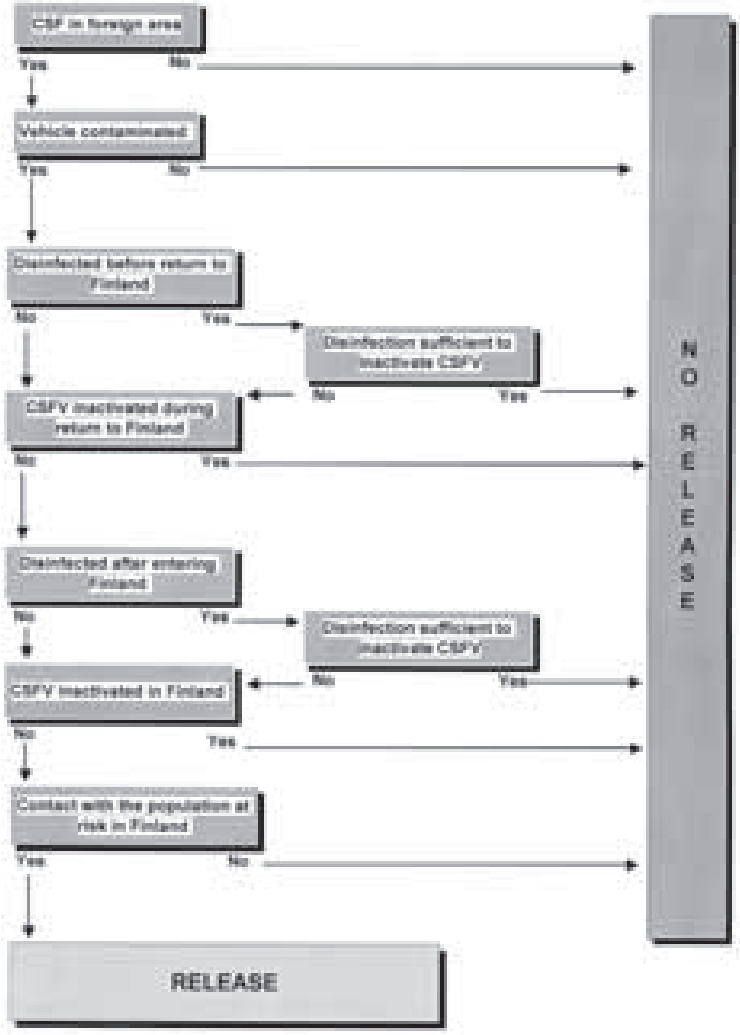
A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by migrating feral wild boars.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles.

Figure 6



A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by travellers.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles.

Figure 5



A schematic presentation of the events necessary (shadowed rectangles) for the release of CSF into the population at risk by transport vehicles returning to Finland.
"Yes" and "No" indicates optional consequences for the events presented in the shadowed rectangles.

agement measures applied to each route. The risk was either negligible, existing but low, or potentially high. The potentially highest risk routes identified were imports of live domestic swine and farmed wild boars, whereas the risks associated with laboratory activities and imports of non-food products were seen as negligible (Table 5).

5.1.2 Release routes in 1998-2000

Information on release routes was gathered from the official statistics of the MAF DFH, the Finnish Customs Information Service, the Information Centre of the Ministry of Agriculture and Forestry (TIKE) as well as from private operators such as the FABA and the ETT. Some information was obtained by personal communications with experts.

5.1.2.1 Live animals and semen

CSF could be released into Finland by imported live domestic swine, farmed wild boars, miniature pigs, migrating feral wild boars or semen. The population at risk would be any population coming into contact with the imported or migrating animals or the imported semen.

Domestic swine

There was one consignment of 16 breeding animals (AI boars) imported from Norway in 2000. Norway has remained free of CSF since 1963. No other imports of domestic swine were recorded in 1998-2000 (Table 6) (MAF DFH 2001b).

Semen

Despite the fact that the total number of imported semen doses remained low, a significant increase in imported semen doses was noticed in 1998-2000. The imported doses originated from approved AI centres in Sweden (last outbreak of CSF in 1944) and Norway (last outbreak of CSF in 1963). The doses imported from Sweden were distributed to one elite breeding herd. The semen doses imported from Norway were used in 2 herds producing piglets (Table 6).

Farmed wild boar

No imports of farmed wild boar were recorded in 1998-2000 (MAF DFH 2001 k).

Miniature pigs

There were three import permits issued to import miniature pigs in 1998-2000. All miniature pigs with import permits were imported from Nordic countries. (Table 6) (MAF DFH 2001f).

Illegal imports of live animals and semen

The general view is that there were no illegal imports of live domestic swine and farmed wild boar in 1998-2000. Deliberate or accidental illegal imports of miniature pigs are regarded as possible but not very likely or frequent.

Table 6

The number of imports, countries of origin and destination of live animals and semen imported to Finland in 1998-2000 (MAF DFH 2001b).

Category	Year	Country of origin	Number of consignments	Number of animals or doses	Destination in Finland
Breeding animals (AI boars)	1998	-	0	0	-
	1999	-	0	0	-
	2000	Norway	1	16	AI centre
Semen	1998	Sweden	NK	26	Elite breeding herd
	1999	Sweden	NK	116	Elite breeding herd
	2000	Sweden Norway	NK NK	155 2,200	1 Elite breeding herd 2 herds producing piglets
Miniature pigs	1998	-	-	-	-
	1999	Norway	1[A]	1	Private owner
	2000	Denmark Sweden	1[A] 1[A]	30 1	Laboratory Private owner

[A] Number of import permits issued

NK not known

Migration of feral wild boars into Finland

Feral wild boars are also known to migrate over the border from the Russian Federation as well as during the winter over the frozen sea from the Baltic countries. The number of animals migrating is low (1-15 annually) (Tenhu 2001). If there is an outbreak of CSF in the Russian Federation or in Estonia, it is possible that CSF could be released into Finland by an infected migrating wild boar crossing the border between the Russian Federation and Finland or migrating over the frozen sea from Estonia during the winter. However, no outbreaks of CSF were reported in wild boar in the Russian Federation or Estonia during the years 1998-2000 (OIE 2002a). There were reported outbreaks of CSF in domestic swine and preventive CSF vaccinations were administered in major farrowing herds in the Russian Federation. Estonia did not reported any outbreaks of CSF and preventive vaccination was not allowed (OIE 2002a).

5.1.2.2 Pork and pork products

CSF could be released into Finland by commercial or private imports of pork or pork products if these products are fed to the population at risk. Illegal imports of pork and pork products are of special concern due to the lack of information on the CSF situation in the country of origin. All domestic swine, farmed wild boars and miniature pigs to which swill was fed were considered as the population at risk in 1998-2000.

Pork

The import of pork has increased from 0 kg in 1990, to 15,000,000 kg in 2000, which was 9% of the total consumption of pork in Finland in 2000. In 1998-2000, Finnish pork processing relied heavily on the domestic pork supply, even though pork production in Finland decreased 6% in 2000 compared to 1999 and imports of pork increased (Finfood 2001). The amount of pork imported from different countries is shown in Table 7 (Finnish Customs Information Service 2001).

In 1998-2000, most (94%) of the imported pork originated from countries that were free of CSF. The rest (6%) was imported from countries where CSF was reported or vaccinations were used in at least part of the country during a specified year (Table 8).

Pork products

In 1999-2000, pork products were imported from a range of countries including countries where CSF was reported during that time or where vaccinations were used in at least some area of the country (Table 9). Data for imports in 1998 were not obtainable for this report.

Table 7

The amount of fresh or frozen pork (in kg) commercially imported to Finland in 1998-2000 and the countries of origin (Finnish Customs Information Service 2001).

Country	1998	1999	2000	Total 1998-2000
Austria	2,400	-	-	2,400
Australia	-	6,100	1,300	7,400
Belgium	439,500	613,000	2,292,000	3,344,500
Brazil	-	38	5,000	5,038
Denmark	8,934,000	10,307,000	8,820,000	28,061,000
France	2,100	-	2,100	4,200
Germany	193,700	661,000	1,210,000	2,064,900
Hungary	-	-	0,600	600
Ireland	-	-	2,800	2,800
Italy	400	-	1,800	2,200
Japan	-	-	14	14
The Netherlands	21,900	38,800	87,000	147,800
New Zealand	-	400	600	1,000
Spain	-	3,300	-	3,300
Sweden	901,000	943,000	535,000	2,379,000
UK	-	1,500	4,200	5,700
Total	**10,516,000**	**12,575,000**	**12,963,000**	**36,054,000**

- no imports

Table 8

The amount (in thousand kg) and the percentage of fresh or frozen pork commercially imported to Finland in 1998-2000 from countries free of CSF and from countries where CSF was reported or vaccinations were used in at least a part of the country during a specified year (Finnish Customs Information Service 2001, OIE 2002a).

		CSF status of country of origin			
	Total	**CSF free**		**CSF present**	
Year		Import of pork	**% of import**	Import of pork	**% of import**
1998	10,516	10,084	**96%**	432	**4%**
1999	12,575	11,914	**95%**	661	**5%**
2000	12,963	11,742	**91%**	1,221	**9%**
Total	36,054	33,740	**94%**	2,314	**6%**

Table 9

Commercial imports of pork products (in kg) to Finland and the countries of origin 1999-2000 (Finnish Customs Information Service 2001).

Country of origin	**Sausage[A]**		**Organs[B]**		**Ham or boneless whole meat product[C]**		**Canned whole pork[D]**		**Canned food containing pork[E]**		**Lard[F]**	
Year	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
Austria	-	-	-	-	-	-	-	-	13,500	9,400	-	-
Belgium	-	-	-	1	800	16,200	400	1,900	14,000	14,100	-	-
Brazil	-	-	-	-	-	400	-	-	-	-	-	-
Costa Rica	-	-	-	-	-	-	-	-	-	-	33,300	-
Denmark	522,300	295,300	41,900	7,500	462,100	374,100	195,100	85,000	199,100	202,500	84,100	2,700
France	5,900	7,400	-	-	-	1,800	-	1,800	2,100	1,400	-	-
Germany	293,400	232,400	6,400	-	9,300	9,100	7,900	9,100	55,200	4,200	-	-
Greece	-	200	-	-	-	-	-	-	-	-	-	-
Hungary	300	-	-	-	-	-	-	-	-	-	-	-
Ireland	9,500	2,200	-	-	-	-	-	17,400	-	1,700		-
Italy	14,000	16,800	-	-	18,500	233,900	900	2,000	100	800	-	-
The Netherlands	18,300	2,300	-	-	500	11,800	17,200	1,700	24,100	21,500	-	-
New Zealand	-	-	-	-	-	-	-	-	1,600	-	-	-
Norway	-	-	-	-	-	500	-	-	-	-	-	-
Spain	6,100	6,900	-	-	5,100	4,600	900	2,200	900	500	-	-
Sweden	110,800	125,700	49,300	1,600	1,000	52,800	15,400	20,900	462,300	434,100	10,800	107,300
Taiwan	-	-	-	-	-	-	-	-	400	-	-	-
UK	-	20	-	-	3,000	-	3,400	-	-	-	-	-
USA	-	-	-	-	-	-	-	-	20	-	-	-
Total	**1,850,400**	**689,200**	**97,600**	**9,100**	**500,300**	**705,200**	**241,200**	**142,000**	**773,300**	**690,200**	**128,200**	**110,000**
Total 1999-2000	**2,539,600**		**106,700**		**1,205,500**		**383,200**		**1,463,500**		**238,200**	
Proportion of total import of pork product	**43%**		**2%**		**20%**		**6%**		**25%**		**4%**	

[A] Sausages containing meat.
• Portion of pork not specified.
• Processing method not specified, some might be unheated.
[B] Fresh or frozen organs.
[C] Ham with bone or other whole meat products without bone.
• Salted, dried or smoked.
[D] Canned whole meat products containing ham with bone or other whole meat product without bone
• Processing method not specified.
[E] Other meat products and canned food containing pork.
• Portion of pork not specified.
• Processing method not specified, some might be unheated.
[F] Liquefied, pressed, extracted, dried or smoked lard from domestic swine or from poultry.
• Portion of lard originating from swine not specified

Table 10

The amount of pork products (in thousand kg) commercially imported to Finland in 1999-2000, the percentage originating from countries where CSF was reported or vaccinations were used in a specified year (Finnish Customs Information Service 2001, OIE 2002a).

Year	Sausages[A]			Organs[B]			Ham or boneless whole meat product[C]			Canned whole pork[D]			Canned food containing pork[E]			Lard[F]		
	Total	CSF[G]	%[H]	Total	CSF[G]	%[H]	Total	CSF[G]	%[H]	Total	CSF[G]	%[H]	Total	CSF[G]	%[H]	Total	CSF[G]	%[H]
1999	2,539.6	307.4	12 %	97.6	6.4	7 %	500.3	27.9	6 %	241.2	8.8	4 %	773.3	57.2	8 %	128.2	33.3	26%
2000	689.2	249.2	36 %	9.1	0	0 %	705.2	233.9	33 %	142	11.1	8 %	690.6	14.4	2 %	110	0	0 %
Total	**2,539.6**	**556.6**	**22 %**	**106.7**	**6.4**	**6 %**	**1,205.5**	**261.8**	**22 %**	**383.2**	**19.9**	**5 %**	**1,463.5**	**71.6**	**5 %**	**238.3**	**33.3**	**14 %**

	Total amount of imports	Total amount of imports from countries where CSF present	% of imports from countries where CSF present
Total for all products in 1999-2000	**5,936.8**	**2,903.4**	**16%**

[A] Sausages containing meat.
• Portion of pork not specified.
• Processing method not specified, some might be unheated.
[B] Fresh or frozen organs.
[C] Ham with bone or other whole meat products without bone.
• Salted, dried or smoked.
[D] Canned whole meat products containing ham with bone or other whole meat product without bone
• Processing method not specified.
[E] Other meat products and canned food containing pork.
• Portion of pork not specified.
• Processing method not specified, some might be unheated.
[F] Liquefied, pressed, extracted, dried or smoked lard from domestic swine or from poultry.
• Portion of lard originating from swine not specified
[G] Total amount originating from countries where CSF was present or from countries where vaccinations are used
[H] Proportion of the total originating from countries where CSF was present or from countries where vaccinations are used

Table 11
The number of border crossings into Finland from the Russian Federation and Estonia in 1999-2000 (Statistics Finland 2002).

Country and CSF status	1999	2000	Total
Russia – CSF present			
Number of Finns crossing the border to the Russian Federation	1,277,631	1,315,976	2,395,607
Number of Russians crossing the border to Finland	1,180,386	1,383,069	2,562,455
Estonia – CSF not present			
Number of Finns visiting Estonia	1,912,157	1,913,622	3,825,779
Number of Finns crossing from Estonia by ferry to Finland	2,660,584	2,556,135	5,216,719
Number of Estonians crossing from Estonia by ferry to Finland	226,700	265,200	491,900
Number of crossings of other nationalities (than Finnish or Estonian) from Estonia by ferry to Finland	200,000	135,000	335,000

Table 12
Finnish charter tourist trips in 1999 and 2000, to countries free of CSF, to countries where CSF was reported or with a vaccination policy and to countries with an unknown CSF status (AFTA 2002, OIE 2002a)

Year	Total number of trips	Number of trips to countries free of CSF	%[A]	Number of trips to countries where CSF was reported or with a vaccination policy	%[A]	Number of trips to a country of unknown destination or unknown CSF status	%[A]
1999	986,875	746,766[B]	76%	82,556[C]	8%	96,523	16%
2000	980,053	679,631[D]	70%	99,789[E]	10%	200,699	20%
Total	**1,966,928**	**1,426,397**	**73%**	**182,345**	**9%**	**297,192**	**18%**

[A] Percent of total number of trips
[B] Trips to Austria, Cyprus, Greece, France, Hungary, Israel, Poland, Portugal, Spain, UK, USA
[C] Trips to Bulgaria, Czech Republic, India, Italy,
[D] Trips to Cyprus, Czech Republic, Greece, France, Hungary, Israel, Poland, Spain, Portugal, USA
[E] Trips to Austria, Bulgaria, India, Italy, UK

Of the pork products imported commercially to Finland in 1999-2000, most were sausages (43%, processing method not specified), canned products containing pork (25%, proportion of pork not specified) or salt cured or smoked whole meat (20 %). A smaller portion of the imports were canned whole pork (6 %), lard (4%) or raw organs (2 %) (Table 9) (Finnish Customs Information Service 2001). Of the total amount of imported pork products in 1999-2000, 16%, originated from countries where CSF was reported or vaccinations were used in at least part of the country during a specified year (Table 10).

Pork or pork products for private consumption

Tourists returning from other countries occasionally carry small amounts of food into Finland. There are no data available on the amount of pork or pork products brought into Finland for private consumption. A considerable number of Finns visited countries where CSF was present in 1999-2000. Visits to the Russian Federation (by road transportation) and the Baltic countries (by passenger ferries), especially to Estonia, are frequent (Table 11). The prices of food, including pork and pork products are lower in the Russian Federation and Estonia than in Finland. Some of the returning tourists carry food, including pork and pork products into Finland. Travelling by plane to other countries is also frequent: in 1999-2000 almost 2,000,000 flights related to tourism, including charter tourism, were recorded (Table 12). There are also frequent passenger ferries crossing between Sweden and Finland.

Illegal imports of pork and pork products

There are no estimates available on the amount of illegally imported pork or pork products in 1998-2000.

5.1.2.3 Other routes

Transport vehicles

CSF could be released into Finland by transport vehicles returning to Finland if the vehicle came into contact with the population at risk before inactivation of the virus.

Transport businesses used by the exporters of domestic swine are registered as transporters of live animals in Finland, and transport domestic swine between herds in Finland as well. In 1998-2000, breeding animals were exported from Finland to Estonia, Thailand, Sweden, the Russian Federation, Latvia, Hungary and Korea. In 1998, 51 pigs were exported in three consignments; in 1999, 157 pigs in four consignments; and in 2000, 130 pigs in two consignments (FABA 2002).

Travellers

Any traveller visiting a country where CSF is present who comes into contact with CSF infected swine or with CSFV contaminated material could then carry the virus into Finland and release CSF into the population at risk. Farmers, foreign or domestic workforce, veterinarians, agricultural advisers and hunters are of special importance when considering the release of CSF into Finland through this route. The population at risk would be any domestic swine, farmed or feral wild boar or miniature pig that came into contact with a person recently returned from a country where CSF is present. Finns travel frequently (Table 11, Table 12), but there were no data available concerning the number of travellers possibly coming into contact with CSFV contaminated material while visiting countries where CSF was present 1998-2000. Farmers occasionally visit agricultural fairs or herds in other countries but there was no information available on the numbers of domestic swine herd visits. It is generally known that some herds employ foreign workforce, but the size and origin of the foreign workforce coming into contact with the Finnish pig population is not known. Wild boar hunting trips to other countries are usually organised by private hunting parties or by several organisations. The Finnish Forest service organises wild boar hunting trips to Estonia, Germany and Poland as well as provides opportunities for foreign hunters to hunt in Finland.

Compound feedstuff and raw material for feedstuff

No compound feedstuff for swine were imported in 1998-2000. The meat and bone meal used in the compound feedstuff produced in Finland before the

Table 13
Imports of non-food products from third countries to Finland in 1998-2000 (MAF DFH 2001e).

Exporting country	Number of consignments (by the content of the consignment and by the year of import)											
	Hide originating from			Flakes of horn cloven-hoofed or hoofed animals			Slaughter offal			Blood products		
	1998	1999	2000	1998	1999	2000	1998	1999	2000	1998	1999	2000
Australia	34	16	22	-	-	-	-	-	-	-	-	-
Canada	-	-	-	-	-	-	-	-	-	-	1	4
China	2	-	-	-	-	-	-	-	-	-	-	-
Estonia	57	59	57	-	-	-	-	-	-	-	-	-
Greenland	-	1	-	-	-	-	-	-	-	-	-	-
Japan	-	-	-	-	-	-	-	-	-	-	1	-
Latvia	2	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	3	1	-	-	-	-	-	-	-	-	-
New Zealand	-	2	-	-	-	-	-	-	-	-	-	-
Norway	18	-	-	4 [A]	-	-	4	-	-	-	-	-
Pakistan	1	-	-	1	2	2	-	-	-	-	-	-
Russia	42	32	91	-	1 [A]	-	-	-	-	-	-	-
USA	-	-	1	-	-	-	-	-	-	-	8	21
Total	**156**	**113**	**172**	**5**	**3**	**2**	**4**	**-**	**-**	**-**	**10**	**25**

- no imports recorded

[A] Reindeer horn

Table 14
The total number of consignments of non-food products possibly of porcine origin imported to Finland 1998-2000 and the portion of consignments imported from countries where CSF was reported or where vaccinations were used (MAF DFH 2001e, OIE 2002a).

Year	Contents of imported consignment											
	Hide from cloven hoofed animals			Flakes of horn			Slaughter offal			Blood products		
	Total number	CSF [A]	% [B]	Total number	CSF [A]	% [B]	Total number	CSF [A]	% [B]	Total number	CSF [A]	% [B]
1998	156	44	28%	5[C]	0	0%	4	0	0	0	0	0
1999	113	32	28%	3	1[D]	33%	0	0	0	10	1	10%
2000	172	91	52%	2	0	0%	0	0	0	25	0	0
Total	**441**	**167**	**38%**	**10**	**1[D]**	**10%**	**4**	**0**	**0**	**35**	**1**	**3%**

[A] Number of consignments from countries where CSF was reported
[B] Percent of the consignments from countries where CSF was reported
[C] Four of these were reindeer horn
[D] Reindeer horn

ban in 2001 on the use of animal-derived proteins (not including fish meal) all originated from Finnish animals rendered in Finland. Raw material for compound feed produced in Finland was heat-treated before distribution to herds. This treatment was considered sufficient to inactivate any contamination of CSFV in the feedstuff distributed to the Finnish population at risk (Rankanen 2001).

Non-food products
It is possible that CSFV could be carried into Finland through non-food products originating from swine if these products are not processed in the country of origin in a way that inactivates the virus. If domestic swine, farmed or feral wild boars or miniature pigs would come into contact with this infected material the release into the population at risk is possible.

Only imports of non-food products from third countries were recorded in 1998-2000. No data were available for imports of non-food products of porcine origin from the EU Member states (Table 13). These imports included hide, slaughter offal and blood but the species of origin were not identifiable.

Most of the imports were the hides of cloven hoofed animals; 25-50% were imported from countries where CSF was present in 1998-2000 or where vaccinations against CSF were used (Table 14).

Laboratory
In 1998-2000, the EU reference laboratory for CSF, located in Hanover, Germany, annually organised ring-tests for the National reference laboratories in the EU Member states. These ring-test samples, possibly containing live CSFV, were tested by various methods. EELA has participated in all of these tests and all samples containing CSFV have been properly detected (Veijalainen 2001).

5.1.3 Risk management measures 1998-2000

The relevant legislation is listed and briefly described in chapter 4 of Annex 1.

5.1.3.1 Live animals

Domestic swine and farmed wild boar

A. Legal requirements for risk management in intra-community trade
The herd of origin must be under the supervision of the Competent Authority (CA) of the country of origin and animals brought into Finland have to be inspected for the presence of clinical signs of any contagious disease within 24 hours before dispatch. The officials inspecting the animals must send a message of the consignment through the ANIMO-computer network of the EU. The animals must be from a herd not under any restrictions due to an outbreak of CSF. The imported animals have to be tested for AD and TGE if they are from an area not free of these diseases (Table 15). (MAF 572/95, MAF 1578/94).

Importers of live domestic swine and farmed wild boars must register as an importer with the MAF DFH and arrange access to premises where the animals

can be quarantined, if necessary. The importers have to report the arrival of the animals to the MAF DFH at least 24 hours before arrival. The MAF DFH might order a control at arrival at the destination, as well as testing of the animals. The documents include data on the day of arrival, the country and herd of origin, as well as on the herd of destination, the number of animals and their identification marks. The documents must be kept by the importer for five years (MAF 572/1995, MAF 1578/1994). Detailed legal requirements for intra-community trade are shown in Table 15.

