WETENSCHAPPELIJK COMITÉ
VAN HET FEDERAAL AGENTSCHAP VOOR DE VEILIGHEID
VAN DE VOEDSELKETEN

ADVIES 06-2013

Betreft : Risicofactoren voor (mogelijk) (her-)opkomende infectieuze dierenziekten (dossier Sci Com 2006/48 – eigen initiatief).

Advies goedgekeurd door het Wetenschappelijk Comité op 22/02/2013.

Samenvatting

Dit eigen initiatief advies heeft als doel de risicofactoren voor het opkomen van infectieuze dierenziekten in België te identificeren wat de risicobeheerders moet toelaten om tijdig actie te ondernemen.

Er werden daartoe 34 voorbeelden van (her-)opkomende infectieuze dierenziekten of ziekten met risico op (her-)opkomen, alsook 33 risico- of beschermingsfactoren uitgekozen waarbij een zo volledig mogelijke representativiteit werd nagestreefd. De invloed van deze factoren op het risico van opkomen van de 34 dierenziekten werd onderzocht via een Delphi-enquête uitgevoerd bij 50 deskundigen.

De studie maakte het mogelijk om de risicofactoren te rangschikken volgens hun belang bij het opkomen van aparte groepen van infectieuze dierenziekten (bijvoorbeeld exotische ziekten, zoönotische ziekten, via voeding overdraagbare ziekten) alsook van alle dierenziekten samengenomen in één globale groep. De zes belangrijkste risicofactoren voor het opkomen van dierenziekten, in het geval de (her)-opkomende dierenziekten globaal in één groep worden samengenomen zijn: de aanwezigheid van reservoirdieren, problemen van opsporing van het opkomen van de ziekte, moeilijkheden om de ziekte door vaccinatie te beheersen, de uitbreiding van de geografische spreiding van de ziekte, het voorkomen van asymptomatische dragers en de toename van de incidentie van de ziekte in andere landen.

Uitgaande van die rangschikking van risicofactoren werden aanbevelingen gedaan, met name in verband met « early warning », waakzaamheid, bewaking, beheer en bestrijding van dierenziekten. Wat « early warning » betreft, wordt aanbevolen een monitoring van de meetbare risicofactoren uit te voeren. (De toename in) het voorkomen van risicofactoren kan de risicobeheerder vroegtijdig waarschuwen op het verhoogde risico voor opkomen van infectieuze dierenziekten.

Summary

Advice 06-2013 of the Scientific Committee of the FASFC on the risk factors of the (potentially) (re)-emerging infectious animal diseases

The objective of this advice is to identify the risk factors of emergence of infectious animal diseases in Belgium to allow the risk managers to undertake control measures in time.

For that purpose, 34 examples of (re)-emerging or at risk of (re)-emergence infectious animal diseases and 33 risk (or protection) factors of emergence were selected aiming for the most complete representativeness as possible. The effect of these factors on the risk of emergence of the 34 animal diseases was analysed via a Delphi survey by 50 experts.

The study allowed to rank the risk factors according to their relevance to the emergence of separate groups of infectious animal diseases (for example, exotic, zoonotic, foodborne diseases, etc.), as well as for all the diseases, taken together in one global group. The six most important risk factors, when considering (re)-emerging animal diseases as one global group, are the following: presence of an animal reservoir, detection problems of emergence of disease, difficulties to control the disease by vaccination, geographical extension of the disease, asymptomatic carriage and increase in the incidence of the disease in other countries.

This ranking of risk factors allowed to make recommendations, namely in regard to « early warning », vigilance, surveillance, and control of animal diseases. Concerning the “early warning”, it is recommended to monitor the measurable risk factors of emergence. The appearance of the increase in incidence of risk factors can alert the risk manager early of the increased risk of emergence of infectious animal diseases.

Sleutelwoorden

Opkomende dierenziekten – risicofactoren – rangschikking - aanbevelingen

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1. Referentietermen

1.1. Doelstelling

Dit eigen initiatief advies heeft als doel de risicofactoren voor het opkomen van infectieuze dierenziekten in België te identificeren wat de risicobeheerders moet toelaten om tijdig actie te ondernemen.

Het is niet de bedoeling om een volledige lijst op te maken van (her-)opkomende infectieuze dierenziekten of ziekten met risico van (her-)opkomen maar wel om een methode te ontwikkelen dat toelaat om bij een aantal representatieve voorbeelden van ziekten gemeenschappelijke risicofactoren te identificeren .