B. Legal requirements for risk management of imports from third countries

Live domestic swine can be imported into the EU from certain non-EU countries approved for imports of live domestic swine (Council Directive 79/542/EEC). Imports of live domestic swine must pass a veterinary border control, which is performed by a border control veterinarian at certain border control posts approved for live animals. After import, pigs are subject to a 30-day quarantine at the herd of destination and may be tested for relevant diseases including CSF (MAF 1338/1996). The domestic swine imported in 2000 were not tested for the presence of CSF as imports of domestic swine from Norway are subjected to the same requirements as intra-community trade (Table 15) (Kuosmanen 2002).

C. Additional voluntary risk management measures

In addition to the risk management measures recommended by the ETT (Table 15), the association (Chapter 3.9 Annex I) provides information to farmers and the general public through pamphlets and newspaper articles. The ETT has published at least two articles annually in two newspapers directed to farmers (with a national coverage) on recommended bio-security measures for herds. The articles have included information on risk factors connected to imports of live domestic swine, miniature pigs and farmed wild boar. The amount of information provided to the farmers and the general public would be increased if there was a CSF outbreak in Finland or in countries relevant to the Finnish CSF situation. In 1998-2000, several issues of a periodically published paper on animal health issues in Finland (KMvet), directed to veterinarians, and of the news pamphlet of the ETT, directed to the industry and veterinarians, discussed risks connected to imports (Kortesniemi 2002).

Miniature pigs

A. Legal requirements for risk management in intra-community trade

A conditional import permit from the MAF DFH is required for importing miniature pigs to Finland (MAF 27/95). The conditions of the permit are drawn up considering the relevant disease situation of the country of origin. The permits issued in 1998-2000 did not require testing of miniature pigs for CSF as the countries of origin were free of CSF. The miniature pigs imported in 1998-2000 had to be accompanied by a health certificate stating that the imported pigs originated from an area where no outbreaks of CSF were recorded in the last 12 months. The pigs had to be kept isolated from other animals for a month before dispatch, though no details were given about the nature of the isolation facility. During isolation the miniature pigs were tested for the presence of AD, TGE, SVD, PRRS and SI. Upon arrival to Finland, the pigs had to be quarantined for two months at a location previously approved by the Municipal Veterinary Officers (MVO, Chapter 3.3. Annex 1). No detailed instructions on the requirements for the quarantine facility were issued in the import permit. The animals had to be inspected by a MVO for any signs of disease at least once a week during the quarantine. After at least 30 days of quarantine and before being released, the pigs had to be tested for the presence of AD and TGE. (MAF DFH 2001f).

B. Additional voluntary risk management measures

No voluntary risk management measures, recommended by the ETT, were applied to the miniature pigs imported in 1998-2000 (Kortesniemi 2002).

5.1.3.2 Semen

A. Legal requirements for risk management in intra-community trade

Semen originating from another EU Member State must originate from an AI centre approved by the CA. The semen must be accompanied by a health certificate certifying that the centre is not under any restrictions due to an outbreak of a contagious animal disease. CSF must not have been detected during the last 12 months in the area of origin. Importers of semen must register with the MAF DFH at least five week days before the arrival of semen, and the

Table 15

Legal and additional voluntary risk management measures for domestic swine in intra-community trade (MAF 572/1995, MAF 1578/1994, Kuosmanen 2002, Kortesniemi 2002).

Risk management measure	Legal requirements for risk management	Additional voluntary risk management measures[A]
Country selection	Any EU- Member State	Country must have been free of CSF for at least 2 years No imports of live swine into the exporting country from countries not free of CSF
Area selection	Not under restrictions due to CSF [B]	See above
Herd selection	Any domestic swine herd under the supervision of the CA CSF free for 12 months No signs of AD or TGE for 12 months No signs of Porcine brucellosis for 3 years No vaccination against AD, TGE or porcine brucellosis	Must, at least, fulfil the same requirements as an Elite Breeding herd in Finland Bio-security and vaccination program of the herd scrutinised before drawing up recommendations Special requirements if semen or live animals have been purchased for the herd or if there is a vaccination regimen of any kind in the herd.
Animal selection	Breeding animals: not imported from a third country or must have spent at least 90 days at the herd of origin Finishing pigs: must have spent at least 90 days at the herd of origin	Animals must be more than 4 months at testing for relevant diseases Animals must have been born in the herd of origin
Isolation in exporting country	30 days	
Quarantine in exporting country	-	30 days
CSF testing in exporting country	If originating from an area where CSF has been present in the last 12 month	Not routinely, requirements drawn up separately for each import
Testing for other diseases in exporting country	Testing for AD and TGE after 21 days of isolation, if originating from an area not classified as free of AD or TGE. Breeding animals tested for porcine brucellosis when at least 25kg	Toxigenic *Pasteurella multocida,* Salmonella spp, *Brachyspira hyodysenteriae,*Mycoplasma hyopneumoniae, PRRS, SI, All serotypes of *Actinobacillus pleuropneumoniae*
Treatments in quarantine in exporting country	-	Twice for Leptospira spp Twice for internal and external parasites
Veterinary inspection of animals in herd of origin	At departure	-
Transport requirements	Isolated from other swine during transport	Disinfecting of transport vehicle at arrival to Finland Careful disposal of waste
Veterinary inspection of animals at arrival	Importer MVO if ordered by the PVO[C]	MVO or Veterinary Practitioner
Quarantine at arrival in Finland	If deemed necessary by the CA 30 days if imported to an Elite breeding herd or AI station	60 days Approved by Veterinary practitioner No other swine at the same location or in close proximity (< 2 km)

		The person caring for the animals in the quarantine must not come into contact with any cloven hoofed animals Careful disposal of waste 2-4 sentinel pigs in the quarantine
CSF testing in quarantine at arrival	Random or if deemed necessary by the CA	-
Testing for other diseases	AD, TGE, Porcine brucellosis, If originating from a third country: within 2 days after arrival	At least once after at least 21 days of quarantine: AD, PRRS, SI, *Leptospira pomona*, Toxigenic *Pasteurella multocida*, *Mycoplasma hyopneumoniae*, *Salmonella spp, Brachyspira spp* Other diseases if deemed necessary by the Veterinary practitioner
Veterinary checks during quarantine	If quarantine deemed as necessary and ordered by the CA	After 3 weeks of quarantine before release If signs of disease in the imported animals
Release from quarantine	-	After two months If herd of origin free from diseasee All tests negative No signs of diseases during quarantine All documents sent to the ETT
Other	-	Selection of the herd of destination (health classified herds with a health care plan) Detailed recommendations of inspection of the animals by the farmer (food and water consumption, locomotion of the animals and constitution of the faeces) Measures (additional visits by the practitioner, additional quarantine, additional testing) recommended depending of the management of the herd of destination Isolation in the herd of destination for an additional period of time, depending on the management of the herd

[A] Recommended by the ETT. Recommendations are drawn up separately for each import and may change according to the imported category and the relevant disease situation in the exporting country.

[B] Lifting of restrictions after a CSF outbreak is the decision of the CA in the Member State, if there is no safeguard clause issued by the EU Commission in the area (Council Directive 80/217/EEC).

- The lifting of the restrictions can start in the Control zone:
- After clinical and serologic survey of all herds in the Control zone has been completed.
- The survey can start 30 days after stamping out, cleaning and disinfecting of the last outbreak of CSF in the zone.
- The lifting can start in the Surveillance zone:
- After a clinical and serologic survey of all herds in the Surveillance zone has been completed.
- The survey can start 15 days after stamping out, cleaning and disinfecting of the last outbreak of CSF in the zone.

[C] The 16 boars imported in 2000 were ordered to be inspected by the MVO.

AD Aujetzky´s diasease
AI Artificial Insemination
CA Competent Authority
CSF Classical Swine Fever
TGE Transmissible Gastroenteritis
MVO Municipal Veterinary Officer
PRRS Porcine Respiratory and Reproduction Syndrome
PVO Provincial Veterianry Officer
SI Swine Influenza

arrival of a consignment must be announced to the MAF DFH at least 24 hours before arrival. The official veterinarian supervising the AI centre of origin must send a message about the consignment through the ANIMO-system of the EU. The MAF DFH can order an inspection of the documents of the imported semen. The documents, including the day of arrival and the country and herd of origin as well as the herd of destination and the number of doses, must be kept for five years by the importer. (MAF 1578/94). Additional risk management measures can be ordered by the MAF DFH if the imported doses of semen are used in an elite breeding herd (MAF 4/93). However, no additional measures have been ordered for the only elite breeding herd using imported semen as the semen originated from an approved AI centre in Sweden (Kuosmanen 2002).

B. Legal requirements for risk management of imports from third countries

Semen may be imported into the EU from certain non-EU countries approved for imports of domestic swine semen (MAF 231/1997, Council Directive 79/542/EEC). Imports of domestic swine semen must pass a veterinary border inspection performed by a certified border control veterinarian. The border inspection is performed at certain Border Inspection Posts (BIP, Chapter 3.5. Annex 1) approved for live animals (MAF 1192/96).

C. Additional voluntary risk management measures

Voluntary risk management measures for imports of semen recommended by the ETT include the same recommendations concerning the country, area and herd selection as for live domestic swine. Recommendations for the bio-security and management of the herds of destination are drawn up separately for each herd, depending on the management of the herd. The ETT recommends that semen only be imported for elite breeding herds or for herds producing piglets which have a health care contract with a Veterinary Practitioner and which are therefore visited by the practitioner on a regular basis (Kortesniemi 2002).

5.1.3.3 Pork and pork products

Commercial imports

A. Legal requirements for risk management in intra-community trade

Pork and pork products originating from the EU must originate from animals not under restriction due to an outbreak of CSF, and must be slaughtered in the EU. The animals must either have been born in a Member State or have been imported to the EU according to the relevant EU legislation. The slaughterhouse of origin must be approved by the EU Commission, and must not be under restrictions due to an outbreak of CSF (MAF 164/1997). However, in order to avoid both animal welfare problems and great disturbances in the pork market, derogation from these rules on the trade of pork can be granted if the risk of transmission of CSF is regarded as minor (Table 16) (Council Directive 80/218/EEC).

Minced internal organs, minced meat of farmed or feral wild boar and unheated farmed wild boar meat possibly containing bone cannot be imported to Finland. Non-skinned eviscerated game can be traded if the area of origin is not under restrictions due to a contagious animal disease and if the meat has been inspected by a Veterinary Officer (MAF 164/1997).

Pork and pork products must be health marked and accompanied by a commercial certificate. Fresh meat products and fresh or frozen meat of wild boar must also be accompanied by a health certificate. The commercial certificate accompanying frozen meat has to include the month and year of freezing (MAF 164/1997).

MVOs monitor compliance with the swill feeding ban at elite breeding herds in the course of their regular visits as part of the health surveillance scheme and at herds if asked by the farmer to visit for any other reason. The MAF DFH has provided information of the risks of swill feeding and of the swill feeding ban to all Veterinary Practitioners in Finland, to the industry, and, through the media, to the general public. However, no information is gathered on the compliance of individual farmers with the ban (Raulo 2002).

Table 16

Possible derogations from the health requirements of pork in intra-community trade regarding CSF, approval of the derogation, circumstances under which approval is possible and possible additional risk management measures (Council Directive 80/218/EEC).

Derogation	Approval	Circumstances	Additional possible risk management
Animals from a disease free zone can be slaughtered at a slaughterhouse in the restricted zone	European Commission	On the request of the CA	Measures deemed necessary by the SVC to ensure the safety of the meat. May include requirements on processing and/or marking of the meat or restrictions on intra-community trade of the meat)
Animals from a herd in the control zone can be sent to a designated slaughterhouse	Authorisation by the CA	More than 30 days have passed since the cleaning and disinfecting of the last infected premises	-
Animals from a herd in the surveillance zone can be sent to a designated slaughterhouse	Authorisation by the CA	More than 7 days have passed since the cleaning and disinfecting of the last infected premises	The meat must be heat treated or maturated for at least nine months at a designated processing facility, to which it must be transported in a sealed consignment under the supervision of the CA
Intra-community trade of pork originating from a slaughterhouse situated in the restriction zones	European Commission	On the request of the CA	Measures deemed necessary by the SVC to ensure the safety of the meat. May include requirements on processing and/or marking of the meat or restrictions on intra-community trade of the meat

CA Competent Authority

B. Legal requirements for risk management of imports from third countries

Pork and pork products may be imported into the EU from certain third countries approved for imports of pork into the European Union (198/1998), but only after a veterinary border inspection (785/1999).

C. Additional voluntary risk management measures

The ETT has no additional risk management recommendations for imports of pork, game or pork and game products.

Pork and pork products for private consumption

A. Legal requirements for risk management

There are no legal restrictions on the import of pork or pork products for private consumption from EU member States. Pork and pork products up to one kg, but no wild boar meat, can be imported for private consumption from the Russian Federation and Estonia (MAF 198/1998).

Customs officials are prepared to provide the MAF DHF with executive assistance in monitoring the import of pork and pork products for private consumption during epidemics of contagious animal diseases in other countries. No assistance was requested during the CSF outbreaks in the EU in 1997-1998. However, during the Foot and Mouth Disease (FMD) outbreaks in the UK in 2000, customs officials monitored the imports of meat for private consumption of tourists returning from the UK by spot checking luggage. Any meat found was confiscated and processed to inactivate any FMD virus (Raulo 2002).

B. Additional voluntary risk management measures

The ETT has annually published at least two newspaper articles on bio-security measures in livestock herds. These articles have included a description of the risk of swill feeding to swine and have been published in two newspapers, with a national coverage, directed to farmers. The amount of information provided to farmers and the general public would be increased if there was a CSF outbreak in Finland or in countries relevant to the Finnish CSF situation. (Kortesniemi 2002).

Information on the risk of CSF connected to import of pork and pork products for private consumption as well as to swill feeding was provided by the MAF DFH to newspapers during the FMD outbreak in the UK in 2000. No information on the risks of CSF has been especially directed to tourists coming from

countries with outbreaks of CSF. There is no information available on the general public appreciation of this risk (Raulo 2002).

5.1.3.4 Other risk management measures

Transport vehicles.

A. Legal requirements for risk management
There were no legal requirements for the cleaning and disinfecting of transport vehicles returning empty after export of live animals in 1998-2000. However, since 2001 vehicles exporting animals must be disinfected before returning to Finland and before coming into contact with the susceptible population in Finland, due to the new legislation concerning FMD (MAF 3/2001).

B. Additional voluntary risk management measures
Animals intended for export are usually carried by Finnish lorries from the herds, either directly to the herds in the country of destination or to a harbour or an airport for further transport by other means. The general view is that lorries have been cleaned and disinfected before return to Finland and before coming into contact with the susceptible population in Finland.

Human contacts

A. Legal requirements for risk management
There are no legal requirements for persons coming into contact with the susceptible population in Finland to implement any risk management measures on arrival to Finland.

Customs is prepared to give executive assistance to the MAF DHF with the distribution of information to travellers and with the disinfecting of shoes at the return of travellers, if asked by the MAF DFH. No assistance was requested during the CSF outbreaks in the EU 1997-1998. However, during the FMD outbreaks in the UK in 2000, customs distributed leaflets on precautions for persons visiting herds in UK as well as managed disinfecting the footwear of persons returning from the UK at airports (Raulo 2002).

B. Additional voluntary risk management measures
The MAF DFH and the ETT have provided education and information leaflets distributed to farmers, veterinarians and others involved with the industry on how to reduce the risk of spread of CSF (Kortesniemi 2002, MAF DFH 2000). The precautions recommended to farmers (not to be in contact with live pigs within 48 hours after arrival from abroad, to take a sauna after arrival from abroad, to disinfect clothes and footwear either chemically or by keeping them in an 80 °C sauna for at least two hours) should be sufficient to inactivate CSFV.

Feedstuff

A. Legal requirements for risk management
Animal-derived proteins, except fish meal, cannot befed to domestic swine at present (MAF 1238/2000). In 1998-2000, animal-derived proteins imported as raw material for feedstuff was heat treated before distribution to herds (Rankanen 2002).

B. Additional voluntary risk management measures
The ETT keeps a list of feedstuff producers that manage risk in compliance with the requirements of the association. To be on the list, producers importing raw material for feedstuff should take precautions concerning salmonella and Bovine Spongiform Enchephalopathy (BSE) (Kortesniemi 2002).

Laboratory

A. Legal requirements for risk management
Only EELA is allowed to process samples known, or suspected, to contain CSFV (EELA 697/3/1999).

B. Laboratory safety precautions
CSFV infected material meant to be processed at EELA is transported to Finland by the EU Reference Laboratory in Hanover or by EELA. Only the Department of Virology in Helsinki EELA is allowed to process material brought into Finland for testing (see Chapter 5.1.2.3). The principle of biological containment, appropriate for laboratories to ensure safety of laboratory processing of CSFV, is in accordance with the requirements set up in Council Directive 80/217/EU. The laboratory staff at EELA may not visit premises where animals are kept within 48 hours of working in the laboratory (Veijalainen 2001).

5.1.4 Scoring of factors preventing the release of CSF into Finland

In addition to risk categorisation, the experts were asked to score lists outlining different profiles of preventive

factors that can be either present or absent during intra-community trade of live domestic swine, fresh pork, semen or during herd visits. The profiles of fresh pork represented the present legal requirements for risk management for intra-community trade. No analogous profiles were introduced for intra-community trade of live animals or semen. There are no legal requirements on precautions to take during herd visits.

The experts were asked to assign a score between 0 (no reducing effect on CSF release into Finland) to 100 (very high reducing effect on CSF release into Finland) for each profile. On the basis of the expert opinions on the effect of the different profiles of the preventive factors, the mean, the standard deviation and the range were counted.

The experts regarded a combination of several well-known risk management practices for selected routes of release of CSF as highly effective in reducing the risk of release of CSF. Of the selected possible routes of release of CSF, intra-community trade of fresh pork was regarded as the route of release of CSF where the risk is most difficult to manage. The legal requirements for intra-community trade of fresh pork (profiles 1-6, Table 19) were not regarded as highly effective in reducing the risk of release of CSF. The scoring range for most of the profiles, given by individual experts, was wide (Table 17-20).

5.1.5 The risk of release of CSF into Finland in circumstances similar to 1998-2000

The objective of the release assessment was to assess the risk of release of CSF in 1998-2000 to the population at risk connected to various release routes identified. The evaluation was based on eight expert opinions, from which the median expert opinion was derived. The experts were independent of risk management (MAF DFH) and represented both the industry, the Veterinary Faculty of the University of Helsinki and EELA. The experts had knowledge and experience of the pork production industry or knowledge in the epidemiology and diagnostics of swine diseases.

During a one day session, the risk to different parts of the population at risk connected to various release routes identified was evaluated by each expert independently on the basis of the expert's experience and on the information provided. The risk of release was classified into five levels (very high, high, moderate, low and negligible), chosen to represent the risk of release in circumstances similar to 1998-2000 (Table 21). A median expert opinion and a median absolute deviation (MAD) for each expert opinion was counted with the formula:

$$MAD = Md|x_{(1,i)} - Md(x_{(1,i)})|$$

MAD median absolute deviation
Md median
x(1,i) the estimates of 1st to the i:th expert on the question

The result was rounded upwards, if the resulting median expert opinion was in between two risk levels.

The evaluations of the individual expert on the risk of release of CSF into AI centres, multiplying herds and farrowing herds were fairly similar. The most divergent disagreement between the experts was connected to the routes of release and type of population at risk where the data on the route and/or the population were incomplete (Table 22).

5.1.5.1 Release of CSF with live domestic swine

The only category of domestic swine that might have released CSF into Finland in 1998-2000 was AI boars, as other categories of domestic swine were not imported during this period. Moreover, the boars were imported from a country that was CSF free. The imported animals did not come into contact with any other part of the population at risk. Therefore, there was no possibility of release of CSF into any other part of the population at risk than the AI centre. The median expert opinion was that the risk of the release of CSF into Finland through this route was negligible. (Table 22)

5.1.5.2 Release of CSF with semen

The number of imported doses of semen increased in 1998-2000. The imported semen was used in three different herds in Finland, one elite breeding herd (imports from Sweden) and two other herds producing piglets (imports from Norway). The countries of origin remained free of CSF during this time. Release of CSF by semen imported from Sweden to any other

Table 17

The mean, standard deviation and range of the expert opinions concerning profiles with different combinations of preventive factors that can either be present (+) or absent (-) in intra-community trade of live domestic swine [A]. A score between 0 (no reducing effect on risk of CSF release into Finland) to 100 (very high reducing effect on risk of CSF release into Finland) was assigned to each profile.

Preventive factor	Profiles								
	1	2	3	4	5	6	7	8	9
Area selection[1]	+	+	-	-	+	+	+	-	-
Quarantine in the exporting country[2]	+	-	-	+	+	+	+	-	+
Testing for CSF in the exporting country[3]	+	-	+	+	-	+	-	-	+
Quarantine in the importing country[2]	+	+	+	+	+	-	-	+	-
Testing for CSF in the importing country[3]	+	+	+	-	+	-	+	+	-
The usage of sentinel swine at the final destination herd[4]	+	-	+	-	-	+	+	-	+
RESULTS									
MEAN	97.1	70.7	67.1	52.9	80.7	62.1	67.4	48.6	48.6
SD	4.5	15.2	24.5	16.0	10.8	11.9	12.7	25.2	19.6
RANGE	90-100	50-100	20-100	35-90	70-100	50-80	52-90	20-100	25-80

[A] It is assumed that the swine have been born on the farm of origin, and would not have any direct or indirect contacts with other swine during transportation. Furthermore, in case of any clinical symptoms or serological response indicating CSF, the whole consignment would be discarded.
[1] There have been no reports of clinical CSF cases in the area during the last 24 months.
[2] The animals in a consignment are isolated for a minimum of 30 days in a separated quarantine building, where bio-security routines of high standard are practised. The animals are under the supervision of an approved veterinarian.
[3] All animals in the consignment are tested for CSF after 21 days in the quarantine using a method approved by the Council Directive 89/2001/EC. If no quarantine is used, the animals are tested at the herd of origin or at the herd of destination.
[4] The imported animals are kept isolated from the rest of the swine in a herd for a minimum of 30 days. However, during 2-3 weeks of the isolation period they do have direct contacts to some fully susceptible sentinel animals in order to promote possible clinical signs of CSF.

Table 18

The mean, standard deviation and range of the expert opinions concerning profiles with different combinations of preventive factors that can either be present (+) or absent (-) in intra-community trade of semen [A]. A score between 0 (no reducing effect on risk of CSF release into Finland) to 100 (very high reducing effect on risk of CSF release into Finland) was assigned to each profile.

Preventive factor	Profiles						
	1	2	3	4	6	7	8
Area selection[1]	+	+	-	-	+	-	+
Quarantine in the exporting country[2]	+	-	-	+	-	+	-
Testing for CSF in the exporting country[3]	+	-	+	+	-	-	+
Isolation of the inseminated sows[4]	+	-	-	-	+	+	-
RESULTS							
MEAN	95.0	61.4	52.1	70	67.4	63.9	73.6
SD	4.6	12.5	23.6	17.5	16.9	19.2	9.9
RANGE	90-100	50-90	15-90	45-100	40-100	40-100	60-90

[A] It is assumed that the semen is imported according to the health requirements of the decision of the MAF 1578/1994.
[11] There have been no reports of clinical CSF cases in the area during the last 24 months.
[2] The donor boars are isolated for a minimum of 30 days in a separated quarantine building, where bio-security routines of high standard are practised. The animals are under the supervision of an approved veterinarian.
[3] All donor boars are tested for CSF after 21 days in the quarantine using a method approved by council directive 2001/89/EC. If no quarantine is used, the animals are tested at the herd of origin.
[4] The sows inseminated with the imported semen are isolated from other animals on the farm for 21 days.

Table 19

The mean, standard deviation and range of the expert opinions concerning profiles with different combinations of preventive factors that can either be present (+) or absent (-) in intra-community trade of fresh pork. A score between 0 (no reducing effect on risk of CSF release into Finland) to 100 (very high reducing effect on risk of CSF release into Finland) was assigned to each profile.

Preventive factor	**Profiles**					
	1	2	3	4	5	6
Country selection[1]	+	-	-	-	+	-
Area selection[2]	-	+	-	-	-	+
Health certificate[3]	-	-	+	+	-	-
Good general knowledge of the ban on swill feeding	+	+	+	-	-	-
RESULTS						
MEAN	80.7	74.3	55.0	33.6	63.6	53.6
SD	20.4	22.1	23.8	17.9	19.0	19.2
RANGE	35-100	35-100	15-90	5-60	25-80	25-80

[1] There have been no reports of clinical CSF cases in the country during the last 6 months.
[2] There are no restrictions due to CSF in the area.
[3] The meat originates from an area with restrictions due to CSF, but is intended for meat processing, only.

Table 20

The mean, standard deviation and range of the expert opinions concerning profiles with different combinations of preventive factors that can either be present (+) or absent (-) during herd visits[A] at a potentially CSF infected herd. A score between 0 (no reducing effect on risk of CSF release into Finland) to 100 (very high reducing effect on risk of CSF release into Finland) was assigned to each profile.

Preventive factor	Profiles								
	1	2	3	4	5	6	7	8	9
The usage of protective clothes and boots during the farm visit	+	+	-	-	+	+	+	-	-
No direct contacts with swine or animal waste during the farm visit	+	-	-	+	+	+	+	-	+
Taking a shower after the abovementioned farm visit	+	-	+	+	-	+	-	-	+
No farm visits for 48 hours after return to Finland	+	+	+	+	+	-	-	+	-
Heating of clothes and footwear which were used during the foreign farm visit	+	-	+	-	-	+	+	-	+
RESULTS									
MEAN	98.6	67.1	68.6	60.0	77.1	78.9	71.4	46.4	57.9
SD	3.5	18.1	19.6	16.7	19.8	15.7	15.8	22.6	25.6
RANGE	90-100	30-90	30-90	30-90	40-100	50-100	45-100	15-90	20-90

[A] There are no legal requirements for precautions to take before contact to the population at risk after herd visits in foreign countries

herd than this specific elite breeding herd was impossible. The expert opinion indicated that the risk to elite breeding herd was negligible. The median of the expert opinion on the risk of release of CSF into herds producing piglets by semen imported from Norway was also that this risk was negligible. The release of CSF into any other part of the population at risk by semen was not possible. (Table 22)

5.1.5.3 Release of CSF by imported farmed wild boars

As there were no imports of farmed wild boar into Finland in 1998-2000, the release of CSF by imported farmed wild boars was considered not to be possible.

5.1.5.4 Release of CSF by imported miniature pigs

In 1998-2000, only a small number of miniature pigs were imported and all the countries of origin remained free of CSF. The import requirements included isolation prior to import and a health check by a veterinarian before release from quarantine, but no requirements for testing for CSF prior to import were included. The expert opinion indicated that the risk of release of CSF on the population at risk was negligible (Table 22).

5.1.5.5 Release of CSF by migrating feral wild boars

The expert opinion indicated that the release of CSF by migrating feral wild boars was negligible to all other populations at risk except to the farmed and the feral wild boar populations, where it was low (Table 22).

5.1.5.6 Release of CSF by illegally imported live animals

Even if there were no reports of illegal imports of live domestic swine, farmed wild boar or miniature pigs the expert opinion indicated that there was a low risk of release of CSF to farmed wild boars and a moderate risk of release of CSF to miniature pigs connected to illegal imports of live animals (Table 22).

5.1.5.7 Release of CSF by pork and pork products

The commercial imports of pork in 1998-2000 originated mostly from countries which have remained free of CSF for an extended period of time (Table 8). However, there was a possibility of release of CSF into Finland during this time, as there were imports from countries where CSF outbreaks were recorded and feeding pigs with swill was allowed in 1998-2000 (Table 22).

The expert opinion indicated that there was a negligible risk connected to commercial imports or imports for private consumption of pork or pork products originating from countries where CSF was not recorded. The risk of release of CSF with commercial imports or imports for private consumption of pork or pork products from countries where CSF was reported to be present was negligible to elite breeding herds, AI stations, multiplying herds, farrowing herds and feral wild boars. The risk to farrowing-to-finishing herds, finishing herds, farmed wild boars and miniature pigs was low, probably due to differences in swill feeding practices in the different parts of the population. Illegal imports of pork and pork products were seen as a low risk to farrowing-to-finishing herds, finishing herds and farmed wild boars and a moderate risk to miniature pigs (Table 22).

Table 21

The risk classification, used in the expert elicitations, of the probability of release of CSF into Finland through a specified route. The rate/frequency of a specified release route is assumed to be at the level of 1998-2000 (see text 5.1.1).

Risk classification	Code	Probable number of release of CSF into the population at risk
Very high	+++++	1 release/ level in 1998-2000
High	++++	1 release/10 times the level in 1998-2000
Moderate	+++	1 release/100 times the level in 1998-2000
Low	++	1 release/1000 times the level in 1998-2000
Negligible	+	<1 release/1000 times the level in 1998-2000
Impossible	-	Release not possible through this route in 1998-2000

Table 22

Median of the expert opinions on the risk of release of CSF into the Finnish swine population at risk in 1998-2000 by the various release routes identified.

CSF release routes identified	See chapter 5.1.	Population types at risk								
Direct contacts		**AI**	**EB**	**MH**	**F**	**F to Fi**	**Fi**	**FW**	**MP**	**WB**
Import of AI boars from Norway	.2.1, .3.1	+	-	-	-	-	-	-	-	-
Import of semen from Sweden	.2.1, .3.2	-	+	-	-	-	-	-	-	-
Import of semen from Norway	.2.1, .3.2	-	+	+	+	+	-	-	-	-
Import of miniature pigs from Denmark	.2.1, .3.1	+	+	+	+	+	+	+	+	+
Import of one miniature pig from Norway	.2.1, .3.1	+	+	+	+	+	+	+	+	+
Import of one miniature pig from Sweden	.2.1, .3.1	+	+	+	+	+	+	+	+	+
Migration of feral wild boars	.2.1, .3.1	+	+	+	+	+	+	++*	+	++*
Illegal imports of live animals	.2.1, .3.1	+	+	+	+	+	+	++	+++	+
Indirect contacts										
Commercial import of pork from CSF free countries	.2.2, .3.3	+	+	+	+	+	+	+	+	+
Commercial import of pork products from CSF free countries	.2.2, .3.3	+	+	+	+	+	+	+	+	+
Commercial import of pork from countries with CSF outbreaks	.2.2, .3.3	+	+	+	+	++	++	++	++*	+
Commercial import of pork products from countries with CSF outbreaks	.2.2, .3.3	+	+	+	+	++	++	++	++*	+
Import of pork or pork products for private consumption from CSF free countries	.2.2, .3.3	+	+	+	+	+	+	+	+	+
Import of pork or pork products for private consumption from countries with CSF outbreaks	.2.2, .3.3	+	+	+	+	++*	++*	++*	++*	+
Illegal imports of pork or pork products	.2.2, .3.3	+	+	+	+	++*	++*	++	+++	+
Transport vehicles	.2.3, .3.4	+	+	+	++*	++*	+	+	+	+
Human	.2.3, .3.4	+	+	++	++	++	++	++	++	+
Non-food products	.2.3, .3.4	+	+	+	+	+	+	+	+	+
Feedstuff	.2.3, .3.4	+	+	+	+	+	+	+	+	+
Laboratory activity	.2.3, .3.4	+	+	+	+	+	+	+	+	+

* Median absolute deviation >0, i.e. more than 3 of the experts had an opinion which differed from the median.

AI Artificial Insemination Centre
EB Elite breeding herd
MH Multiplying herd
F Farrowing herd
F to Fi Farrowing-to-finishing herd
Fi Finishing herd
FW Farmed wild boar
MP Miniature pig
WB Feral wild boar

The MADs for the risk of release to the population at risk for illegal imports of pork and pork products for private consumption were, in general, higher than for the rest of the identified routes of release, a phenomenon that may reflect uncertainty over the destination of the imported pork and pork products (Table 22).

5.1.5.8 Other routes

Transport vehicles

Any vehicle either used to carry infected swine, or otherwise contaminated by CSFV infected material, could carry the virus into the country. The release of CSF into Finland is possible if the vehicle would come into contact with the population at risk before adequate cleaning and disinfecting or other kind of inactivation of the virus. The population at risk would be any swine carried by or coming into contact with an incompletely cleaned and disinfected vehicle returning from a country where CSF is present. The expert opinion indicated that there was a low risk of release of CSF in 1998-2000 to farrowing and farrowing-to-finishing herds by transport vehicles but the risk was negligible for other categories of the population at risk (Table 22).

Human contact

The expert opinion indicated that there was a low risk of release of CSF in 1998-2000 to Multiplying, farrowing, farrowing-to-finishing and finishing herds as well as to farmed wild boar and miniature pigs. The risk to elite breeding herds, AI centres and feral wild boars was negligible (Table 22).

Feedstuff

No compound feed is presently imported to Finland. Raw material for compound feed produced in Finland is heat treated before distribution to herds and the treatment is sufficient to inactivate any contamination of CSFV in the feedstuff distributed to the Finnish population at risk (Table 22).

The expert opinion indicated that the risk of release of CSF into the population at risk by this route was negligible in 1998-2000 (Table 22).

Other non-food products

The expert opinion indicated that the risk of release of CSF into the population at risk by this route was negligible in 1998-2000 (Table 22).

Laboratory activity

CSFV contaminated material is transported to Finland and processed at EELA. The risk of release depends on the safety precautions taken when processing the material. The expert opinion indicated that the risk of release of CSF into the population at risk by this route was negligible in 1998-2000 (Table 22).

5.2 EXPOSURE ASSESSMENT WITHIN FINLAND

Exposure routes and routes for the further transmission of CSF are presented in chapters 5.2.1 and 5.2.2. In contrast to the release assessment, where the risk connected to a specific route was assessed, the risk of exposure was considered to be conditional to a specific event, i.e. a contact occurring (chapter 5.2.4). This contact was considered to be able to expose a certain part of the population at risk to CSF or to carry infection from an infected population to an unspecified part of the population at risk. The risks connected to these routes and types of contacts are estimated using a new risk classification defined in chapter 6.4.2.1 (Table 33). The classification of the estimate is different for incoming and outgoing contact events for the population at risk.

5.2.1 Identification of contacts between the populations at risk

Exposure of the population at risk can either be by direct contacts with infected live animals (Figure 7) and semen or by indirect contact with CSFV contaminated material. Indirect contacts are swill feeding to the population at risk (pork and pork products), transport vehicles or humans visiting herds. Other routes of contact could be classified as neighbourhood spread (Table 23).

5.2.2 Contact rates

5.2.2.1 Movement of live domestic swine

A questionnaire was sent to the major slaughterhouses to gather data on the movements of live domestic swine and on the frequency of movements between herds in 2000 (EELA 2002). The population covered by the questionnaire represented 85% of the domestic swine herds in Finland in 2001, and

its results are shown in Table 24. Detailed data on the movement of domestic swine will accumulate from the beginning of 2002, after new legislation concerning the registration of movement and the identification of domestic swine is implemented (MAF 1296/2001).

Elite breeding herds

Breeding animals move from the elite breeding herds to other elite breeding herds, to the AI centres, to the performance test station, to multiplying herds, to farrowing herds, to farrowing-to-finishing herds and to finishing herds or directly to the slaughterhouse (Figure 7).

A schematic representation of the pork production in Finland in 2000 and the direction of live animal movements (blue arrows) between different herd types (rectangles) and to the slaughterhouse (red arrows). The number of a specific herd type in 2000 is indicated in the brackets rectangles.

Artificial insemination centres

AI centres receive boars from performance test stations and elite breeding herds. AI centre boars are only distributed to the slaughterhouses (Figure 7).

Performance testing stations

Performance tested pigs are brought to the testing stations from elite breeding herds at approximately

Table 23

The identified routes of exposure to CSF and the routes for spread from the herd in different types of domestic swine herds in Finland.

HERD TYPE	Exposure of the herd		Spread from the herd [A]	
	By direct contact	By indirect contact	By direct contact	By indirect contact
AI	Breeding animals (from EB and Performance test stations)	Transport of breeding animals Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread Swill feeding	Semen	Transport of breeding animals Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread
EB	Breeding animals (from EB) Semen (from AI)	Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread Swill feeding	Breeding animals Young finishing pigs	Animals for slaughter (pork) Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread
MH	Breeding animals (from EB) Semen (from AI)	Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread Swill feeding	Breeding animals Young finishing pigs	Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread
F and F to Fi	Breeding animals (from EB, MH, F or F to Fi) Semen (from AI)	Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread Swill feeding	Young finishing pigs	Transport of breeding animals Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread
Fi	Young finishing pigs (from EB, MH, F or F to Fi)	Transport of young finishing pigs Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread Swill feeding		Transport of animals to slaughter Feedstuff transport vehicles Human contact Neighbourhood spread

[A] To an unspecified part of the population at risk

AI Artificial insemination centre
EB Elite breeding herd
MH Multiplying herd
F Farrowing herd
F to Fi Farrowing-to-finishing herd
Fi Finishing herd

25 kg (10-12 weeks) and are distributed to the slaughterhouses or to the AI centres (Figure 7).

Multiplying herds

Multiplying herds purchase replacement stock from elite breeding herds. Animals move from the multiplying herds to farrowing herds, farrowing-to-finishing herds, finishing herds or directly to the slaughterhouses (Figure 7).

Farrowing and farrowing-to-finishing herds

Farrowing and farrowing-to-finishing herds rear their replacement stock or purchase young breeding animals from elite breeding herds, multiplying herds and occasionally from other farrowing or farrowing-to-finishing herd. farrowing or farrowing-to-finishing herds distribute animals to finishing herds and to the slaughterhouses and occasionally to other farrowing or farrowing-to-finishing herds (Figure 7). Piglets are weaned at the age of 4-5 weeks and young finishing pigs are distributed to the finishing herds at 25 kg at an age of 10-12 weeks.

Finishing herds

Finishing herds purchase animals from elite breeding herds, multiplying herds, farrowing herds and farrowing-to-finishing herds (Figure 7). The most probable number of times that a compartment in a finishing herd is filled is 2.7 times a year, with a range of 1-3 times a year (Table 24) (EELA 2002).

5.2.2.2 Artificial insemination

Approximately 300,000 doses of semen are used annually in around 2,500 herds producing piglets (elite breeding herds, multiplying herds, farrowing herds and farrowing-to-finishing herds). Approximately half of all sows in herds producing piglets in Finland are inseminated. One of the AI centres distributes 3,800 doses of semen to 750 herds and the other 2,000 doses to 400 herds each week. The most probable number of herds receiving semen from one boar during a week is 10, and the maximum number is 20. The semen from one collection from a boar is used within 5 days after collection. Half of the doses used are mixtures of semen from several boars. The number of doses derived from a mixture of the semen of 5-10 boars is 200. (Puonti 2002).

5.2.2.3 Farmed wild boars

There were no data gathered for this report on the movement of farmed wild boars between wild boar farms. Detailed data on the movement of farmed wild boars will accumulate after the new legislation concerning movement registration and identification of domestic swine is implemented and enforced in 2002 (MAF 1296/2001).

5.2.2.4 Movement of miniature pigs

There were no data gathered for this report concerning movements of miniature pigs in Finland. Some data on the movement of miniature pigs will accumulate after the new legislation concerning movement registration and identification of swine is implemented and enforced in 2002 (MAF 1296/2001).

5.2.2.5 Slaughtering of animals
Domestic swine

A total of 63,429 sows were slaughtered in Finland in 2000. There were 15 slaughterhouses that slaughtered swine and 99% of sows (62,968) were slaughtered at these. The remaining 1% (524) of sows were slaughtered at one of the 66 low capacity slaughterhouses approved for slaughtering of pigs. Half of these (260) were slaughtered at a low capacity slaughterhouse also slaughtering farmed wild boars (Annex 2).(EVI 2001a, EVI 2001b).

Finishing pigs are distributed directly to the slaughterhouse when they weigh 100kg and are approximately 6 months old. Of the total of 1,961,304 slaughtered finishing pigs in 2000, 98% (1,928,777) were slaughtered at slaughterhouses; the remaining 2%, (32,527) were slaughtered at one of the 66 low capacity slaughterhouses approved for the slaughtering of domestic swine (Table 25, Annex 2). Of all slaughtered finishing pigs, 0.6% (10,818) were slaughtered at premises also slaughtering farmed wild boars (EVI 2001a, EVI 2001b).

Farmed wild boar

In 2000, 1,053 farmed wild boars were slaughtered. Slaughtering of wild boars took place at two large scale (16 wild boars) and at 26 low capacity slaughterhouses (976 farmed wild boars) (Table 25). In ad-

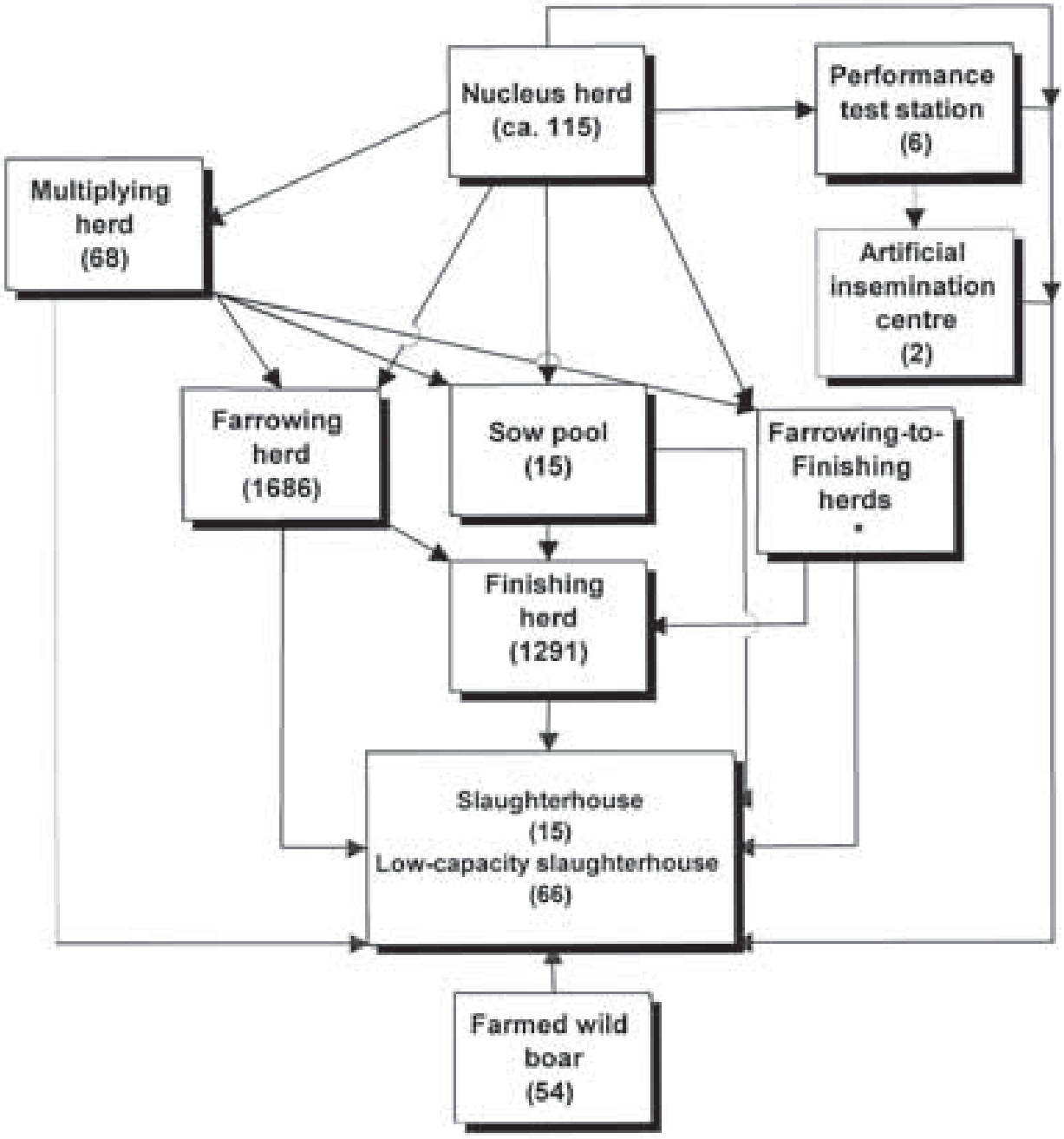


Figure 7
The pork production structure in Finland 2000 and live animal movement s (EELA 2002b, EVI 2002a, FABA 2001, TIKE 2000) A schematic representation of the pork production in Finland in 2000 and the direction of live animal movements (blue arrows) between different herd types (rectangles) and to the slaughterhouse (red arrows). The number of a specific herd type in 2000 is indicated in the brackets rectangles.

dition, the meat of 61 feral wild boars was inspected by veterinarians at other locations. Of the low capacity slaughterhouses, seven slaughtered only farmed wild boar and 19 slaughtered both domestic swine and farmed wild boar. Of the 26 low-capacity slaughterhouses slaughtering wild boars in 2000, 17 were approved for slaughtering wild boars (Table 25, Annex 3 (EVI 2001a, EVI 2001b).

5.2.2.6. Pork and farmed wild boar meat

Pork

In 2000, 173 000,000 kg of pork was produced in Finland. There were 15 large scale slaughterhouses and 66 low capacity slaughterhouses slaughtering pigs in Finland in 2000 (EVI 2001a). Pork is processed at cutting plants, plants producing minced meat, plants producing meat preparations and in meat processing plants approved for the processing of pork (Table 25)

Table 24
Purchases and distribution of live domestic swine in 2001 based on a questionnaire (EELA 2002).

Direct contact event	Elite breeding herds			
Purchases for the herds				
Purchases of breeding animals	**Min**	**Mp**	**Max**	**Min**
Number of purchases of breeding animals/year	2	5	12	2
Number of herds of origin of breeding animals/purchase	1	1	2	1
Number of herds that breeding animals are purchased from /year	1	1	5	1
Number of gilts purchased at a time	1	5	25	1
Number of boars purchased at a time	1	1	2	1
Number of hybrid gilts purchased at a time	-	-	-	-
Purchases of young finishing pigs	**Min**	**Mp**	**Max**	**Min**
Number of herds of origin/ batch of young finishing pigs in one compartment	-	-	-	-
Number of times a compartment in a finishing herd is filled/year	-	-	-	-
Distributions from herds				
Distribution of breeding animals	**Min**	**Mp**	**Max**	**Min**
Number of times that young piglets are sent to the phenotype testing station annually	1	2	6	-
Number of groups of young piglets send to the phenotype testing station annually	4	12	30	-
Number of batches of breeding animals distributed /year	10	20	100	10
Number of herds receiving breeding animals / batch distributed	1	1	5	1
Number of herds receiving breeding animals / year	5	25	75	1
Number of breeding animals distributed to one farm at a time	1	1	20	1
Distribution of young finishing pigs	**Min**	**Mp**	**Max**	**Min**
Number of batches of young finishing pigs distributed/year	-	-	-	-
Number of young finishing pigs distributed at a time	Nk	Nk	Nk	Nk
Number of herds receiving young finishing pigs at a time	Nk	Nk	Nk	Nk
Number of finishing herds receiving young finishing pigs/year from one pig production herd	Nk	Nk	Nk	Nk
Slaughtering of animals	**Min**	**Mp**	**Max**	**Min**
Number of times animals are sent to slaughter /year	Nk	Nk	Nk	Nk
Number of sows sent to slaughter/batch	Nk	Nk	Nk	Nk
Number of other swine sent to slaughter/batch	Nk	Nk	Nk	Nk
The number of batches of finishing pigs sent to slaughter from one compartment	-	-	-	-
Number of finishing pigs sent to slaughter/batch	-	-	-	-

Min Minimum Mp Most probable number Max Maximum - No movements under normal circumstances Nk Not known

Table 25
The number of establishments approved for slaughtering or processing pork and wild boar in Finland in 2000 (EVI 2001a).