Een Delphi-enquête werd uitgevoerd waarbij alleen het opkomen van infectieuze dierenziekten in aanmerking werd genomen zonder de humane ziekten te beschouwen in geval van een zoönotische dierenziekte. De Belgische epidemiologische situatie op het tijdstip van de studie werd beschouwd (2007-2012).

De studie maakte het mogelijk om de risicofactoren te rangschikken naar belangrijkheid van de invloed ervan op het risico van opkomen van groepen van ziekten alsook voor alle ziekten samen. Er konden uitgaande van deze studie ook aanbevelingen worden gedaan.

1.2. Wettelijke context

Het koninklijk besluit van 20 november 2009 betreffende de erkenning van dierenartsen legt de plicht op om het FAVV in kennis te stellen wanneer de morbiditeit of de mortaliteit plots stijgt als gevolg van een van de ziekten van de lijst[1] van de Wereld Dieren Gezondsorganisatie (OIE). Het beoogt dus de aangifteplicht voor dierenziekten binnen een context van opkomende ziekte.

1.3. Definities (in het kader van dit advies)

Dierenziekte (**Toma *et al*., 2001**): afwijkende gezondheidstoestand die te wijten is aan een pathogeen agens in een gevoelige dierenpopulatie. Een dierenziekte kan infectieus zijn (waarbij het pathogene agens in het aangetaste dier vermeerdert), overdraagbaar zijn (wanneer het pathogene agens overgedragen en doorgegeven kan worden naar andere dieren) en/of besmettelijk zijn (overgedragen via direct of indirect contact met een besmet dier als bron van het pathogene agens).

Zoönose : Een ziekte of infectie die natuurlijk wordt overgedragen van gewervelde dieren op de mens en omgekeerd (Toma *et al*., 1991).

Opkomende zieke :
- in België aanwezige ziekte waarvan de reële incidentie (aantal nieuwe gevallen van infecties) in een bepaalde dierenpopulatie van een bepaalde regio en tijdens een bepaalde periode significant stijgt in vergelijking met de gewone epidemiologische toestand van die ziekte, en los van de gewone seizoensgebonden schommelingen voor die ziekte;

[1] URL: http://www.oie.int/en/animal-health-in-the-world/oie-listed-diseases-2012/

- nieuwe ziekte die wordt veroorzaakt door een voordien onbekend pathogeen agens;
- ziekte die wordt veroorzaakt door pathogene agentia die gemuteerd zijn;
- ziekte die reeds bestaat en die zich verspreidt in een nieuwe regio waar ze voordien niet voorkwam.

Binnen de context van dit advies moet de term « opkomende dierenziekte » dus in zijn ruime betekenis worden opgevat : stijging van de incidentie ; introductie en vestiging in België als het gaat om een exotische ziekte ; verspreiding als de ziekte reeds aanwezig is, enz. Deze definitie wordt nader uitgelegd in de **brochure van het Wetenschappelijk Comité (2010).** Opkomende dierenziekten zijn logischerwijs overdraagbare ziekten.

Mogelijk opkomende ziekte of ziekte met risico op opkomen : ziekte die niet voorkomt in België maar wel in een ander land (exotische ziekte) en waarvoor het risico van introductie en verspreiding op het grondgebied op korte of langere termijn reëel is.

Heropkomende ziekte of ziekte met risico op heropkomen: ziekte die in België voorkwam, werd uitgeroeid maar opnieuw voorkomt of opnieuw dreigt voor te komen.

Risicofactor : factor die geassocieerd is met een verhoging van de kans van het optreden of van de ontwikkeling van ziekte.

Beschermingsfactor : factor die geassocieerd is met een verlaging van de kans van het optreden of van de ontwikkeling van ziekte.

Reservoirdier : diersoort waarin de pathogene agentia overleven en dat een belangrijke bron is van overdracht van infectieuze ziektekiemen op andere dieren.

Overwegende de besprekingen tijdens de werkgroepvergaderingen van 17 november 2006, 13 februari 2007, 2 mei 2007, 30 augustus 2012 en 4 januari 2013 en de plenaire zitting van XX/XX/2013,

geeft het Wetenschappelijk Comité het volgende advies :

2. Methodologie

<u>Stap 1. Opmaken van een lijst met voorbeelden van (her-)opkomende dierenziekten of dierenziekten met risico van (her-)opkomen en indeling volgens de epidemiologische situatie ervan</u>

Het Wetenschappelijk Comité verkoos niet te werken op basis van een volledige lijst van (her-)opkomende infectieuze dierenziekten of infectieuze dierenziekten met een risico op (her-)opkomen maar op basis van een lijst van voorbeelden van ziekten. Die voorbeelden werden zodanig gekozen dat ze represenatief zijn voor alle dierenziekten en voor de biologische eigenschappen ervan (interactie tussen gastheer en ziektekiem) op basis van :