Activity	Number of approved plants	
	Large scale	Low capacity
Slaughtering	15	66
Slaughtering of Farmed wild boar	2	17A
Cutting	86	208
Mincing	37	71
Meat preparation production	52	50
Meat processing	91	179

[A] A total of 26 low capacity slaughterhouses slaughtered wild boars in 2000 (EVI 2001b).

(EVI 2001a). A small amount of pork and pork products is also sold directly from herds to consumers and to tourists visiting the herds (Niemi 2000). Pork from a certain herd can be traced until the cutting plant. A batch of pork cut during a certain day at a certain cutting plant can be traced until the further processing of the meat or to the retail level (EVI 2001b).

In 1999 there were 104 companies involved with the retail of meat and meat products. Of a total of 4,283 small retail stores, 2,706 belonged to five retail groups. Purchases of meat and meat products are co-ordinated within the groups. (Suomen Gallup Elintarviketieto OY 2001).

Farmed wild boar meat

The meat of slaughtered farmed wild boars is mainly distributed directly to restaurants or consumers.

Multiplying herds			Farrowing herds			Farrowing to finishing herds			Finishing herds		
	Mp	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**
	5	12	0	1	10	0	1	5	-	-	-
	1	2	1	1	3	1	1	2	-	-	-
	1	5	0	1	5	0	1	4	-	-	-
	5	25	0	3	10	0	2	5	-	-	-
	1	2	0	1	2	0	1	2	-	-	-
	-	-	0	10	25	0	10	20	-	-	-
	Mp	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**
	-	-	-	-	-	-	-	-	1	10	30
	-	-	-	-	-	-	-	-	1	3	3
	Mp	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**
	-	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-	-
	20	50	-	-	-	-	-	-	-	-	-
	1	5	-	-	-	-	-	-	-	-	-
	4	20	-	-	-	-	-	-	-	-	-
	6	26	-	-	-	-	-	-	-	-	-
	Mp	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**
	-	-	1	28	52	1	11	35			
	Nk	Nk	10	27	700	10	21	80			
	Nk	Nk	1	1	3	1	1	3			
	Nk	Nk	1	12	40	1	6	40			
	Mp	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**	**Min**	**Mp**	**Max**
	Nk	Nk	5	15	40	13	24	52	-	-	-
	Nk	Nk	1	3	50	1	2	18	-	-	-
	Nk	Nk	1	9	50	1	19	100			
	-	-	-	-	-	-	-	-	1	4	6
	-	-	-	-	-	1	19	100	1	50	200

Swill feeding

Feeding of swill to domestic swine was allowed after heating of the swill in 1998-2000, but has been banned since the beginning of 2001 (MAF 467/1994). The MVOs are responsible for supervising compliance with the ban, but no data are available on the compliance of herds with these requirements.

5.2.2.7 Other contacts

Transport vehicles

Transport vehicles visiting domestic swine herds coming into contact with possibly CSFV contaminated material are live animal and feedstuff transport vehicles, mobile feed mixers, emergency slaughtering vehicles and carcass collecting vehicles.

Live animal transport vehicles

Domestic swine traded in Finland are transported by entrepreneurs registered for animal transports. Registration is obligatory, based on animal welfare legislation (MAF 496/1996). Emergency slaughtering of diseased animals can be performed at the herd or at the slaughterhouse, but these animals must be transported separately from other animals.

In 2000, there were 202 entrepreneurs registered in Finland for transporting different categories of swine (Table 26). Most of the entrepreneurs transporting swine had registered only one vehicle for animal transports, but 31 entrepreneurs had two, three entrepreneurs had three, two entrepreneurs had four, one entrepreneur had five and one entrepreneur had seven vehicles registered. Of the 202 entrepreneurs registered, 38 declared that their area of coverage

was the whole country, while the rest reported that they operated in one or more provinces (MAF DFH 2001c).

Indirect contacts between domestic swine herds through live animal transports are frequent (Table 24 and Table 27). The number of herds visited by live animal transport vehicles between cleaning and disinfecting of the vehicle is different depending on the category of swine transported (Table 27). Transport of breeding animals to elite breeding herds are separate from transport of young finishing pigs and from transport of animals to slaughter. All breeding animal transport vehicles are disinfected at least once a day, though in some cases between each batch of transported animals. Transport vehicles transporting young finishing pigs are cleaned and disinfected more irregularly. Sometimes between each batch transported but mostly once a day. In more scarcely populated areas the vehicles might be cleaned and disinfected every second day. The vehicles used for transport of domestic swine to large scale slaughterhouses are cleaned and disinfected at least once a day or even between batches of animals (EELA 2002).

Table 26
The number of registered entrepreneurs for swine transports in Finland in 2000 (MAF DFH 2001c).

Category of swine	Number of registrations
Registered for one category	**53**
AI boars	1
Finishing pigs for slaughter	20
Young finishing pigs	16
Emergency slaughtered animals	16
Registered for several categories	**149**
Young finishing pigs and breeding animals	7
Any category of swine	138
Any category of swine and emergency slaughtered animals	4
Total	**202**

Transport of feedstuff and mobile feed mixers

Feedstuff transport vehicles are usually owned by private entrepreneurs. In 2000, 130 entrepreneurs and a total of 370 vehicles were registered for the transporting of feedstuff. A small part of the feedstuff is transported from the feed mill to the herd by the domestic swine producers themselves (Turunen 2001).

There were 18 mobile feed mixers operating in 2000, most of them operating in the most densely populated areas in the South Western parts of the country (Turunen 2001) (Annex 4).

The own-checking system of feedstuff transport vehicles includes requirements for keeping records of the time and destination of transports, but not for

Table 27
Indirect contacts between domestic swine herds caused by live animal transport vehicles based on a questionnaire (EELA 2002).

Category of domestic swine transported	Min	Mp	Max
Transport of breeding animals[A]			
Number of herds of origin of breeding animals in one vehicle between cleaning and disinfecting	1	3	7
Number of herds receiving animals from a vehicle between cleaning and disinfecting	1	4	7
Transport of young finishing pigs[B]			
Number of herds of origin in one full transport vehicle	1	9	20
Number of herds receiving animals from a full transport vehicle	1	1	3
Number of herds of origin of animals transported in a transport vehicle between cleaning and disinfecting	1	9	20
Number of herds receiving animals from a transport vehicle between cleaning and disinfecting	1	1	6
Transport of animals for slaughter[B]			
Number of finishing pigs/ batch	50	101	210
Number of herds of origin of animals in one batch	1	5	15
Number of herds of origin of animals between cleaning and disinfecting of the vehicle	1	5	15
Number of batches transported /vehicle / day	1	2	4

[A] Indirect contacts between elite breeding, multiplying herds, farrowing herds and farrowing-to-finishing herds

[B] Indirect contacts between all herds

Min Minimum Mp Most probable number Max Maximum

the frequency of cleaning and disinfecting of the vehicles. Disinfecting the vehicle is required when a new batch of feedstuff is transported, and if the feedstuff transported is known to be contaminated by salmonella (MAF 20/2001). The frequency of disinfecting the mobile feed mixer is not stipulated but, depending on the raw materials used and the number of herds, it is performed two to four times/month (Turunen 2001).

Human contacts

A wide variety of people visit swine herds, including animal caretakers, holiday substitutes, agricultural advisers, artificial inseminators, veterinarians and others. The frequency of visits partly depends on the number and category of swine in the herd, the stage of production and on the disease situation in the herd. There were no data gathered on the frequency of these visits for this report.

The various health classification systems run by the slaughterhouses as well as the National health monitoring scheme of elite breeding herds include requirements for bio-security measures for visitors to herds. No data were gathered on the compliance with and effectiveness of these measures.

Feedstuff

Raw materials used in compound feedstuff for swine is heat treated up to 80-90oC before distribution to herds. Animal-derived proteins used in 1998-2000 in feeding of domestic swine originated from a rendering plant using Finnish animal waste as raw material (Rankanen 2001). Animal-derived protein (except fish meal) cannot be used in feeding of swine at present (MAF 1238/2000).

Management of animal waste

The Plant Production Inspection Centre (KTTK), the MVO and the PVO, as well as Veterinary Officers at slaughterhouses supervise the processing of animal waste. Two rendering plants are approved for the destruction of high risk materials in Finland. The capacity of these plants during an outbreak of CSF is estimated to be 2,500 carcasses/day (MAF DFH 2001g).

In 2000, 32 announcements were made on the use of carcasses for feeding of wild life. Eight of these announced the use of species other than swine. Five announcements specified the use of swine and the rest did not specify the species to be used (Table 28) (MAF DFH 2001d). No data were gathered for this report on the compliance of farmers with regulations concerning the management of carcasses at herds.

Livestock density and neighbourhood spread

Due to the density of domestic swine herds in Finland there are only a few areas where neighbourhood spread could be taken into consideration on a larger scale (Table 29, Annex 1). There are individual domestic swine herd clusters susceptible to neighbourhood spread in scarcely populated areas but no information on the location of these herd clusters was gathered for this report. In 2000, the maximum domestic swine herd density in a Finnish municipality was three herds/10km^2, while the maximum density of domestic swine in a Finnish municipality was 155 domestic swine/ km^2 (Table 29) (TIKE 2000, National Land Survey of Finland 2000). There were both wild boar farms and domestic swine herds in 10% (44) of all Finnish municipalities in 2000 (TIKE 2000, MAF DFH 2001h).

Less than 1% of all domestic swine herds housed swine outside for at least part of the year (EELA 2002).

Table 28
Announcements on the use of carcasses for feeding of game or other purposes in 2000 (MAF DFH 2001d).

Province	Number of announcements	Species information	Use
Province of Southern Finland	7	Not specified	Feeding of game
Province of Western Finland	5	Not specified	Feeding of eagles, bear research, hunting
Province of Eastern Finland	8	Not specified	Photographing, hunting, not specified
Province of Oulu	11	Swine, bovine, mouse, reindeer, fish	Feeding of game, photographing, hunting
Province of Lapland	1	Reindeer	Feeding of eagles

Table 29
The domestic swine herd and domestic swine densities in Finnish municipalities (TIKE 2000, National Land Survey of Finland 2000).

	Number of municipalities (total 458)	% of all municipalities	% of municipalities with domestic swine herds	Land area (km^2)	% of the total land area in Finland (338,150 km^2)
Domestic swine herd density					
> 1 herd/10km2	36	8	10	9,638	3
0,1- 1 herd/10km2	171	37	48	71,802	21
<0,1 herd/10km2	151	33	42	144,778	43
0 herds	100	22	-	111,933	33
Density of domestic swine					
1-10 swine/ km2	263	57	73	186,126	55
11-50 swine/ km2	75	16	21	29,956	9
51-100 swine/ km2	16	4	5	3,688	1
>100 swine/ km2	4	1	1	989	0.3

5.2.3 Assessment method of the exposure risk per contact event

The objective of this exposure assessment was to form a general view of the risk connected to various contacts between the populations at risk in the pork production structure of 2001. The risk was assessed for a specific contact event as opposed to the release assessment, where the objective was to assess the risk connected to a specified route. The contacts with and from the populations at risk were assessed for each part of this population separately. The assessment was performed like the release assessment in all practical aspects (see chapter 5.1.5) using the same experts. The risk was classified into a logarithmic scale, with 5 levels (very high, high, moderate, low and negligible) and was chosen to represent the risk for a specified event (contact) into and from the herd (Table 30).

The median and the median absolute deviation (MAD) of the individual experts opinions were calculated. If the median expert opinions was in between two levels, the median for the expert opinion was rounded upwards. The MAD for the evaluated risk to the population at risk was in general higher than in the release assessment. A MAD of more than 0.5 was considered a disagreement within the expert pool. If the MAD reached this limit, 50% or more of the experts had a different opinion than the median of all the experts. Because the 5 risk classification levels had a logarithmic scale (10-base), a MAD over 0.5 would also require that at least half of the individual expert opinions deviated from the median by

Table 30
The risk classification of the probability of the exposure and the further spread of CSF through different types of contacts, used for the expert elicitation.

		The probability of exposure of the population to CSF	
Codes	**Risk classification**	**The probability of the exposure of the population at risk through a specific infected or contaminated route**	**The probability of the spread from the herd, to a unspecified part of the population at risk, through a specific route**
+++++	**Very high**	1 exposure/ event	1/ event
++++	**High**	1 exposure/10 events	1/10 events
+++	**Moderate**	1 exposure /100 events	1/100 events
++	**Low**	1 exposure /1000 events	1/1000 events
+	**Negligible**	<1 exposure /1000 events	<1/1000 events
-	**Impossible**	Exposure not possible through this route	Spread not possible through this route

at least a ten-fold difference (range in log-scale is 1 or greater) in the assessed risk.

5.2.4 The risk of exposure of the population to CSF

All domestic swine populations were considered susceptible to exposure to CSF. The overall median expert opinion on the risk of the populations ranged from low to moderate risk per event. Direct contacts were assessed to have the highest risks per event. There was a large disagreement among the experts on the exposure risks, however. The MAD was higher than 0.5 in 66.7% of the combinations of contact type and susceptible population, indicating that there was at least a tenfold difference in the individual opinions of the experts in the majority of the events they assessed (Table 31).

Direct contact

Replacement of breeding animals was seen by the experts to be a high (multiplying, farrowing, farrowing-to-finishing herds), moderate (elite breeding herds) or low (AI centre) risk of exposure of the population to CSF (Table 31). Breeding animals (excluding young boars purchased for an AI centre) are most likely purchased 1-5 times annually, in a group of 1-10 animals at a time (Table 24). The number of animals introduced into an AI centre is high but the annual direct contacts from other herds into the AI centre is low, as animals introduced into an AI centre are either from the performance test station or introduced from an elite breeding herd.

A batch of young finishing pigs delivered to a finishing herd was seen by the experts to be a very high risk of exposure of the population to CSF (Table 31). A finishing herd most probably consists of two compartments (Annex 1), and one compartment is filled 3 times annually (Table 24), thus a new batch of pigs is most likely introduced to the herd six times annually. The most probable number of pigs in a batch is 239 (Annex 1), and they most probably originate from ten herds producing piglets (Table 24).

In the case of CSF at an AI centre, the risk of exposure via semen was assessed as moderate-to-high in elite breeding, Multiplying, farrowing and farrowing-to-finishing herds, and non-existing for AI centres and finishing herds (Table 31). The majority of sow herds purchase several doses of semen weekly (see 5.2.2.2).

Farmed and feral wild boar as well as miniature pig movements were considered to be a negligible exposure risk to the domestic swine population (Table 31). The risk of exposure of domestic swine to CSF by infected miniature pigs was considered negligible or non-existent. Direct contact by infected farmed and feral boars was estimated to be a high risk per event for other parts of the feral or farmed wild boar populations, but the risk for other populations was estimated to be negligible or low (Table 31).

Indirect contact

The highest risk per indirect contact was associated with the transportation of live animals. The number of herds of origin of animals in a transport vehicle of breeding animals, between cleaning and disinfecting, is most likely three (range one to seven) and the corresponding number for transport vehicles transporting young finishing pigs is nine (range one to 20) (Table 27). Transport vehicles for breeding animals visit one to seven herds (most likely four) and vehicles transporting finishing pigs visit one to six herds (most likely 1) between cleaning and disinfecting. Human contacts and neighbourhood spread were associated with a low risk per event for all populations, whereas exposure by swill feeding and by feedstuff were considered to have negligible risks per event (Table 31).

Transportation of infected live miniature pigs was associated with a high risk per contact for other miniature pig populations and moderate risk per event for feral and farmed wild boar populations.

5.2.5 The risk of spread of CSF from the population

The risk of further spread of CSF from an infected domestic swine herd depends on the type of population at risk. The risk of further spread of CSF from elite breeding and multiplying herds by movement of young breeding animals as well as young finishing pigs was assessed to be high. The disagreement among experts appeared to be smaller in estimating the risk of further spread of CSF than in estimating

Table 31

The median expert opinion[A] on the risk of exposure of the population at risk in Finland to CSF through various contacts identified (per contact event).

Transmission route	Population type at risk									Median risk for route
	AI	EB	MH	F	FtoFi	Fi	FW	MP	WB	
Direct contacts										
Breeding animals	++*	+++*	++++*	++++*	++++*	-	-	-	-	**High**
Young finishing pigs	-	-	-	-	++++*	+++++	-	-	-	**Very high**
Animals to slaughter	+*	+*	++*	++*	+++*	+++*	-	-	-	**Low**
Semen	-	++++*	++++*	++++*	+++**	-	-	-	-	**High**
Farmed wild boar	-	-	-	-	-	-	+++++*	++*	+++*	**Moderate**
Miniature pigs	-	+*	-	+*	+*	+*	++*	++++*	++*	**Negligible**
Feral wild boar	+*	+*	+*	+*	+*	++*	++++*	++*	++++*	**Negligible**
Indirect contacts										
Swillfeeding	+*	+*	+*	+*	+*	++*	+++*	+++*	+*	**Negligible**
Transport of breeding animals	++*	++*	+++	+++*	+++*	-	+*	-	+*	**Moderate**
Transport of young finishing pigs	-	++*	+++	+++*	+++*	+++	-	-	-	**Moderate**
Transport of animals to slaughter	++*	++*	+++	+++*	+++	+++	+++*	-	-	**Moderate**
Emergency slaughter transports	+++*	+++*	+++*	+++*	+++*	+++*	+*	-	-	**Moderate**
Transport of feedstuff	++	++*	++*	++*	++*	++*	+*	-	-	**Low**
Human contact	++*	++*	++*	+++*	+++*	+++*	+++*	+++*	+*	**Moderate**
Feedstuff	+*	+	+*	+*	+*	++*	+*	++*	+	**Negligible**
Neighbourhood spread	+*	++*	++*	++	++*	++*	++*	++*	+*	**Low**
Median risk for population	**Low**	**Low**	**Low**	**Moderate**	**Moderate**	**Moderate**	**Low**	**Low**	**Negligible**	

[A] Eight experts

* Median absolute deviation >0, i.e. at least half of the experts had an opinion which differed from the median.

AI Artificial insemination centre
EB Elite breeding herd
MH Multiplying herd
F Farrowing herd
F to Fi Farrowing-to-finishing herd
Fi Finishing herd
FW Farmed wild boar
MP Miniature pig
WB Feral wild boar

Table 32

The median expert opinion[A] on the risk of further spread of CSF from the population at risk through various infected contacts identified (per contact event)

Transmission route	Population type at risk									Median risk for route
	AI	EB	MH	F	FtoFi	Fi	FW	MP	WB	
Direct contacts										
Breeding animals	+*	++++*	++++*	+*	+*	-	-	-	-	**Negligible**
Young finishing pigs	-	++++*	++++*	+++++	+++++*	-	-	-	-	**Very high**
Animals to slaughter	++*	+++*	+++*	+++*	+++*	+++*	+*	-	-	**Moderate**
Semen	++++*	-	-	-	-	-	-	-	-	**High**
Farmed wild boar	-	-	-	-	-	-	+++++*	+++	+++*	**High**
Miniature pigs	-	-	-	-	-	-	++*	++*	++*	**Low**
Feral wild boar	-	-	+*	+*	+*	++*	++++*	++++*	++++*	**Low**
Indirect contacts										
Swillfeeding	-	-	-	-	-	-	-	-	+*	
Transport of breeding animals	++*	+++*	+++*	++*	+++*	-	+*	-	-	**Moderate**
Transport of young finishing pigs	-	+++*	+++*	+++*	+++*	++*	-	-	-	**Moderate**
Transport of animals to slaughter	+++*	+++*	+++*	+++*	+++*	+++*	++*	-	-	**Moderate**
Emergency slaughter transports	+++*	+++*	+++*	+++*	+++*	+++*	+*	-	-	**Moderate**
Transport of feedstuff	++*	++*	++*	++*	++*	++*	+*	-	-	**Low**
Human contact	++*	++*	++*	++*	++**	++**	++*	++*	+*	**Low**
Feedstuff	-	-	-	-	-	-	-	+*	+*	**Negligible**
Neighbourhood spread	+*	++	++*	++*	++*	++*	++*	++*	+*	**Low**
Median risk for population	**Low**	**Moderate**	**Moderate**	**Low**	**Moderate**	**Low**	**Low**	**Low**	**Low**	

A Eight experts

* Median absolute deviation >0, i.e. at least half of the experts had an opinion which differed from the median.

AI Artificial insemination centre
EB Elite breeding herd
MH Multiplying herd
F Farrowing herd
F to Fi Farrowing-to-finishing herd
Fi Finishing herd
FW Farmed wild boar
MP Miniature pig
WB Feral wild boar

the risk of exposure of the population. The MAD was >0.5 in half of the combinations of contact type and susceptible population and thus there were at least tenfold disagreements in half of the assessed risks (Table 32). The highest risk for further spread of CSF from the herd was assessed for elite breeding, multiplying and farrowing-to-finishing herds (Table 32).

Direct contacts

Infected domestic swine may expose other parts of the population at risk by direct contacts. The number of direct contacts from an AI centre (semen) to other parts of the domestic swine population is significant even in a single week (5,800 doses of semen from two AI centres to 1,150 herds producing piglets). The most probable number of herds receiving semen from a particular boar in one week is 10, the maximum being 20 (see 5.2.2.2). According to the experts, the risk of spread of CSF from AI centres via semen was high (Table 32).

The highest risk for further spread from an infected herd was associated with movements of infected young finishing pigs. A batch of young finishing pigs made up a very high to a high risk of spread of CSF from herds producing piglets (Table 32). Batches of young finishing pigs (most probably comprising 21-27 pigs) are most probably delivered 28 times from a farrowing and 11 times annually from a farrowing-to-finishing herd, most probably to one finishing herd at a time (Table 24). The risk of CSF spreading from an infected herd to other herds by direct contact with animals sent to slaughter was assessed to be moderate (Table 32).

Distribution of breeding animals made up a high risk of spread of CSF from elite breeding and multiplying herds but a low risk to other herds producing piglets (Table 32). Breeding animals are most likely distributed from a herd 20 times annually and most likely to one herd producing piglets at a time (Table 25).

Direct contact with animals transported to slaughter was the only direct contact that could spread CSF from an infected finishing herd. The risk of spread by this route was estimated to be moderate. Pigs are most probably sent to slaughter 24 times annually from a finishing herd (Table 24) (i.e. two to three times during the high risk period), and the slaughter vehicle most likely collects animals from five herds per batch (Table 24). All other types of contacts able to spread CSF further from finishing herds were indirect contacts.

The risk of spread from a specific population by direct contact through infected farmed wild boars and miniature pigs appeared to be limited to direct contacts with miniature pigs, farmed and feral wild boars. Spread of CSF through direct contacts by feral wild boars from the domestic swine population was regarded as possible but the risk was assessed to be low to negligible per event. Direct contact between farmed or feral wild boar populations was assessed to have a high to very high risk of CSF spread per event. (Table 32)

Indirect contacts

The most probable number of indirect contacts through transport of live animals is of the same magnitude as the number of the incoming and outgoing direct contacts via live animals (Table 24). The risk for further spread of CSF per indirect contact event was seen as moderate. The risk of further spread of CSF by human contacts and neighbourhood spread was considered to be negligible-low. Feedstuff was seen as an impossible route of further spread from any part of the population at risk (Table 32).

In addition to the possible direct contact routes, other types of contacts considered to transmit CSF from the farmed and feral wild boar and the miniature pig populations were swill feeding, human contacts, feedstuff and neighbourhood spread.

5.2.6 Detection of a case of CSF in Finland

It has been argued that awareness and appreciation of the risk of CSF in Finland might be low in different groups involved with the pig industry as a result of the long period of freedom from CSF (SANCO/1096 2000), which could lead to a prolonging of the high risk period. On the other hand, the favourable overall contagious animal disease situation might facilitate prompt detection of the signs of CSF.

If CSF would spread into the country, the length of the high risk period would be crucial in determining the further spread of the disease and the magnitude of the outbreak. The high risk period for a single herd is at least as long as the incubation period (2-14 days), from the exposure to CSF until CSF is sus-

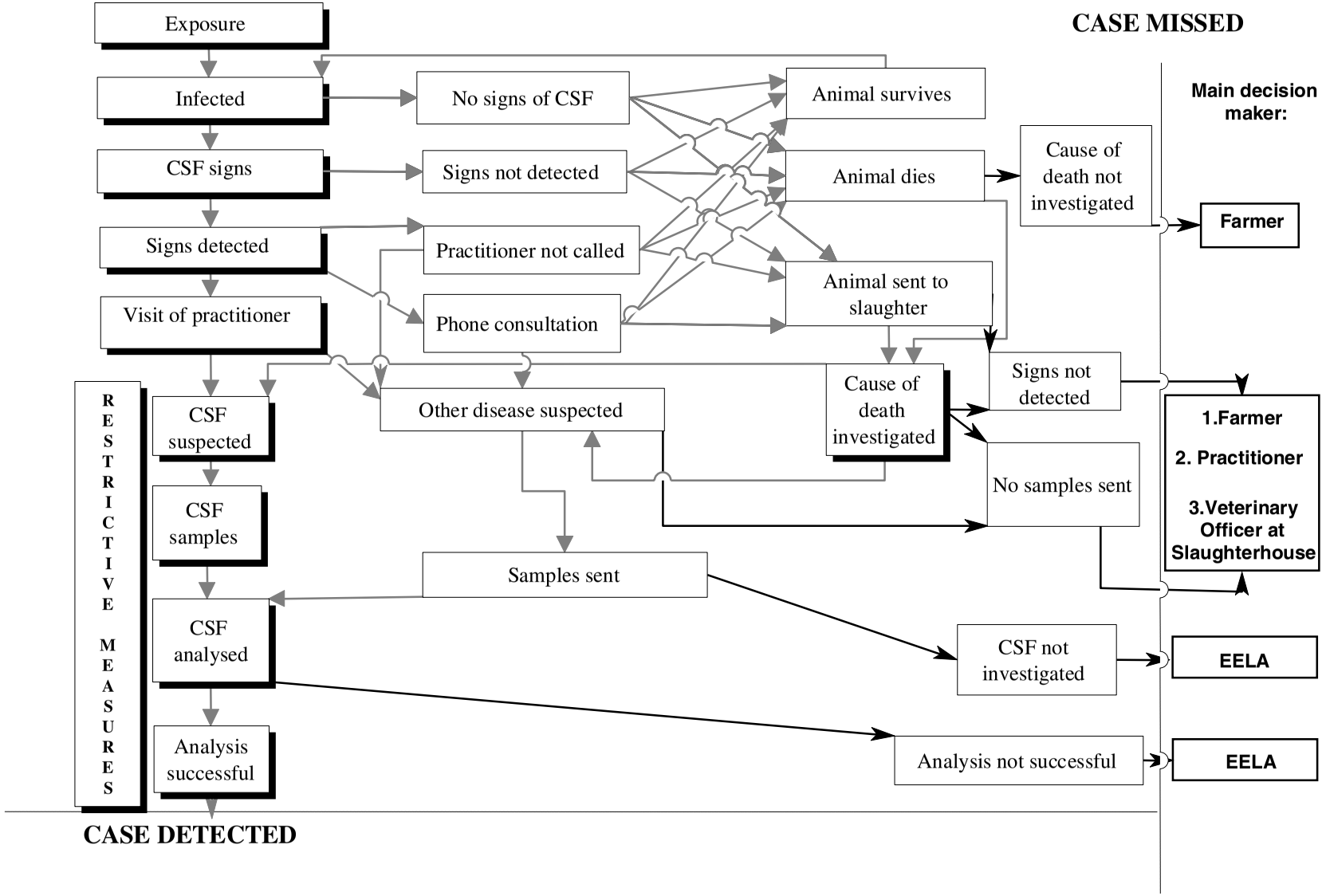


Figure 8

The paths (arrows) and events (rectangles) leading to missing (black arrows and black line) or detection of a case (grey dotted line) of CSF in the domestic swine, miniature pig and farmed wild boar population. Grey arrows represent paths leading towards detection of a case, black arrows represent paths leading towards missing a case. The shadowed rectangles represent events described in the Finnish CSF contingency plan and CSF manual.

pected by a veterinarian and restrictions are put on the herd. The length of the high risk period would be longer if any other disease is suspected (Figure 8). The high risk period for a herd in contact with an infected herd is at least as long as the time between the contact to the infected herd and the detection of symptoms and notification of a suspicion of CSF in the infected herd. The length of the high risk period in the Netherlands in the outbreak in 1997-1998 was estimated to be six weeks (Elbers et al.1999), whereas in the UK where the disease had not been present for 14 years the high risk period was estimated to be at least 2 months (Gibbens et al. 2000).

5.2.6.1 Detection ability of the serologic monitoring of CSF in Finland

Antibodies to CSF can be detected in serum samples only if the samples are taken at least three weeks after infection. The virus antigen in the serum can be detected at an earlier stage of the infection (after the incubation period) by CSF-PCR and by virus isolation (Laevens et al.1998). Antibodies and virus antigen can be detected on the same day that the samples arrive to the laboratory if the samples are analysed immediately. CSF-PCR of the samples takes 2 days and virus isolation from cell cultures takes 2-3 days (Veijalainen 2002).

Domestic swine

The possibility of detecting a case of CSF by the current serologic monitoring and surveillance of healthy domestic swine (performance tested pigs and boars at AI centres) depends on the categories of domestic swine affected by the disease and the bio-security measures at the performance and testing stations and AI centres (i.e., the risk of exposure to AI boars and pigs at the performance test stations). The present serologic monitoring and surveillance (same as the program in 1998-2000) (Annex 1, Table 6) is able to detect CSF at the AI centres or the performance test stations (representing of elite breeding herds). Other domestic swine populations at risk are not covered by the program. Moreover, a case of CSF at the AI centres or performance test stations would only be detected by serologic surveillance and monitoring if the samples are taken at least three weeks after the introduction of CSF.

Farmed wild boar

There is a serologic monitoring and surveillance programme to detect the presence of CSF in farmed wild boars. In 1998-2000, approximately a total of half of all farms sent samples for investigation to EELA. A total of 125 samples were analysed for the presence of antibodies to CSFV. (EELA 2002a). As with domestic swine, an outbreak of CSF would only have been detected if the samples had been taken at least three weeks after exposure of the herd to CSF.

Feral wild boar and miniature pigs

There was no surveillance and monitoring program especially designed to detect the presence of CSF in the feral wild boar or miniature pig population in 1998-2000.

5.3 CONSEQUENCE ASSESSMENT

5.3.1 Consequences on the domestic swine and farmed wild boar population

The current policy in CSF control is that any CSF epidemic would eventually be eradicated from Finland by stamping out infected herds and contact herds, as well as by severe restrictions on movements of animals, humans and transport vehicles. The consequences of a CSF epidemic on the domestic swine population would be related both to the health and welfare of the animals affected and to the welfare of animals located in the restricted zones. The severity of the consequences on the population at large would mainly depend on the effectiveness of the restriction measures and on the density of the population in the area affected by the disease.

5.3.2 Consequences on the feral wild boar population

The consequences of an outbreak of CSF on the feral wild boar population will be related to animal health. The possibility of CSF becoming endemic in the feral wild boar population depends on the density of the feral wild boar population as well as on the number of susceptible animals in the population.

5.3.3 Economic consequences

There would be considerable costs, both direct and indirect, if there were a CSF outbreak in Finland. The pork production industry would experience costs and losses associated with the killing of animals, restrictions on the purchasing of replacement stock and pork, restrictions on the distribution of live animals and pork, and restrictions on artificial insemination and herd movements of animals. Costs will also be associated with the disposal of animal waste as well as with the cleaning and disinfecting of contaminated premises and vehicles. There will also be losses due to export restrictions on live animals as well as pork and pork products. Some of the direct losses to the industry due to the stamping out of CSF would be covered by reimbursements from the CA but most of the indirect losses would not be covered by the authorities.

The costs for the CA would be associated with an increase in manpower needed for surveillance and control of the disease, an increase in laboratory activities and an increase in telecommunication and stationary costs. There will also be costs associated with reimbursement for killed animals and with the cleaning and disinfecting of premises. Some of the direct costs (reimbursements for killed animals) of the Finnish CA would be reimbursed by the EU.

5.3.4 Environmental consequences

The increased use of rendering capacity during the rendering of killed and slaughtered animals would increase the emission of airborne pollutants from the rendering plants and possible burning of carcasses on pyres. The release of chemicals into the environment during the disinfecting of herds and other buildings, vehicles, slurry, manure and equipment would increase during a CSF outbreak.

5.3.5 Social consequences

There might be severe social consequences for farmers and their families, both for those experiencing an outbreak in their herd and for others. An outbreak will at least have a big social impact in the areas affected by the disease, especially in densely populated livestock areas where the society is dominated by the agricultural sector. The overall reaction of the Finnish population to the killing and possible pre-emptive slaughtering of diseased and healthy animals as well as on the non-vaccination policy is not easily foreseen as there have not been any major epidemics of any animal diseases for a long time.

5.4. RISK ESTIMATION

5.4.1 CSF release into Finland in circumstances similar to 1998-2000

The experts were asked to classify possible routes of release without considering risk management practices. The panel was very unanimous about the relative importance of different routes in respect to the release of CSF into Finland. Most experts regarded the import of live animals (domestic swine, farmed wild boars, miniature pigs) as a potentially high-risk practice. The import of semen, pork and pork products were considered to represent a lower risk of release compared to the import of live animals as were transport vehicles, humans and migrating feral wild boars. (Table 5)

An attempt was also made to carefully identify and describe the potential routes of CSF release into Finland in 1998-2000 taking into account risk management practices. Using that data as a "base level", the experts were asked to assess the risk of release of each release route (Table 22).

Most importantly, the risk of CSF release through the import of live domestic swine as well as semen was seen as negligible (Table 22), taking into account the countries of origin and the quantities and frequency of imports in those years (see 5.1.2.1). The import of pork and pork products from countries that had experienced CSF outbreaks (5.1.2.2) made up a low risk of release into the population at risk (Table 22). In other words, according to the experts, a very significant increase in the volume of import (x 1000) could have caused a CSF outbreak, most probably in farrowing-to-finishing herds, finishing herds or farmed wild boars and miniature pigs. Since the swill feeding ban that came into force at the beginning of 2001, the risks posed by pork and pork products have possibly decreased. The magnitude of the decrease, however, cannot be assessed on the basis of the

data gained with this report. Generally, the volume of illegal imports of live animals or pork was considered unimportant or non-existent (5.1.2.1 and 5.1.2.2). However, should it take place, miniature pigs were seen as the population most at risk of CSF release. Indirect contacts via transport vehicles as well as humans were considered negligible or low risks of CSF release into Finland (Table 22). However, we lacked proper data on the frequencies of these routes and were therefore not able to assess the risks associated with them.

5.4.2 The exposure of the population at risk to CSF

The incubation period of CSF is 2-14 days. Shedding of the virus starts before onset of clinical signs, which may vary according to the virulence of the virus and the age and production stage of the animals affected. The virus is moderately sensitive to environmental impact, but is very resistant at temperatures below 0 °C. A transient pyrexia and anorexia might be the only signs in a mild form of the disease. Accordingly, the detection time of CSF in a country previously free of the disease might be up to 6-8 weeks (see chapter 3.3.2). Eight weeks is therefore used here as a rough estimate of the typical high risk period after the release of virus into Finland.

CSF could spread within Finland by direct or indirect contacts. The indirect routes are not as effective as the direct routes for the transmission of CSF, as the transmission of CSF by contaminated vectors is possible only if the virus is not inactivated before contact with the population at risk. Even if neighbourhood spread is not likely to occur in most parts of Finland, there are some areas where CSF could be transmitted between herds due to the short distance between herds (see chapter 5.2.2.7). Information or quantitative data on the frequencies of other indirect contacts were not obtained for this report (feedstuff, other vehicles, visitors) and therefore it is not possible to estimate the possible spread through these routes during a specific time frame other than the event itself.

The risk of exposure of the population at risk as well as the spread of CSF from the population was assessed for the direct and indirect contact events into and from the populations assessed. The direction and the frequency of the contacts are strongly dependent on the population and must therefore be considered in the final CSF risk estimate of the different populations.

5.4.2.1 The risk estimation method of exposure and further spread

The risk of exposure and further spread of CSF from an infected population was estimated by calculating the expected contact rates (see chapter 5.2.2, Table 24 and Table 27) during a high risk period of eight weeks and multiplying this with the expert opinion on the risk per contact event. Infectious contact rate estimates were calculated only for those contact types on which we had information available (Table 24 and Table 27). Spread from an AI-centre by semen was estimated according to the values given in chapter 5.2.3.2. Our contact rate information (Table 24 and Table 27) was defined as the minimum, most probable and maximum number of contacts and this structure was preserved during the analysis. Both the incoming and outgoing rates associated with animal transportation between domestic swine populations and the risk of further spread from an AI centre were estimated if applicable.

After calculating the rates of infectious contact, these rates were classified with risk estimates (Table 33). A different risk estimate categorisation was applied to incoming and outgoing contacts, due to the different assumptions for these incoming and outgoing contacts, leading to different scales of estimates.

Table 33
Classified risk estimations of the expected exposure rate and the expected number of infected farms by first stage contacts during a high risk period of eight weeks.

Risk class	Symbol	Expected exposure rate[A]	Expected number of infected herds by further spread[B]
Very high	+++++	x 1	x 10
High	++++	0.1 x < 1	1 x < 10
Moderate	+++	0.01 x < 0.1	0.1 x < 1
Low	++	0.001 x < 0.01	0.01 x < 0.1
Negligible	+	x < 0.001	x < 0.01
Impossible	-	x ≅ 0	x ≅ 0

[A] Incoming contact events are assumed to be infected. Expected rate of exposure = exposure rate of one farm belonging to the specified population (expected exposures/8 weeks).
[B] Outgoing contacts are assumed to be infected. Expected number of infected herds by further spread = The expected number of herds (belonging to the unspecified part of the population at risk) which one farm is able to infect.
x Expected value

The exposure risk per contact event, as estimated by the experts, was assessed by assuming that the contact is contaminated and thus the previous contacts before the assessment need not be taken into account. The classified risk corresponds to the risk of one uninfected farm (belonging to a specified part of the population at risk) experiencing infectious contacts which would lead to an infection (Table 34). When estimating the risk of further spread, the first stage contacts from an infected farm have been taken into account in our calculations. The expert opinion on the risk per contact event were similarly classified (Table 35).

5.4.2.2 Domestic swine

The risk of exposure as well as the risk of spread were estimated using a known number of contact events for different populations as well as by the risk assessed per event. These estimations do not take into account the risk of transmission routes without frequency data. The true risk of exposure and spread might therefore be underestimated, especially for the populations where there is a lack of data on the frequency of these routes. To obtain a more detailed estimate of the exposure of the populations at risk to CSF, a quantitative risk assessment is needed.

Risk of exposure

When estimating the risk of exposure, it was assumed that the animals introduced into a herd are infected. For indirect contacts, it was assumed that the vector coming into a herd is contaminated.

A. Herds producing piglets

The frequency of purchases of young breeding animals and exposure via animal transport vehicles while distributing animals (young breeding animals, young finishing pigs and animals to slaughter) were considered in the risk estimation of exposure for herds producing piglets. We did not have data on the occurrence and frequency of purchases of young finishing pigs for farrowing-to-finishing herds, so these were excluded from the estimate (see chapter 5.2.2 Table 24). The risk of exposure to CSF by semen is not included in the estimate, as the frequency of inseminations in the herds was not known. The risk of direct contacts with animals sent to slaughter was also excluded from the estimate. We did not have frequency data concerning the transport vehicles distributing young finishing

Table 34

The estimated risk of exposure of the domestic swine population to CSF during a high risk period of eight weeks (exposure by semen not included in the estimate)

Type of contact	Elite breeding herd			Multiplying herd			Farrowing herd			Farrowing-to-finishing herd			Finishing herd		
	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max
Direct contacts															
Breeding animals	++*	++*	+++*	+++*	+++*	++++*	-*	+++*	++++*	-*	+++*	+++*	-	-	-
Young finishing pigs	-	-	-	-	-	-	-	-	-	NE	NE	NE	++++	++++	+++++
Indirect contacts															
Transport of breeding animals	+	+	++	++	++	+++	-*	++*	+++*	-*	++*	++*	-	-	-
Transport of young finishing pigs	+	++	++	++	+++	+++	++*	+++*	+++*	++*	++*	++*	++	++	+++
Transport of animals to slaughter	+*	++*	++*	++	+++	+++	++*	+++*	+++*	+++	+++	+++	++	+++	+++
Total [A]	**Low**	**Moderate**	**Moderate**	**Moderate**	**High**	**High**	**Moderate**	**Moderate**	**High**	**Moderate**	**High**	**High**	**High**	**High**	**Very high**

[A] The median of all the estimated risks for the specific population

* At least 50 % of the experts opinions deviated from the median expert opinion on the exposure risk per event (see chapter 5.2.4 Table 31).

- No contact events occuring

Min Minimum

Mp Most probable

Max Maximum

NE Risk not estimable due to lack of contact rate information.

pigs and animals sent to slaughter from elite breeding herds and multiplying herds, so we used the corresponding data from farrowing herds in the risk estimation.

The estimated risk of exposure of elite breeding herds during a high risk period of eight weeks is low to moderate (most probably moderate) and the estimated risk for multiplying herds is moderate to high (most probably high) (Table 34). The estimated risk of exposure for farrowing herds is moderate to high (most probably moderate) and for farrowing-to-finishing herds moderate to high (most probably high) (Table 34).

B. Finishing herds

In estimating the risk of exposure of finishing herds, we considered direct contacts by purchases of young finishing pigs from herds producing piglets and the transport of young finishing pigs and animals to slaughter. The estimated risk of exposure of finishing herds is high to very high (most probably high) (Table 34).

C. AI centre

AI centres could be exposed to CSF only by direct contacts with boars from performance test stations or elite breeding herds. The risk of exposure of an AI centre is probably low, considering the types of indirect and direct contacts possible in an AI centre, the stringent bio-security measures required and the assessed risk of the contacts as well as the frequency of the contacts (Table 34).

Risk of spread

In estimating the risk of spread of CSF from an infected farm in Finland by first stage contacts, it is assumed that the herd and the animals distributed are infected. For the indirect contacts it is assumed that the vector leaving a herd is contaminated.

A. Herds producing piglets

There are frequent contacts, both direct and indirect, from herds producing piglets. The contacts are both with other herds producing piglets and with finishing herds. In calculating the risks of spread, we considered the frequency of direct contacts through the distribution of young breeding animals and young finishing pigs as well as the frequency of indirect contacts through the transport of breeding animals, young finishing pigs and animals sent to

Table 35

The estimated risk of further spread of CSF infection by first stage contacts from a specified infected population to an unspecified part of the population at risk during an eight week high risk period in the population.

Type of contact	Artificial insemination centre			Elite breeding herd			Multiplying herd			Farrowing herd			Farrowing to finishing herd			Finishing herd		
	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max
Direct contacts																		
Semen	+++++*	A	+++++*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Breeding animals	-	A	-	+++*	+++*	++++*	+++*	+++*	++++*	-	-	-	-	-	-	-	-	-
Young finishing pigs	-	A	-	++*	+++*	++++*	++*	+++*	++++*	+++	++++	+++++	+++*	++++*	+++++*	-	-	-
Indirect contacts		A																
Transport of breeding animals	-	A	-	++*	++*	++++*	++*	+++*	+++*	-	-	-	-	-	-	-	-	-
Transport of young finishing pigs	-	A	-	+*	++*	+++*	+*	++*	+++*	+*	++*	+++*	+*	++*	+++*	-	+	++
Transport of animals to slaughter	-	A	-	+*	+++*	+++*	+*	+++*	+++*	+*	+++*	+++*	++*	+++*	+++*	-	+	++
Total[B]	Very high	A	Very high	Moderate	High	Very high	Moderate	High	Very high	Moderate	High	Very high	Moderate	High	Very high	Negligible	Low	Low

[A] There are only two AI centres in Finland
[B] The median of all the estimated risks for the specific population
* At least 50 % of the experts opinions deviated from the median expert opinion on the risk of spread per event (see chapter 5.2.5 Table 33).

- No contact events occurring
Min Minimum
Mp Most probable
Max Maximum

slaughter. We did not have data concerning the distribution of young finishing pigs from elite breeding herds or multiplying herds but the corresponding data from farrowing herds was used in the risk estimation for these herds.

The estimated risk of CSF spread during a high risk period of eight weeks, from all herds producing piglets (elite breeding, Multiplying, farrowing and farrowing-to-finishing herds), is moderate to very high (most probably high) (Table 35).

B. Finishing herds

As there are no regular direct contacts with other parts of the population at risk from finishing herds other than indirect contacts through transport of young finishing pigs and animals sent to slaughter, we considered only these in our estimation of the risk of spread from a finishing herd. The estimated risk for the spread of CSF from finishing herds was negligible to low (most probably low) (Table 35).

C. AI centre

There are direct contacts with other domestic swine herds through the distribution of semen from the two AI centres in Finland. The estimated risk of spread from an AI centre during a high risk period of eight weeks was very high, even though we did not consider the possible indirect contacts with other domestic swine herds (Table 35).

5.4.2.3 Farmed wild boars, feral wild boars and miniature pigs

The risk of a direct contact event within the farmed and feral wild boar as well as within the miniature pig population was assessed to be high to very high (Table 31 and Table 32). The frequencies of contacts within these populations are not known. Therefore it is not possible to obtain a risk estimate for exposure and further spread during an eight-week high risk period.

The median risk of exposure of farmed wild boars is low per contact event. In general, there are no direct contacts between the domestic swine population and the farmed wild boar population, but there are possible indirect contacts with transport vehicles for animals sent to slaughter. No data on the rates of these contacts were obtained for this report, so it is not possible to obtain a risk estimate for exposure and further spread during an eight-week high risk period.

A human contact event was assessed as providing a moderate risk of exposure to miniature pigs but a low risk of spread. The median risk assessed for the exposure of miniature pigs and feral wild boars by direct or indirect contacts was low or negligible. The number of direct or indirect contact events from domestic swine to miniature pig and feral wild boars is not likely to be high (see chapters 5.2.1, 5.2.2 , 5.2.3 and Annex 1). No quantitative data on the rates of these contacts were obtained for this report, so it is not possible to obtain a risk estimate for exposure and further spread during an eight-week high risk period.

5.4.3 The risk of CSF spreading into and within Finland

In circumstances similar to 1998-2000, the risk of CSF spreading into Finland is assessed to be negligible or low (Table 22). The main reason is the strictly controlled and low volume import of live pigs and semen to Finland. Not surprisingly, the results of our release assessment indicate that the larger the proportion of imports from countries with CSF present, the higher the estimated risk. Our results also indicate that the less known about a transmission route or a population at risk, the larger the estimated risk. In the view of our results, we conclude that a good understanding of the population at risk and the routes themselves might be an important risk management measure.

The risk of release of CSF into AI centres in 1998-2000 was negligible (Table 22). However, an outbreak of CSF in an AI centre would be the worst case scenario with respect to CSF spreading within Finland (Table 35). It is likely that CSF would spread to a number of herds during the incubation period and the high risk period, even though it is likely that CSF detection would be prompt and accurate in an AI centre. Spread of the virus via semen would affect tens of different kinds of herds producing piglets in a geographically large area even within a week.

The risk of CSF release into herds producing piglets was assessed as negligible in 1998-2000 (Table 22). The estimated risk of further spread from herds producing piglets, if infected, is moderate to very high (Table 35), but a smaller number of herds would be affected than in the previous scenario. The expert group unanimously agreed that the highest risk of infection from herds involves the delivery of young finishing pigs from a farrowing herd to finishing herds (Table 31).

The risk of CSF release into finishing herds was assessed as negligible to low in 1998-2000 (Table 22). The risk of further spread from a finishing herd is not as probable as from AI centres or from herds producing piglets, as live animals are only distributed to the slaughterhouse and indirect contacts from finishing pigs are not as likely as with other domestic swine herds (Table 35).

The commercial import of pork and pork products (15,000,000 kg annually) can be seen as a risk of release of CSF, although low (Table 22). According to the expert panel, the populations most at risk of release of CSF would be finishing herds and feral wild boars, from which further spread would most likely occur only by indirect contacts. Thus, if CSF would be released through this route, the spread within Finland before detection would probably be slow.

In the case of illegal imports of live animals or pork, the risk of release would be highest in the miniature pig population. However, the release of CSF into the miniature pig populations would be less serious compared to CSF release into the domestic swine population, since spread into the domestic swine population from the miniature pig population would probably be slow.

In addition to risk categorisation, expert opinions were elicited about the effect of different risk management practices aimed at reducing the risk of release of CSF through different routes. Only the combinations of risk management practices for intra-community trade of fresh pork and semen included one or more combinations representing the present legal requirements for risk management. According to the expert opinion, it is possible to manage risks effectively, if major well-known risk management measures are applied. Intra-community trade of fresh pork was regarded as a route of release of CSF where the risk is most difficult to manage. The legal requirements for intra-community trade of fresh pork (profiles 1-6, Table 19) were not regarded as highly effective in reducing the risk of release of CSF. The range of the scores for most of the profiles, given by individual experts, was wide (Table 17-20).

It must be considered that there will be at least economic consequences if an outbreak is detected in Finland, regardless of the population that CSF would be released into, as there would be restrictions on movements of all categories of the population at risk.

5.5 SENSITIVITY ANALYSIS

During this qualitative risk assessment, we identified several factors which, if changed, could have an impact either on the results of this assessment or on any reassessment of the potential risk of CSF spread into or within Finland.

The factors identified were either related to the data used for the assessment, the experts assessing the risk, the distribution of CSF in countries relevant to Finland, risk management practices both in other countries and within Finland, the pork production structure in Finland or the national and international pork market. Of these factors, those related to the data and experts might impact the results of this assessment whereas the other factors would mostly affect the results of a reassessment.

As a result of the risk assessment process we also concluded that more detailed data would be required for a detailed assessment of the routes for exposure to CSF within Finland, as the contact routes within the population at risk are much more frequent and complex than those routes that could release CSF into Finland.

5.5.1 Data

5.5.1.1 Release assessment

This assessment of the release of CSF into Finland was fairly clear and straightforward as it was based on data and information on volumes of imports and risk management practices in 1998-2000. Not surprisingly, the differences between the individual opinions of the experts were larger for the routes or the populations at risk where the obtainable data were incomplete.

Due to the coverage of the OIE disease reporting system, we had fairly good knowledge of the CSF situation in the countries relevant to the risk of release of CSF into Finland. However the data concerning the regional distribution of CSF in countries reporting the disease to the OIE was not very exten-

sive. We could obtain good data on the imports of live animals and semen. The general view of the small scale migration of feral wild boars into Finland is regarded as fairly reliable. Data on the volumes of commercial imports of pork and pork products into Finland are regarded as fairly comprehensive. However, the region of origin of the imports or the destination of the imports could not be determined from our data set. There was no data concerning the quantity and destination of private imports of pork and pork products or illegal imports of any kind. In the analysis of the results of the assessment on the risk connected transport vehicles as well as human contact, the large variety of vehicles (animal or other transport vehicles) and groups of humans (farmers, foreign workforce, hunters) involved (see 5.1.2) should be taken into account. Unfortunately we lack proper data on these routes. Data on intra-community trade in non-food products of porcine origin or their destinations in Finland is missing as it is not collected.

Differences in the opinions of individual experts on the less known routes may reflect their strategies of handling uncertainties concerning the risk involved. Therefore, the risk estimation of the release of CSF into the domestic swine population may be more reliable than the estimation for other populations. This can also be seen as a strength of this risk assessment, since the domestic swine population is economically more important than the other populations. The estimate of a negligible risk of release of CSF by imports of live domestic swine is a reliable estimate as there are only small differences between the opinions of individual experts. The only direct contact routes regarded as having a low or moderate risk were those without recorded data (migration of feral wild boars and illegal imports of live animals) and they were assessed as presenting a lesser known risk to these populations (i.e., farmed and feral wild boars as well as miniature pigs).

5.5.1.2 Exposure assessment

The exposure assessment concerned the risk of a certain type of contact per event. Factors related to the data may have contributed to the larger differences between the opinions of the individual experts.

Missing data regarding different parts of the production chain and contact structures have an impact on the reliability of the exposure risk assessment. The location and density of the Finnish domestic swine population is well known and documented. The data on direct contacts between domestic swine herds are fairly extensive. The locations of the wild boar farms are also known, whereas we had no data concerning the size of the population or the management practices of the wild boar farms. Information on the size of the feral wild boar population is also regarded as fairly reliable. No data were obtained on the size and location of the miniature pig population. The data on slaughtering of domestic swine and farmed wild boars are extensive, both regarding the amount of pork produced and the location of the slaughtering facilities. The destination, processing and use of pork and farmed wild boar meat are less well known. The bio-security practices of individual farms, human contacts as well as the identification of individual farm clusters in scarcely populated livestock areas will be the scope of further risk assessment projects.

5.5.2 Experts

The small number of experts as well as the quite narrow number of fields represented among our experts might have influenced the results of this risk assessment. The large differences between the individual expert opinions in the exposure assessment might, in addition to uncertainties due to data, reflect the differences in the experiences of the experts and thus reduce the accuracy of the risk estimate. Changes in the composition of the expert group could have an impact on the assessed risk as well as on the variation between individual experts.

5.5.3 Distribution of CSF in countries relevant to Finland

Any change in the CSF situation in any country with trade relations with Finland or in close proximity will also influence the risk of release of CSF into Finland. A detected case of CSF in the countries relevant to Finland might also change risk management practices both in Finland as well as in the country of origin and thereby influence the risk of release. This release assessment only concerns the situation in 1998-2000. If the situation changes, we will obviously need to reassess the risks connected to routes of release from that country. Imports of pork, for example, clearly demonstrate this. The largest portion of

the imports into Finland originate from a few countries and a change in the CSF status of, for example, Denmark would markedly change the proportion of pork imported from countries with CSF present. Therefore, the risk of release by this route would also change. Naturally, the CSF situation in other countries does not influence the risk of exposure of the population at risk in Finland before an actual release of CSF into Finland have occurred.

5.5.4 Virulence of the CSFV strain

This risk assessment does not differentiate between the risk of release or exposure of the population to different strains of CSF. The virulence of the CSFV strain affects the detection of signs of CSF and hence the time of the high risk period and the time of implementation of the risk management measures, both in Finland and in other countries. Therefore, the risk of both release of and exposure to CSF might be different if only strains of a specific virulence would be assessed. Regardless of the virulence of the strain released, the control measures will still be the same.

5.5.5 Risk management, population and production structure

Any change in legal or voluntary risk management measures will also influence the risk of both release and exposure of the population at risk to CSF. During a disease free period as well as during a high risk period there will be no risk management measures specifically implemented to prevent the spread of CSF. As soon as an outbreak is detected, however, there will be measures implemented to reduce the risk of CSF spread. Thus, the risk of release of CSF into Finland as well as the risk of exposure of the population at risk will also be influenced by the control measures taken in other countries and in Finland as well as by the timing of the implementation of these measures. Measures ensuring early detection and notification, those aimed at tracing contacts as well as those aimed at preventing spread are relevant to the risk of release as well as to the risk of exposure of the population at risk to CSF.

All practices aimed at preventing the spread of contagious animal diseases will also affect the spread of CSF within Finland. However, there are factors not related to preventing the spread of diseases that might influence the risk of exposure of the population at risk as well. Any major changes in the production and population structures which influence the types of contacts as well as the quantities and frequencies of contacts also influence the risk of exposure of the population in Finland to CSF. However, a quantitative risk assessment is needed to estimate the impact of these factors on the risk of CSF.

5.5.6 Market

Changes in the international pork market might also influence the risk of release of CSF into Finland. The pressure to increase the quantities of imports of both live animals as well as pork and pork products is influenced by demand and supply as well as by the price of animals and pork on both the national and international markets.

The demand and supply of pork on the market in Finland might affect the risk of exposure of the population at risk if CSF would be released into Finland, by influencing the distribution of both potentially infected live animals as well as potentially contaminated pork.

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6.1 LEGAL ACTS

6.1.1 EU legislation

Council Directive 79/542/EEC. of 14 June 1979 on animal health problems affecting trade of fresh pork.

Council Directive 64/432/EEC of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine.

Council Directive 80/217/EEC of 22 January 1980 introducing Community measures for the control of classical swine fever.

6.1.2 National legislation

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MAF 198/1998. Decision of the MAF on the import of meat and meat products from third countries (Not in force since 2001, amended by MAF 17/2001, Decree on meat and meat products from third countries 17/2001).

MAF 785/1999. Decision of the MAF on veterinary border control of animal-derived foodstuff and other products of animal origin (785/1999).

MAF 1238/2000. Decree of the MAF on the import, export and use of animal proteins in feeding of animals.

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ANNEX 1

1 BACKGROUND INFORMATION

1.1 GEOGRAPHICAL DATA

The area of Finland covers 338,150 km^2, of which 304,590 km2 (90%) is land area and 33,560 km^2 (10%) is covered by water. Of the total land area, 200,290 km^2 (63%) is covered by forest and 21,290 km2 (7%) is arable land (National Land Survey of Finland 2002).

Finland shares borders with Sweden (586 km), Norway (727 km) and the Russian Federation (1,269 km). The rest of the country is surrounded by the Baltic sea (Statistics Finland 2002). Countries around the Baltic sea not directly bordering Finland but which are nevertheless in close proximity, or countries which have ports from where lorries depart to Finland, are Estonia, Latvia, Lithuania, Poland, Germany and Denmark.

1.2 DEMOGRAPHICS OF THE POPULATION AT RISK

The structure of the Finnish pork production industry shares features with industries in other countries, but there are some differences in trading patterns, management traditions, slaughterhouses and in the ways veterinary services are organised. The population at risk, defined as the animals susceptible to infection with classical swine fever (CSF), include the domestic swine, farmed and feral wild boar and miniature pig populations in Finland.

1.2.1 Domestic swine

The agricultural sector in Finland has experienced a major structural change in the last few decades, a change that was speeded up when Finland joined the European Union (EU) in 1995. The number of domestic swine in Finland has remained fairly stable throughout the 1990s: although the number of herds has declined the size of the herds has increased (Finfood 2000).

In 1998-2000, domestic swine were counted in May of each year. In 2000, the number of live domestic swine was 1,296,000. There were 184,000 sows and 405,000 finishing pigs. Regarding the supply of pork, the Finnish pork production industry has traditionally been self-sufficient. However, production declined throughout the 1990s and in 2000 the degree of self-sufficiency was barely over 100% (FinFood 2000) (Table 1).

Table 1

Total numbers of domestic swine, finishing pigs, and sows, and the degree of self-sufficiency in pork production in 1990-2000 in Finland (Finfood 2002).

Year	Total number of pigs (in thousands)	Finishing pigs[A] (in thousand kgs)	Sows (in thousand kgs)	Production of pork[B] (in million kgs)	% of self-sufficiency
1990	1,394	692	130	183	114
1998	1,401	421	187	185	105
1999	1,351	431	180	183	103
2000	1,296	405	184	173	101

[A] The classification of finishing pigs was changed in 1995.

[B] From 1990-1994 without hot carcass weight-decrease, starting 1.7.1995 with hot carcass weight-decrease.

1.2.2 The number of herds

There were 4,300 domestic swine herds in 2000 (Table 2). A total of 1,686 herds produced mainly piglets; most of these were farrowing herds, 68 were multiplying herds, and approximately 115 were elite breeding herds (EELA 2002, TIKE 2000). All elite breeding herds complied with the requirements of the National Health monitoring scheme (MAF 24/1997). 1,291 of the herds were finishing herds (TIKE 2000), rearing young finishing pigs to slaughter. At least 60% of the finishing herds managed the herd according to the all-in-all-out principle (EELA 2002). 1,323 herds were farrowing-to-finishing herds, both producing piglets and rearing at least some of them formance testing stations (FABA 2001).

1.2.3 Sow pools and other multisite systems

New types of management systems for domestic swine herds, sow pools or multisite systems have been introduced in Finland in the last decade (Tuovinen 2001). A number of herds form a chain, through which all animals pass from birth until slaughter. Each part of the chain is specialised in only one production stage (breeding, farrowing, weaning or rearing) Apart from some new breeding animals from multiplying herds, no live animals are brought into the system from other herds outside the chain (Åberg & Övermark 2001). The activity of one sow pool or a multisite system can extend over a considerable area and several municipalities, in some cases even in several provinces (EELA 2002).

One sow pool consists of one or more central units, where the breeding takes place, and of several satellites per central unit, where the farrowing takes place. Rearing of young finishing pigs takes place in finishing herds. In some pools, two more steps are added to the system, as a multiplying herd is involved with the multiplying of breeding sows for the central units and gilts are reared at a separate location before being moved to the central unit (Åberg & Övermark 2001). After breeding at the central unit, the pregnant sows are distributed to the satellites three weeks before farrowing. A majority (84%) of the satellites receive new sows every eighth week, 11% receive new sows every fourth week and 5% every 16th week (EELA 2002). The sows are moved back to the central unit after the piglets are weaned at the age of five weeks. The piglets are then reared at a separate location for an additional six to seven weeks before distribution to the finishing units. All compartments of the central units and the satellites operate according to the all-in-all out principle (Åberg & Övermark 2001).

Table 2
The number of domestic swine herds in Finland in 1998-2000 (TIKE 2000)

Principal form of production	1998	1999	2000
Herds producing piglets[A]	2,147	1,929	1,686
Finishing herds	1,668	1,465	1,291
Other[B]	1,481	1,437	1,323
Total	5,296	4,831	4,300

[A] Farrowing herds, Elite breeding herds, Multiplying herds
[B] Including Farrowing-to-finishing herds

The first sow pool in Finland was founded in 1994. It is estimated that 10,000 sows were in the 15 sow pools operating in Finland in 2001, corresponding to approximately 5% of the total sow population (EELA 2002, Tuovinen 2001). The most probable number of sows within a sow pool in 2001 was 708 (range 400-1300). In 2001, the mean distance between a satellite of a sow pool and the central unit was 54 km (at most 200 km) (EELA 2002).

In 2001, there were seven multisite systems in operation. A multisite system consists of one or several farrowing herds where the insemination of sows and the weaning of piglets takes place simultaneously. The piglets from several farrowing herds are reared at a separate rearing facility from where the young finishing pigs are distributed to several finishing herds. In 2001, the most probable number of sows in the farrowing herds of a multisite system was 743 (range 550-850). The most probable number of finishing pigs was 1,086 (range 200-4,000) (EELA 2002).

1.2.3.1 Location of herds

In 2000, domestic swine herds were located in 358 of the 455 municipalities of Finland. Domestic swine herds are mainly located in the South and South West parts of the country and no herds can be found in the

Table 3
The minimum, most probable and maximum number of sows, finishing pigs, compartments and pigs/compartment in Finnish domestic swine herds in 2001 (based on a questionnaire) (EELA 2002).

	Elite breeding herds			Multiplying herds			Farrowing herds			Farrowing-to-finishing herds			Finishing herds		
	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max	Min	Mp	Max
Numbers of sows	10	46	100	10	77	200	5	55	900	5	55	300	-	-	-
Number of finishing pigs	-	-	-	-	-	-	-	-	-	30	241	2000	50	340	2000
Number of compartments[A] in finishing herd	-	-	-	-	-	-	-	-	-	-	-	-	1	2	6
Number of finishing pigs reared in one compartment at a time	-	-	-	-	-	-	-	-	-	-	-	-	10	239	1300

Min Minimum
Mp Most probable number.
Max Maximum
[A] Managed according to the all-in-all-out principle.

northern parts (TIKE 2000). Most domestic swine are housed all year around. Less than 1% of herds with piglet production keep empty sows outdoors during the summer. The area over which young finishing pigs from one herd are distributed varies considerably. In 2001, the mean distance between a herd producing piglets and the finishing herds receiving young finishing pigs was 133 km (range 1 -700 km). (EELA 2002).

1.2.3.2 Size of the herds

Of the herds producing piglets in 2001, the multiplying herds had the highest and the elite breeding herds the lowest number of sows per herd. The range for number of sows per herd of farrowing herds was very wide (5-900), whereas the range was considerably narrower for elite breeding herds (10-100) and multiplying herds (10-200). The number of finishing pigs was higher in finishing herds than in farrowing-to-finishing herds (EELA 2002) (Table 3).

There is an average of 300 AI boars at an AI centre at one time, and about 500 total in one year (Puonti 2002).

1.2.4 Farmed wild boar

Farming of wild boars can be classified as extensive animal production with animals ranging freely within a fenced area. Wild boar farms have to register with the Provincial Veterinary Officer (PVO) before starting activity (MAF 247/1996). There were 54 registered wild boar farms in 43 municipalities in Finland in 2000. One municipality had three wild boar farms. In 40 of these 43 municipalities with wild boar, there were also domestic swine herds. The farm size ranged from only a few adult wild boars and piglets up to farms with 250 animals (MAF DFH 2002b).

1.2.5 Feral wild boar

The density and reproduction ratio of the feral wild boar population is small. According to the local game wardens of the game management areas, in recent years feral wild boar observations have only been reported in three locations in the southern parts of the country. Due to the severe winter conditions, with ground frost and deep snow cover, the survival of wild boar through the winter without additional feeding is unlikely in most parts of the country. Due to the low survival rate, the size of the wolf population on both sides of the border of the Russian Federation and the hunting of feral wild boars in Finland and the Russian Federation, the size of the feral wild boar population is not expected to change drastically in the future (Tenhu 2001, Wikman 2001). The reported number of feral wild boars shot annually is small. A total of 35 feral wild boars were reported shot from 1992 to 1999 (three in 1998 and five in 1999). There were no reports of feral wild boar shot 2000 (RKTL 2001).

1.2.6 Miniature pig population

The number of miniature pigs and their location in Finland was not registered in 1998-2000, but the general view is that the total number of miniature pigs in Finland is not very high. Most miniature pigs in Finland are most likely kept as pets at stables or private homes, or as an attraction at small scale zoos or domestic animal parks and housed outside at least part of the year. Some miniature pigs are kept as laboratory animals under strict bio-security or controlled circumstances.

A total of 18 import permits were issued in 1994-2000 by the Department of Food and Health of the Ministry of Agriculture and Forestry for miniature pigs. The number of imported animals per permit ranged from 1-30 (MAF DFH 2001a).

1.3 CONTAGIOUS ANIMAL DISEASE CONTROL IN FINLAND

In addition to bio-security measures at the herd level, both the Central Veterinary Service, as well as private operators, have implemented risk management measures to control contagious animal diseases from imports and within Finland.

1.3.1 The Central Veterinary Service

The MAF DFH is responsible for matters relating to monitoring, surveillance and control of CSF outbreaks, as well as for supervision of import and border control of live animals, semen, pork and pork products. The MAF DFH is also responsible for reimbursing farmers for dead and killed animals during an outbreak of CSF (55/1980). The head of the MAF DFH, the Chief Veterinary Officer (CVO), makes decisions concerning disease control strategies in Finland. Contingency planning for CSF during disease free periods has been delegated to the Deputy Director General, who is the head of the Animal Health Unit (AHU) at the MAF DFH. In case of an outbreak of CSF, the AHU will activate the National Disease Control Centre (NDCC). The NDCC consists of nine veterinarians and three auxiliary personnel staff (Commission Decision 1999/246/EC). A CSF expert group was founded (14.2.2000) to assist the NDCC at the MAF DFH in case of an outbreak of CSF. The group consists of experts from MAF DFH (3), the National Veterinary and Food Research institute (4) and the Veterinary Faculty of the University of Helsinki (1). The group is required to meet annually to discuss issues concerning CSF (Raulo 2002).

1.3.2 Provincial Veterinary Officers (PVO)

Since 1997 Finland has been divided into six provinces. At the moment each province has 1-4 Provincial Veterinary Offices (13 total), while each office is staffed by 1-2 PVOs (23 total). The PVOs are responsible for monitoring, surveying and controlling animal diseases on a provincial level. Each province has its own local contingency plan, created according to the special circumstances in each province. The plan includes contact information of veterinarians and industry officials who will be involved in control and eradication in case of an outbreak in the province (Commission Decision 1999/246/EC)

The PVOs are under the direct supervision of the AHU at the MAF DFH in matters concerning CSF (55/1980). The Local Disease Control Centre (LDCC), which will be activated in case of a CSF outbreak in the area, is formed by the PVO together with the contingency veterinarians (see text 1.3.7). During an outbreak, the PVO is responsible for organising and executing the killing and destroying of the diseased and dead animals, as well as for cleaning and disinfecting the premises. The evaluation of diseased and killed animals is performed by an independent organ and the evaluation is either accepted or rejected by the PVO (55/1980, Commission Decision 1999/246/EC).

1.3.3 Municipal Veterinary Officers (MVO)

All of the 448 municipalities in Finland are obliged to provide round-the-clock veterinary services covering their area (685/1990). In addition to providing veterinary services in the area, the Municipal Veterinary Officers (MVO) are responsible for disease monitoring and surveillance at the local level (55/1980, 601/1980). There were 393 MVOs working in Finland in 2000 (MAF DFH 2002c). MVOs are responsible for approving low-capacity slaughterhouses and for ante mortem and post mortem inspections of the animals slaughtered in these slaughterhouses.

1.3.4 Veterinary Officers at slaughterhouses

Veterinary Officers at the slaughterhouses, employed by the National Food Agency, are responsible for supervising measures preventing the spread of contagious animal diseases at the slaughterhouses. The Veterinary Officer is obliged to instantaneously notify any suspicions of CSF to the MVO or the PVO. The Veterinary Officer is also obliged to take all necessary actions to eradicate the disease in the slaughterhouse and to prevent the further spread of the disease. (601/1980).

1.3.5 Border Control Veterinarians

Border Control Veterinarians employed by the MAF DFH (three in 2002) and Border Control Veterinarians authorised by MAF DFH (17 in 2002) working at six (2002) Border Inspection Posts (BIP) are responsible for performing veterinary border control on live animals, semen, pork and pork products imported from third countries (MAF DFH 2002, MAF 1192/1996).

1.3.6 Other veterinarians

The MAF DFH supervises the professional work of practising veterinarians in Finland and keeps a list of all licensed veterinarians in the country. The list is updated annually. Veterinary students and all veterinarians under the age of 50 can be enlisted by the MAF DFH to work as supplementary staff during an animal disease outbreak (685/1990). All veterinarians are obliged to notify any suspicion of CSF in swine to an official veterinarian (601/1980).

A postgraduate specialist degree in Veterinary Medicine/Infectious diseases was established at the Faculty of Veterinary Medicine at the University of Helsinki in 2000 (275/2000). The first postgraduate specialists graduated in 2001.

1.3.7 Contingency training of veterinarians

Designated MVOs in each province receive special training concerning contingency matters (In 2000 generally 7-10 per province, but only 4 in the province of Lapland and 1 in the province of the Åland Islands). These contingency veterinarians will act as support for the PVO during an outbreak of CSF. These contingency veterinarians also participate in the elaboration of the provincial contingency plan (Commission Decision 1999/246/EC). Annually, 1-2 training sessions for the contingency veterinarians are organised by the MAF DFH. A total of 80-100 veterinarians, including the CSF expert group, participated in these sessions in 1998-2000. The MAF DFH annually organises a seminar on contagious animal disease issues. In 1998, one of the topics covered was CSF. Approximately 150 veterinary practitioners attended the 1998 seminar (Kahelin 2002).

In order to get practical experience of controlling the eradication of CSF, one member of the MAF DFH staff and one PVO visited Great Britain during the CSF outbreak in 2000. In 2001, a PVO and a contingency veterinarian attended a workshop on CSF at the EU Reference laboratory for CSF in Hannover, Germany (Kahelin 2002).

1.3.8 National Veterinary and Food Research Institute (EELA)

The National Veterinary and Food Research Institute (EELA), operating under the jurisdiction of the MAF, consists of the Central laboratory in Helsinki and three regional laboratories in Kuopio, Seinäjoki and Oulu (1111/2000). The Department of Virology in Helsinki EELA is the national reference laboratory for CSF and all samples from suspected cases of CSF must be analysed there (EELA 679/3/1999) . CSF analysis is carried out by detecting virus, viral genome or viral proteins in organs (virus isolation, RT-PCR, ELISA) and by testing for antibodies to Classical swine fever virus (CSFV) (ELISA, NPLA). The three regional laboratories carry out pathological and microbiological examinations of swine and, if necessary, send samples for further analysis to the Central laboratory in Helsinki.

A health care veterinarian was employed by EELA in 2001. This health care veterinarian at EELA should, together with the ETT (see 1.3.9), co-ordinate a National Health Care System for bovine, domestic swine and poultry farms.

There are two private diagnostic laboratories analysing diagnostic samples from animals in Finland. One performs diagnostic serology, mainly on pets and horses, but also on bovine and sheep. The other analyses diagnostic cythologic samples, mainly from pets. These laboratories are not allowed to perform CSF diagnostics (EELA 697/3/1999).

1.3.9 Association for Animal Disease Prevention (ETT)

A private association, the Association for Animal Disease Prevention (ETT), was founded in 1994 by Finnish dairies, slaughterhouses and egg packaging centres. The ETT co-ordinates voluntary risk management measures of the industry, in order to reach a higher degree of risk management than that provided by national and EU legislation. The organisation draws up detailed recommendations on import risk management measures separately for each planned import of swine and other live animals. The ETT also provides education and information regarding contagious animal disease matters and bio-security measures at the herd and industry levels, and develops procedures for animal sales between herds. (Kortesniemi 2002).

At present, 95% of the feedstuff, poultry, beef and pork industry are members of the organisation. The organisation has several supporting members as well. Most of the importers of live animals are not members of the organisation, but compliance with the recommendations on imports of live domestic swine, semen and feedstuff is still high since compliance with ETT recommendations is a prerequisite for insurance against salmonella for a herd. The industry has also negotiated an agreement on purchasing live animals, meat, milk and feedstuff only from herds that manage disease risk in compliance with the import recommendations drawn up by the ETT. In 1997, individual farmers of domestic swine and bovine herds in different areas were surveyed about their knowledge of the existence and objectives of the ETT; the survey concluded that the ETT and its activities were well known by the farmers. (Kortesniemi 2002).

1.3.10 Voluntary Health Classification of the industry

Finnish slaughterhouses have implemented voluntary health classifications of farrowing herds distributing young finishing pigs to finishing herds associated with the slaughterhouse in question. To become health classified, a herd must be free of certain contagious diseases. The herds should also have an agreement with a veterinary practitioner on health care. The practitioner should visit the herds at least 4 times a year and inspect the animals for signs of contagious diseases. Finishing herds purchasing animals from a health classified herd are entitled to compensation from the producer of the piglets if the young finishing pigs do not comply with the requirements of the health classification. Farrowing-to-finishing herds are not yet covered by the classification, but plans to classify them are being prepared. Approximately 70% of the farrowing herds were classified in 2001, so they should have been visited by a veterinarian at least four times that year. These herds distribute approximately 90% of the finishing pigs in Finland. (Kortesniemi 2002). There are also several veterinarians employed directly by the pork industry who are involved with swine herd health care.

2 LEGISLATION

2.1 LEGISLATION AFFECTING THE RELEASE OF CSF

2.1.1 Intra-community trade in live animals, semen, pork and pork products

When joining the EU in 1995, Finland adopted the policy on the free movement of goods within the EU, including live domestic swine, farmed wild boar, semen, embryos, pork and pork products (Council Directive 64/432/EEC). The legal requirements for intra-community trade in pork and pork products trade are set up by Council Directive 64/432/EEC and several national acts, decrees and decisions (Table 4). Legislation on the risk management of intra-community trade and imports of live domestic swine, farmed wild boars and pork and pork products is based on Council Directives 64/432/EEC of the EU legislation concerning the control of CSF (Council Directive 2001/89/EEC, previously Council Directive 80/217/EEC). Finland is free from Aujeszky`s disease (AD) and Transmissible Gastroenteritis (TGE) and has therefore been granted additional guarantees concerning imports of swine from other Member States of the EU and from third countries where these diseases are present (Commission Decision 2001/618, EFTA surveillance authority decision 48/94/COL).

There is no veterinary border inspection on live domestic swine, farmed wild boars, semen, pork or pork products originating from EU Member States.

Safeguard measures

If CSF control measures laid down in the Council Directive 2001/89/EC (previously Council Directive 80/217/EC) are not sufficient to prevent the spread of CSF to other Member States, additional risk management measures may be enforced according to Council Directive 90/425/EEC. These measures can include any additional risk management measures deemed necessary by the EU's Standing Veterinary Committee (SVC) and are enforced at the earliest possible time. Meanwhile, the country of dispatch as well as the country of destination of live pigs, semen or pork and pork products can take the necessary measures to prevent the spread of CSF. These measures can include the quarantine of animals and restrictions on the trade of live pigs, semen, embryos, pork or pork products from the country or region experiencing a CSF outbreak.

Imports from third countries and veterinary border control

The import conditions for live pigs differ for each third country approved for import of live domestic swine and semen to the EU. The conditions, including requirements for CSF, are drawn up by the European Commission and are approved by the SVC of the EU. These conditions are drawn up according to the organisation of the Veterinary Service as well as the disease situation in each country (Table 4). In 1998-2000 there were 11 countries approved for imports of live domestic swine into the EU (MAF 231/1997).

Live animals, semen, pork and pork products originating from a third country have to pass through a veterinary border control at the veterinary BIP of the member state in which they first arrive to the European Community (MAF 937/97).

The veterinary BIPs in Finland are situated at the Helsinki-Vantaa airport and at the ports of Helsinki, Kotka and Hamina; for lorries entering Finland by road the BIPs are at Vaalimaa and Ivalo. In 1998-2000, import of live animals directly to Finland from a third country was only possible via the Helsinki port, the Helsinki-Vantaa airport and Vaalimaa. Although not

Table 4
Legislation relevant to the prevention of the release of CSF into Finland.

Number	Name
4/93	Circular letter of the MAF on the health requirements for boar semen
605/1994	Decision of the MAF on the treatment of waste potentially hazardous to animal health from international and transit traffic
1578/1994	Decision of the MAF on animal disease requirements for certain domestic animals, semen and embryos on the internal market of the European Union
27/1995	Decision of the MAF on animal disease requirements for certain animals and products on the internal market of the European Union
572/1995	Decision of the MAF on controls on the internal markets to prevent animal disease transmission
1192/1996	Veterinary border control act
1338/1996	Decree on animal disease control on the internal market and in export to third countries
164/1997	Decision of the MAF on meat and meat products on the internal market of the European Union
937/1997	Decision of the MAF on veterinary border control of live animals
182/1997	Decision of the MAF on the use of meat in feeding of certain domestic animals
231/1997	Decision of the MAF on animal disease requirements for live animals, semen and embryos from third countries
8/1998	Decision of the MAF on certificates issued by the authorities for animals and animal-derived products on the internal market of the European Union
198/1998	Decision of the MAF on the import of meat and meat products from third countries
785/1999	Decision of the MAF on veterinary border control of animal-derived foodstuff and other products of animal origin
29/2000	The veterinary profession act
1238/2000	Decree of the MAF on the import and export of animal-derived proteins and the use in feeding of animals
3/EEO/2001	The disinfecting of transport vehicles used in transporting by road to prevent the spread of contagious animal disease
1022/2001	Decision of the MAF on animal disease requirements for non-food products from third countries
-	Relevant Safeguard clause based on the Council Directive 90/425

Table 5
Legislation relevant to the exposure of the population at risk to CSF and to the control and eradication of CSF within Finland

Number	Name
488/1960	Easily spreading animal disease act
55/1980	Animal disease act
601/1980	Decree on animal diseases
15.8 1980	Ministerial letter No 178 on veterinary visits due to an outbreak of a contagious animal disease
362/513-89	Ministerial letter on killing and reimbursement of infected animals
685/1990	The Veterinary Services Act
1/1994	Ministerial letter on the animal health requirements for boar semen
467/1994	Decision of the MAF on feeding of catering-waste to certain domestic animals.
779/1994	Decision of the MAF on own-checking systems in animal waste processing plants
1363/1994	Decree of the MAF on animal disease control during transport
1364/1994	Decision of the MAF on animal diseases to be controlled and on the notification of animal diseases
1/EEO/1995	Classical swine fever order
17/1995	Direction on disinfecting for the control of contagious animal diseases
1346/1995	Decision of the MAF on the diseases to control and the notification of diseases to control
247/1996	Animal welfare act
496/1996	Decree of the MAF on animal transports
18/EEO/1997	Decision of the MAF on the prohibition of movement of farmed wild boars
24/EEO/1997	Decision of the MAF on a voluntary National Health Monitoring Scheme of domestic swine
182/1997	Decision of the MAF on the use of meat in the feeding of certain domestic animals
16/EEO/2001	Decree of the MAF on meat hygiene
697/3/99	The National Veterinary and Food Research Institutes decision on the requirements of diagnostic laboratories for animal diseases
1022/2000	Decision of the MAF on the treatment of animal waste
1238/2000	Decree of the MAF on the import, export and use of animal proteins in feeding of animals.
1239/2000	Decree of the MAF on animal-derived proteins and foodstuff of animals origin
20/2001.	Decree of the MAF on entrepreneurs of foodstuff.
188/2001	Decree of the MAF on changing the decision 467/1994 on feeding of catering waste to domestic animals
1296/2001	Decree of the MAF on the identification and registration of swine

obligatory at the time, it was possible to disinfect vehicles at these BIPs in 1998-2000 (MAH DFH 2002).

2.1.2 Legislation affecting the exposure of the population at risk before detection

CSF is a notifiable disease in all animals of the porcine species (MAF 1364/1994). The exposure of the population at risk is affected by several ministerial Acts, Statues and Decisions (Table 5).

2.1.2.1 Live animals

Elite breeding herds and Artificial Insemination centres

Elite breeding herds must belong to the National Health Monitoring Scheme for breeding herds of domestic swine (MAF 24/EEO/1997). Before approval as an elite breeding herd, the herd must be tested for a number of diseases, including CSF, and inspected three times by the PVO. Animals purchased for an elite breeding herd must originate from other herds in the scheme and must be transported separately from any other pigs or animals. The herds must send at least four groups of young finishing pigs annually to one of the six performance test stations. The groups can be sent either separately or jointly at the same time. The herds should comply with certain bio-security standards (replacement stock from herds of the same health status, quarantine of replacement stock, separate loading room for animals distributed from the herd, restrictions on visitors) and should be visited by an authorised veterinary practitioner every third month. The PVO supervises the further monitoring of herds. All diseased animals in the herds should be inspected for signs of contagious animal diseases. Dead animal carcasses or samples must be sent to EELA for further investigation if deemed necessary by the authorised veterinary practitioner. If the elite breeding herds use imported semen for insemination of sows, they have to comply with additional instructions, if such are provided by the MAF DFH (MAF 24/EEO/1997).

Artificial Insemination (AI) centres can only purchase boars which are tested at performance test stations, or from elite breeding herds. Boars coming from an elite breeding herd must be quarantined for 30 days and tested for CSF before admission to the centre (MAF 24/EEO/1997).

Performance test stations can only accept piglets from herds belonging to the National Health Monitoring Scheme for elite breeding herds (MAF 24/EEO/1997). Groups of young pigs (a group is composed of three piglets from the same litter) are brought to the performance testing station at the age of 10 to 12 weeks weighing 25 kg and are kept until they weigh 105 kg. About 40% of the boars tested at the performance test station are accepted for use at an AI centre. A testing station operates according to the all-in-all-out system (FABA 2002). The animals distributed from a performance test station are tested for CSF, either at the slaughterhouse or before admission to an AI centre (MAF 24/EEO/1997).

Other domestic swine herds

A farmer of domestic swine is not legally obligated to call a veterinary practitioner if a domestic swine falls ill or dies. However, if the farmer suspects CSF the MVO must be notified immediately (MAF 1364/1994). The animal welfare act obliges the farmer to provide proper care for diseased animals (MAF 247/1996).

Miniature pigs and farmed and feral wild boars

A farmer of wild boar or an owner of a miniature pig is not legally obligated to call a veterinary practitioner in the case of a diseased animal. The animal welfare act, however, does oblige the farmer/owner to provide proper care for diseased animals (MAF 247/1996). If the farmer or owner suspects CSF the MVO must be notified immediately (MAF 1364/1994). Farmed wild boars cannot be released into the wild without the permission of the MAF DFH (MAF 18/EEO/1997). Hunting of feral wild boars is allowed throughout the year. There are no legal requirements for hunters or others to send samples of killed feral wild boars or feral wild boars found dead.

2.1.2.2 Slaughtering of swine and swill feeding

All swine slaughtered in Finland must pass an ante mortem inspection within 24 hours prior to slaughtering. The inspection is performed by the Veterinary Officer at the slaughterhouse. The MVO performs the ante mortem inspection at small scale slaughterhouses (at the slaughterhouse itself or at the farm within 24 hours prior to slaughtering). Emergency slaughtered animals showing signs of disease must be transported to the slaughterhouse separately from healthy animals only after ante mortem inspection at

the farm. Animals showing signs of disease in the slaughterhouse are slaughtered separately from healthy animals, either in a separate line or in the same line after healthy animals have been slaughtered. Post mortem inspection of carcasses and internal organs is performed partly by the Veterinary Officer at the slaughterhouse and partly by assistants of the Veterinary Officer (employed by the slaughterhouse) (MAF 16/EEO/2001). If the Veterinary Officer or the MVO suspects CSF they must sent samples to EELA for analysis and take the necessary actions to prevent further spread of the disease (685/1980).

In 1998-2000, swill was allowed to be fed to Finnish domestic swine after processing at temperatures adequate to inactivate CSFV. Processing could take place at the holding, if authorised by the PVO. The MVO approved the equipment used for heating. Swill feeding to swine was banned at the beginning of 2001, after the Foot and Mouth Disease (FMD) outbreak in the United Kingdom (UK). Swill feeding (and feeding of catering waste) will also be banned due to changes in the relevant EU legislation concerning CSF (Council Directive 2001/89/EC).

2.1.2.3 Animal waste management

Animal waste products

Organs and other materials from swine condemned at meat inspection, but not dangerous for human or animal health, are classified as low risk material (hide, claws, blood and intestinal organs originating from animals approved at meat inspection). Low-risk material can be processed at designated plants (high or low risk material or pet-food processing plants, incineration plants for animal waste, plants producing technical and pharmaceutical products) or used as raw material in feedstuff for fur animals. Low risk material can also be burned, buried or composted (MAF 1022/2000).

Potentially hazardous waste of swine is classified as high risk material (dead pigs and still-borne piglets, emergency slaughtered swine condemned at meat inspection, animals ordered for killing and destruction, carcasses not presented for meat inspection). High risk material can be processed at high risk material processing plants, incineration plants, buried or burned. Burial or burning would become an option only if transportation would threaten the transmission of animal disease, or if a high risk material processing plant cannot receive the waste. Burial of small amounts of high risk material is also possible in remote areas with low livestock density. Dead, emergency slaughtered or killed animals as well as carcasses not presented for meat inspection can also be used to feed game (excluding feral wild boars), kennel dogs, fur animals, zoo animals or maggots. An announcement indicating the use of high risk material, including the kind of material used, the place of use and the origin of the material, should be submitted to the MVOs before use. A carcass collection and transportation system for domestic swine that have died on the farm is presently (2002) being designed (MAF 1022/2000).

All animal waste processing plants must have an own-checking system in place and keep records of the process. The results of the own-checking system must be recorded, and the plant has to contact the Competent Authority (CA) if irregularities are recorded (MAF 1022/2000).

Slurry and manure management

Slurry tanks are the most common waste disposal management system in Finnish domestic swine herds. Some herds, mainly piglet production herds, keep swine on straw beds. Slurry and manure can only be distributed on ground which has not yet frosted, so the timing depends on the latitude of the area in question. Slurry is spread in the spring before seedtime (April-May) or in the autumn after harvest (September-November).

2.1.2.4 Feedstuff production and transport

Due to legislation concerning TSE, since the end of 2000 animal-derived proteins (except fish meal) cannot be imported, used in feeding of swine or stored at premises where swine are kept. A feedstuff producer must announce when starting the manufacturing, distribution or import of feedstuff. An announcement must also be made if there are any major changes in the practice. The producer must keep records of the activities and, if necessary, hand these over to the CA. A feedstuff plant must have its own

control system. The CA may ban the use of feedstuff suspected to be dangerous to animal health (MAF 20/2001).

There were no legal requirements on the registration of feedstuff transporters or transporters of raw material of feedstuff in 1998-2000. Since the beginning of 2001, however, these entrepreneurs have been required to announce their activities to the Plant Protection Inspection Centre (KTTK) and must run an own-checking system. If mobile feed mixers mix fish meal or concentrate containing fish meal, the own-checking system plan must be approved by the KTTK (MAF 20/2001), who checks the records of the transports as well as the disinfection and hygiene of the vehicles during controls at feed mills (Turunen 2000).

2.1.3 CSF contingency plan

CSF is a notifiable disease in domestic swine, wild boars and miniature pigs in Finland. Signs of CSF must be notified immediately to the PVO and/or to the MAF DFH. The legal basis of the current contingency plan of CSF in Finland is Council Directive 2001/89/EC (previously Council Directive 80/217/EEC), which is transposed into national legislation by CSF order 1/1995. The legal powers of the Veterinary Service to implement the contingency plan is set by the Animal Disease Act (55/80) and Statue (601/80). More detailed provisions for the surveillance and control of contagious animal diseases are set up in several Ministerial Decisions (Table 5).

The guidelines for the CSF contingency plan and the duties of the NDCC and LDCC are specified in a Manual of Operations for CSF (Comission Desicion 1999/246/EC). This annually updated manual contains detailed descriptions of operations in case of a CSF suspicion and after confirmation of CSF. This manual, along with national legislation concerning the CSF contingency plan, must be revised before 31 October 2002 to meet changes in the relevant EU-legislation (Council Directive 2001/89/EC).

2.1.3.1 Traceability of domestic swine, farmed wild boars and miniature pigs

Since 1997, all domestic swine and farmed wild boar herds have had to register with the Central Authorities (MAF 641/1997). In 1998-2001, domestic swine were identified at the herd of origin by a tattoo or an ear-tag at dispatch to another herd or the slaughterhouse or by a slap-mark on both sides at dispatch to the slaughterhouse, bearing the registration number of the herd of origin (SANCO/1096 2000). A record had to be kept of the destination of all swine traded or slaughtered. (MAF 641/1997). The herd of origin was identified from the transport documents accompanying the pigs to the slaughterhouse (SANCO/1096 2000).

Legislation on the identification and registration of pigs was revised at the end of 2001 (MAF 1296/2001). Miniature pigs used for piglet production and those which come into contact with domestic swine are now covered by the legislation. All domestic swine herds, wild boar farms and premises with miniature pigs should be registered. Domestic swine and farmed wild boar should be marked before movement from the herd where they were born as well as before movement to the slaughterhouse. If mixing of farmed wild boars with other swine is not possible at the slaughterhouse then marking is not compulsory. All farmers, traders of pigs as well as slaughterhouses must keep a record of the origin and destination of all swine traded or slaughtered, and all these movements should be notified to a central register within seven days of movement. The farmer must keep a record of all the piglets born and of all the animals who die in the herd. Every three months, these numbers as well as the number of live domestic swine in the herd should be reported for each month to the central register. Reporting is done by Internet, by mail or by phone. The central register is kept at the Information Centre of the MAF (TIKE). Submission of data to the central database started in February, 2002.

3 MONITORING AND SURVEILLANCE FOR CSF

3.1 CLINICAL AND PATHOLOGICAL MONITORING AND SURVEILLANCE

Pigs at the performance test stations and boars at the two AI stations in Finland are supervised by the MVO or an authorised Veterinary practitioner. The National Health Monitoring Scheme of elite breeding herds includes regular visits by an authorised Veterinary practitioner (every third month). All diseased animals in the herds should be inspected for any signs of contagious animal diseases. Dead animals or samples must be send to EELA for further investigation, if deemed necessary by the supervising veterinarian (MAF 24/EEO/1997).

There are no legal requirements for regular visits by a veterinary practitioner to other herds. Monitoring and surveillance for the presence of CSF is based on clinical investigation of animals by any veterinary practitioner visiting the farm, on ante mortem and post mortem inspection at the slaughterhouse or farm, and on diagnostic procedures at EELA (Table 6).

In 1998-2000, 2,542 autopsies were performed on domestic swine at EELA. CSF testing was performed on eight autopsied animals (Table 6). There is no regular monitoring and surveillance for signs of clinical CSF in the farmed wild boar population or in the miniature pig population. In 1998-2000, nine wild boars were autopsied; none of these showed any pathological signs of CSF and were therefore not tested serologically or virologically for the presence of CSFV (Table 6).

The symptoms of CSF resemble the symptoms of several other diseases of swine, many of which are present in the Finnish domestic swine population (Table 7).

3.2 SEROLOGY OF CLINICALLY HEALTHY ANIMALS

Until 1998, the target population for sampling of healthy domestic swine were sows from herds producing piglets. In 1997, performance tested pigs were tested as well. In 1998, the target populations were changed to represent the top breeding animal population and the target of the sampling was AI-boars and performance tested pigs. In 1998-2000, 4000-5000 serum samples from swine were analysed at EELA for CSF antibodies. Samples from performance tested pigs for CSF antibody testing were collected at slaughter. AI boars were tested for CSF annually at the AI centre, before entering the centre and at slaughter (Table 6). elite breeding herds sending piglets for performance testing are tested for the presence of antibodies to CSFV at admission to the National Health Monitoring Scheme for pig breeding herds. (EELA 2001b, EELA 2001c)

A voluntary health surveillance scheme for farmed wild boars was introduced in 1998; blood samples were collected at slaughter. In 1998-2000, a total of 125 wild boars from approximately 20 wild boar farms were tested for the presence of antibodies to CSFV (Table 6). No samples from miniature pigs were analysed for the presence of CSFV (EELA 2001b).

3.3 CSF SUSPICIONS AND CONTINGENCY TRAINING EVENTS

In 1998-2000, there were 15 suspicions of CSF in domestic swine herds, raised due to clinical signs consistent with signs of CSF. However, CSF was not detected in any of the herds. These suspicions were either raised by a veterinarian visiting a herd, at EELA during an autopsy, or at the ante mortem or post

Table 6
CSF-tests performed at EELA and the number of CSF suspect herds in 1998-2000 (EELA 2001a, EELA 2001b, EELA 2001c).

Serologic monitoring and surveillance of CSF in clinically healthy animals	**1998**	**1999**	**2000**	**Total 1998–2000**
AI station boars	942	1,271	1,238	3,451
Phenotype tested pigs	1,971	3,491	4,455	9,917
Sows	0	0	0	0
Finishing pigs	0	0	0	0
Farmed wild boar	ND	ND	ND	125
Imported domestic swine	0[A]	0[A]	0	0
Imported miniature pigs	0[A]	0	0	0
Total	**2,913**	**4,762**	**5,69**	**313,493**
Number of contingency training events where samples were sent to EELA	1	0	1	2
Monitoring and surveillance of the risk groups at EELA	**1998**	**1999**	**2000**	**Total 1998–2000**
Total number of diagnostic autopsies of domestic swine at EELA	630	984	928	2542
Number of domestic swine tested for CSF due to pathological findings at EELA	2	4	2	8
Total number of autopsies of farmed/feral wild boar at EELA	ND	ND	ND	9
Number of feral wild boars tested for CSF due to pathological findings at EELA	0	0	0	0
Monitoring and surveillance of diagnostic samples sent to EELA	0	0	0	0
CSF Suspicions 1998-2000	**1998**	**1999**	**2000**	**Total 1998–2000**
Number of clinically suspect herds tested	2	6	7	15

[A] no imports ND no data available on an annual basis

mortem inspection at the slaughterhouse (Table 6). Samples from the suspected cases of CSF were investigated at EELA by several methods (EELA 2001c).

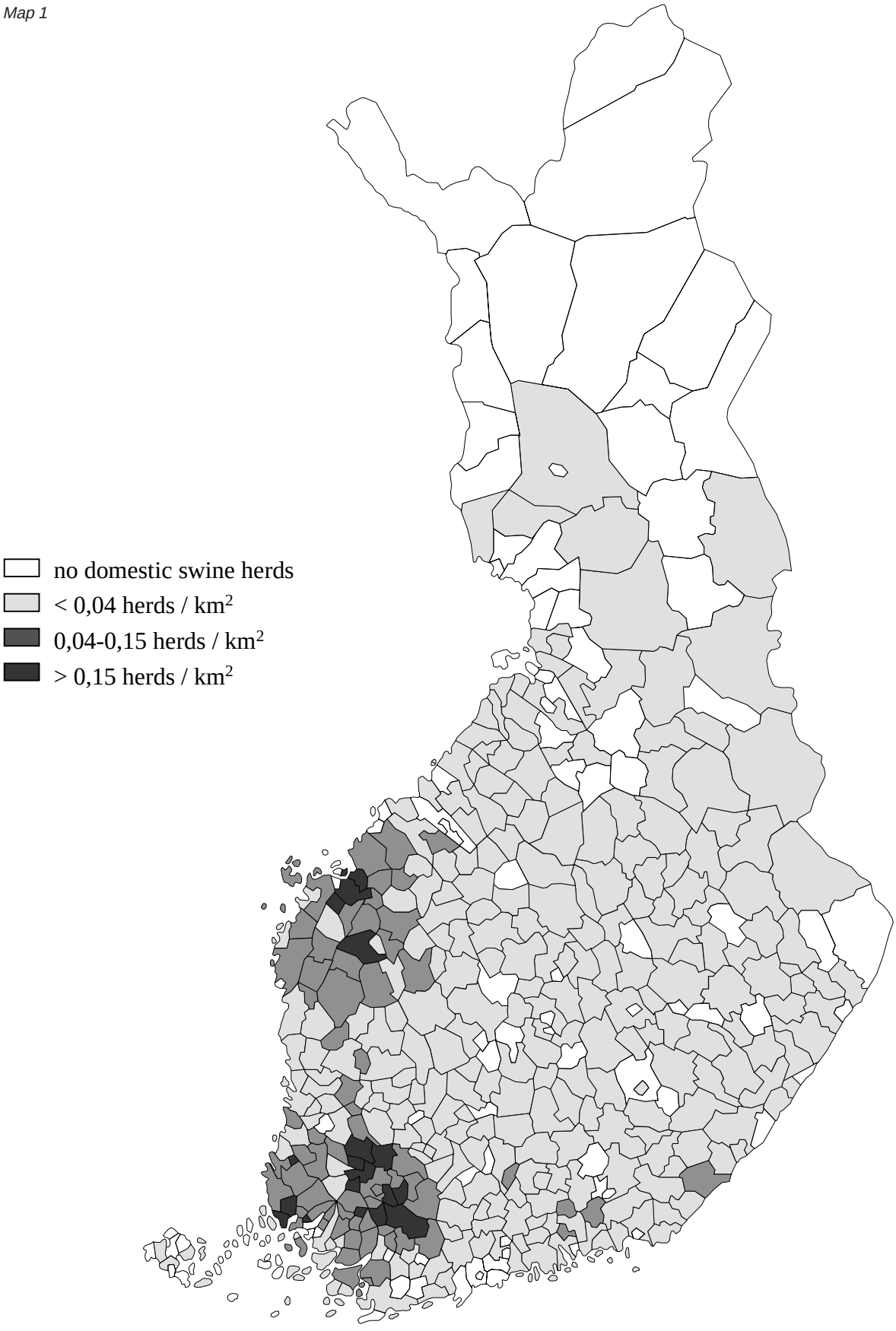
Two contingency training events were organised in 1998-2000, during which CSF samples where sent to EELA (Table 6).

Table 7
List of main differential diagnoses for CSF and presence in the Finnish domestic swine population in 2001 (EELA 2001b, EELA 2001c).

Differential diagnosis	Presence in the Finnish domestic swine population
Infective agent	
Bacterium	
Actinobacillus pleuropneumoniae	Yes
Pasteurella spp.	Yes
Erysipelothrix rhusiopathiae	Yes
Leptospira spp.	Yes[A]
Salmonella Choleraesuis	No
Mycoplasma hyopneumoniae	Yes
Virus	
Aujeszky Disease (AD)	No
African swine fever	No
Bovine Viral Diarrhoea (BVD) in pigs	No
Postweaning Multisystemic Wasting Syndrome (PMWS)	No
Porcine Dermatitis and Nephropathy Syndrome (PDNS)	No
Border Disease(BD) in pigs	No
Non-infective	
Cumarine poisoning	Yes
NaCl poisoning	Yes

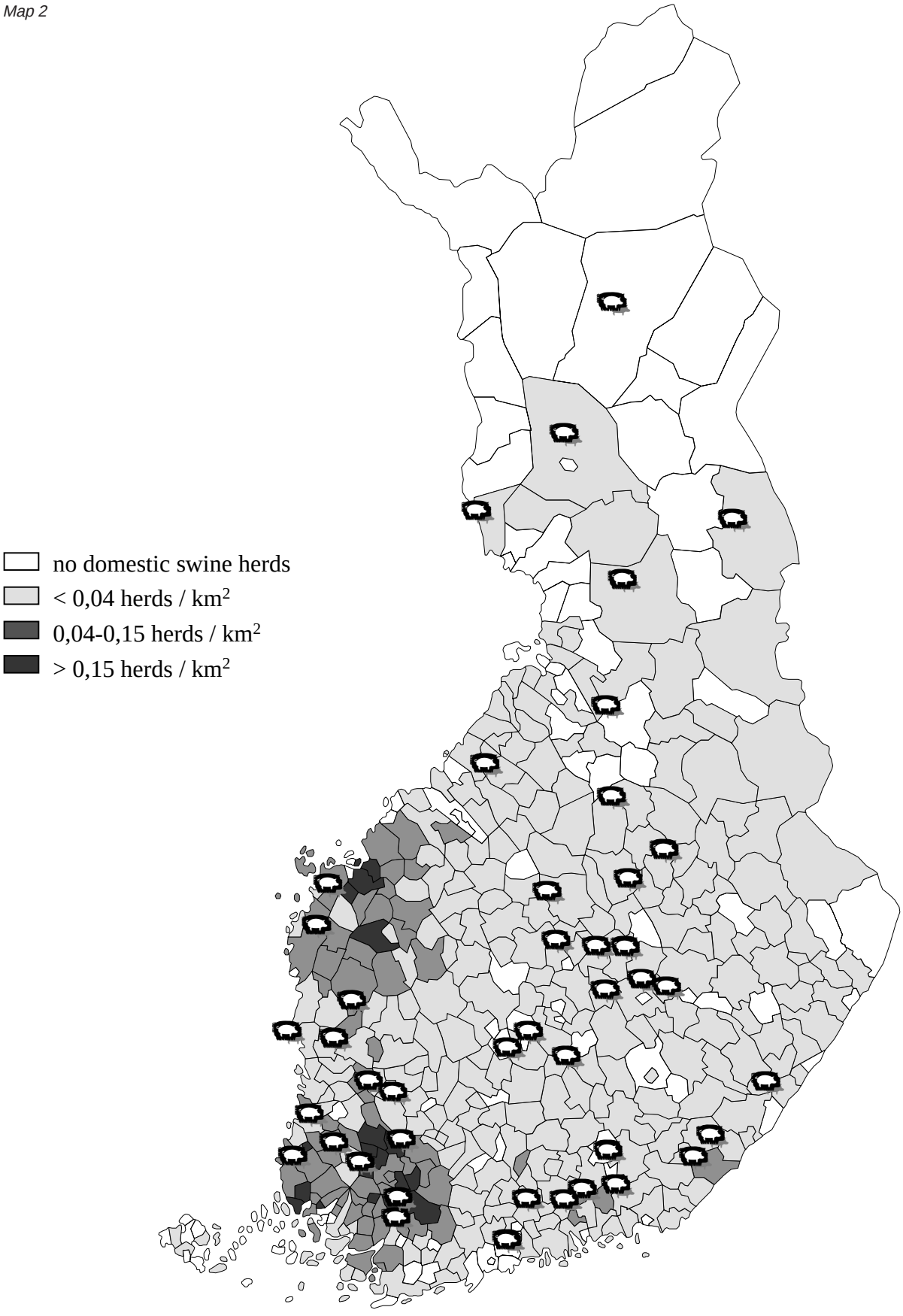
[A] Sporadic cases

Map 1



The domestic swine herd density of municipalities (indicated as different shades of grey) in Finland in 2000 (National Land Survey of Finland 2000, TIKE 2000).

Map 2



The locations of wild boar farms in relation to domestic swine herd density (indicated as different shades of grey) of municipalities in Finland in 2000 (National Land Survey of Finland 2000, TIKE 2000, MAF DFH 2001b).

4 ANNEX REFERENCES

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4.1 LEGAL ACTS

4.1.1 EU legislation

Commission Decision 1999/246/EC. on the 30 March 1999 approval of the Finnish contingency plan for classical swine fever.
Commission Decision 2001/618. of 23 July 2001 on additional guarantees in intra-Community trade of pigs relating to Aujeszky's disease, criteria to provide information on this disease and repealing Decisions 93/24/EEC and 93/244/EEC (Text with EEA relevance) (notified under document number C(2001) 2236)
Council Directive 64/432/EEC. of 26 June 1964 on animal health problems affecting intra-Community trade in bovine animals and swine.
Council Directive 80/217/EEC. of 22 January 1980 introducing Community measures for the control of classical swine fever.
Council Directive 90/425/EEC. of 18 of August 1990 concerning veterinary and zootechnical checks applicable in intra-community trade of certain live animals and products with a view to the completion of the internal market.
Council Directive 2001/89/EEC. of introducing Community measures for the control of classical swine fever.

4.1.2 National legislation

55/1980. Animal Disease act (as last amended).
601/1980. Decree on Animal Disease (as last amended).
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MAF 1192/1996. Veterinary border control act (as last amanded).
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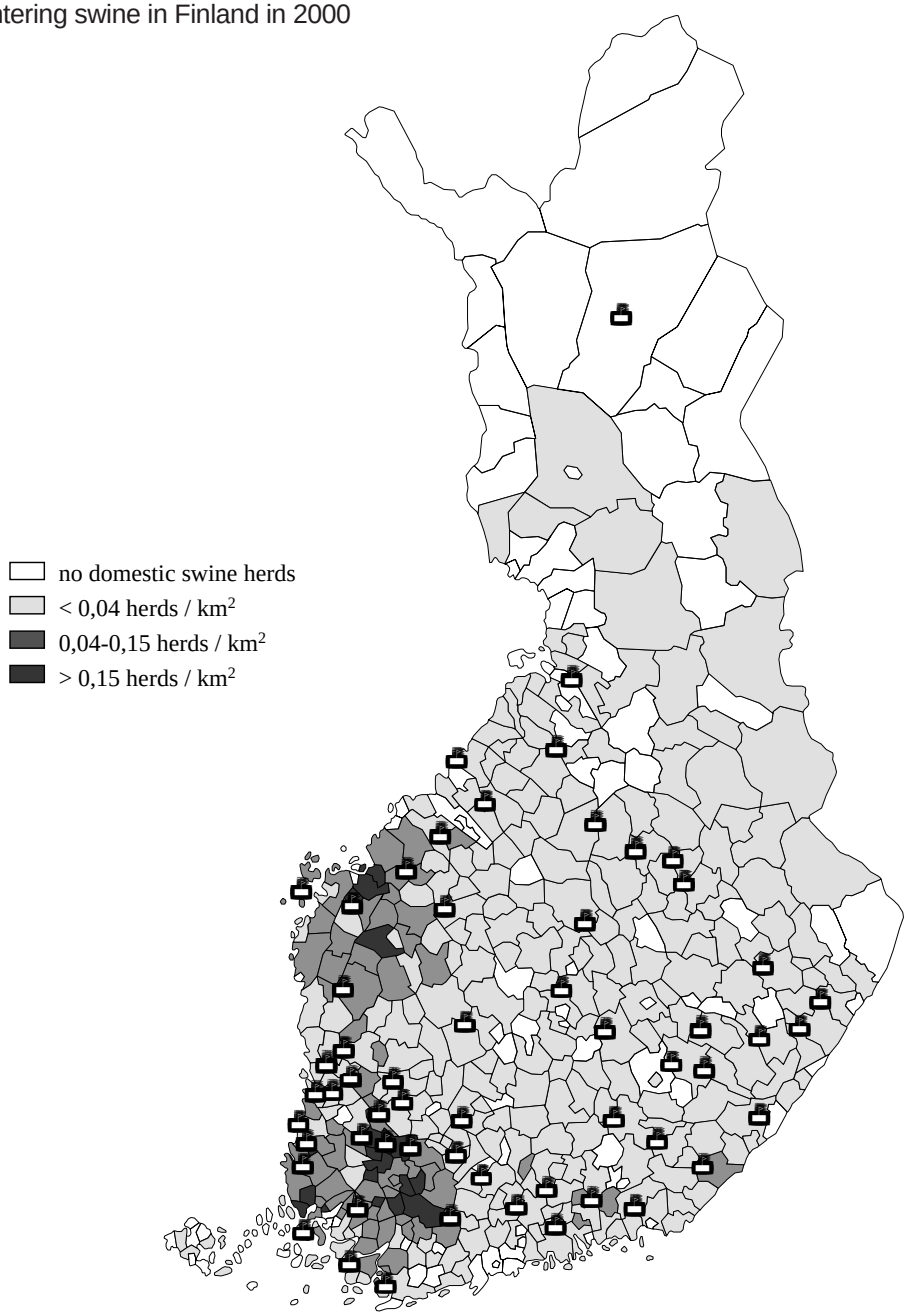
MAF 16/EEO/2001. Decree of the MAF on meat hygiene.
MAF 20/2001. Decree of the MAF on entrepreneurs of foodstuff.
MAF 1296/2001. Decree of the MAF on the identification and registration of swine.

ANNEX 2

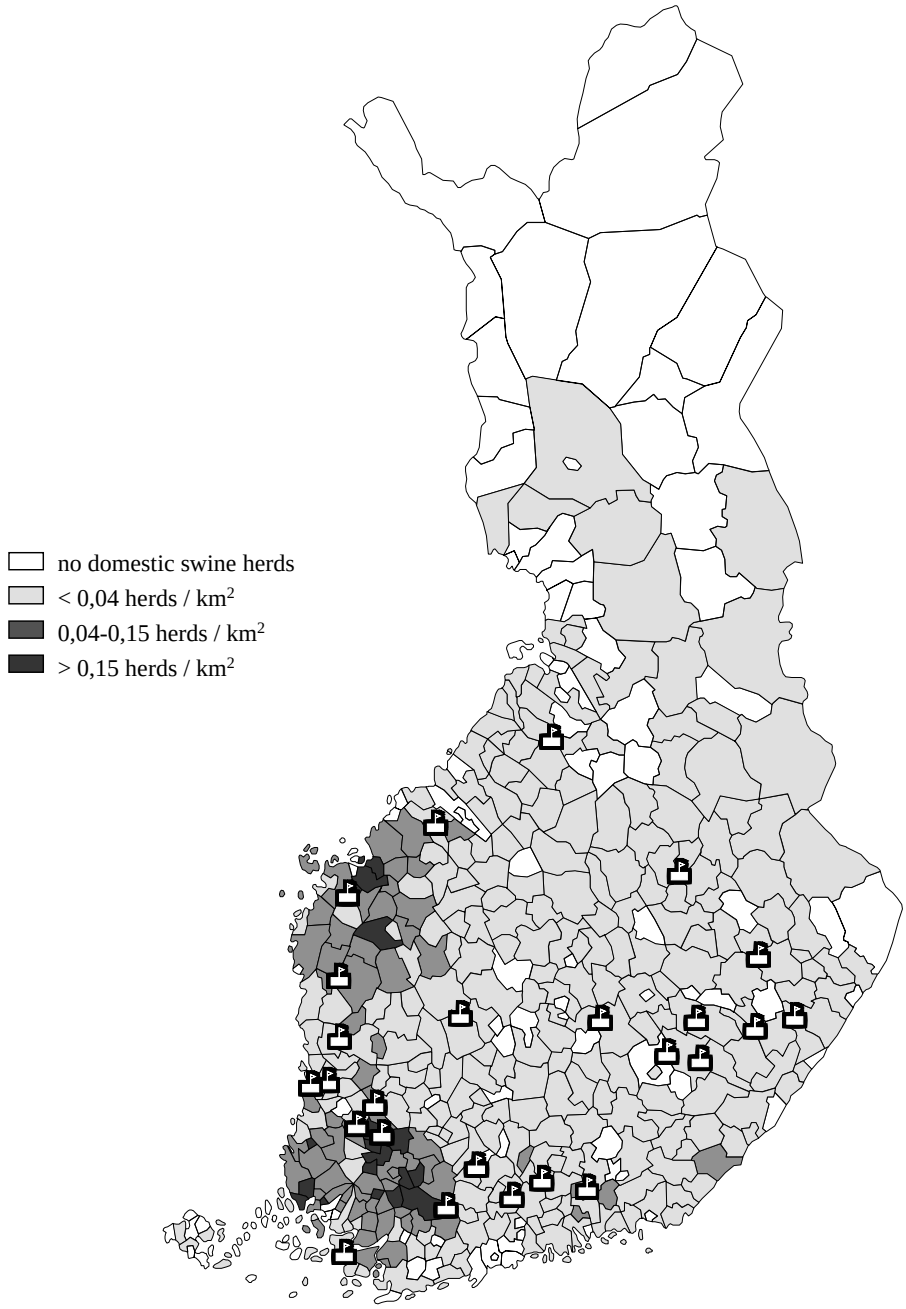
Domestic swine herd density of municipalities and location of low capacity slaughterhouses approved for slaughtering swine in Finland in 2000



The locations of low capacity slaughterhouses approved for slaughtering of domestic swine in relation to domestic swine herd density of municipalities (indicated as different shades of grey) (National Land Survey of Finland 2000, TIKE 2000, EVI 2001a, EVI 2001b).

ANNEX 3

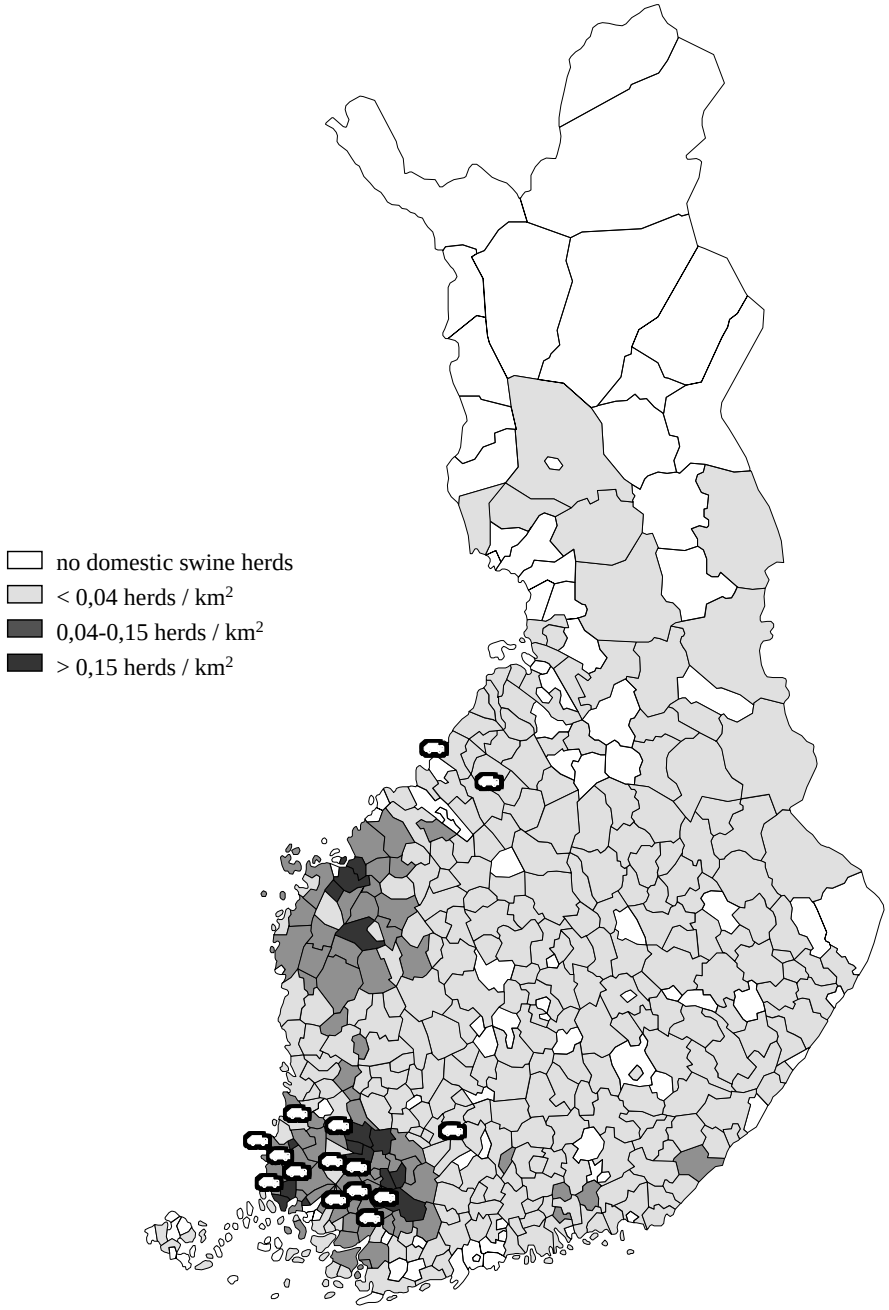
Location of small-scale slaughterhouses slaughtering both farmed wild boars and domestic swine in Finland in 2000



The locations of low capacity slaughterhouses slaughtering both domestic swine and farmed wild boar (rectangle with flag) in relation to domestic swine herd density of municipalities (indicated as different shades of grey) (National Land Survey of Finland 2000, TIKE 2000, EVI 2001a, EVI 2001b).

ANNEX 4

Mobile feed mixers in Finland in 2001



The base location for mobile feed mixers in relation to domestic swine herd density (indicated as different shades of grey) (National Land Survey of Finland 2000, TIKE 2000, KTTK 2001).

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