- de verschillende types van etiologische agentia (bacteriën, virussen, parasieten, prionziekte),
- de verschillende epidemiologische situaties (ziekten die reeds voorkomen, exotische ziekten, enz.),
- de verschillende gastheertypes (huisdieren, wilde fauna, verschillende diersoorten, enz.),
- de verschillende wijzen van overdracht (via vectoren, voeding, direct, indirect, enz.),
- het feit of de ziekte zoönotisch is of niet.

Op die manier kunnen de resultaten van de studie worden geëxtrapoleerd naar andere ziekten met gelijkaardige kenmerken als de bestudeerde ziekten.

Er werden 34 dierenziekten uitgekozen en al naargelang van de epidemiologische situatie werden deze verdeeld over meerdere groepen en deelgroepen :

(1) ziekten die in België voorkomen, ofwel endemisch, ofwel sporadisch, en waarvoor een risico op opkomen (stijging van de incidentie) bestaat:
   - endemische ziekten : Boviene Babesiose, Varkensbrucellose bij everzwijnen, Ziekte van Lyme, Q-koorts[2], Hantavirose, Boviene cysticercose, Echinococcose (*Echinococcus multilocularis*), *E. coli* O157:H7[3],
   - sporadische ziekten: Rundertuberculose, Tularemie, Leishmaniose, Rabiës bij vleermuizen, Anaplasmose[4],

(2) in België voorkomende ziekten waarvan de incidentie stijgt (vaststaande en vastgestelde opkomst) : Bluetongue[1], Echinococcose (*Echinococcus granulosus*), Equine virale arteritis, Necrotische enteritis veroorzaakt door *Clostridium perfringens* bij pluimvee, atypische overdraagbare spongiforme Encefalopathie (TSE) bij kleine herkauwers, Atypische myopathie bij paardachtigen,

(3) ziekten die in België niet voorkomen (exotische ziekten) maar die een risico vormen op introductie en verspreiding in België (mogelijk (her-)opkomende ziekten of ziekten met een risico van (her-)opkomst) : Mond- en klauwzeer, Afrikaanse varkenspest, Klassieke varkenspest, West-Nijlkoorts, Riftdalkoorts, Epidemische hemorragische ziekte, Chronic wasting disease bij hertachtigen, Boviene besmettelijke pleuropneumonie, Hoogpathogene aviaire influenza, Varkenscysticercose, Klassieke rabiës bij hondachtigen, Pest, door teken veroorzaakte Encefalitis, Atypische boviene spongiforme encefalopathie (BSE), Dirofilariose.

De belangrijkste kenmerken van die ziekten (etiologische agens, zoönotische aard, gastheren, wijze van overdracht) zijn vermeld in **bijlage 1.**

<u>Stap 2. Opmaken van een lijst van risico- (en/of beschermings-)factoren voor het opkomen van infectieuze dierenziekten en indeling in domeinen op basis van het convergentiemodel (King, 2004)</u>

Met het convergentiemodel[5] van King (2004) kunnen de specifieke factoren voor opkomen van zoönotische ziekten worden ingedeeld in grote domeinen waartussen

[2] De studie werd uitgevoerd tussen 2006 en 2012. De keuze van de ziekte geeft de epidemiologische kenmerken ervan weer bij de aanvang van de studie. Die keuzes werden niet gewijzigd in aansluiting op de evolutie van de epidemiologische toestand omdat het de bedoeling is om de risicofactoren te bestuderen als indicatoren, los van de epidemiologische evolutie, zodat de risicomanager de matrix op middellange termijn kan gebruiken, ongeacht hoe de epidemiologische situatie is.

[3] E. coli O157:H7 veroorzaakt een infectie maar geen ziekte bij runderen.

[4] Anaplasmose kwam sporadisch voor in België bij de aanvang van de studie. Deze ziekte is sindsdien endemisch geworden.

raakvlakken mogelijk zijn. De domeinen en de risicofactoren uit het convergentiemodel van King (2004) werden in dit advies gewijzigd om ze aan te passen aan het doel van het eigen initiatief dossier en om rekening te kunnen houden met de niet-zoönotische ziekten. De factoren die in het kader van die studie besproken worden, zijn ook op **Morse (2004)** en **Slingenbergh *et al*. (2004)** geïnspireerd. Er werden vier domeinen in aanmerking genomen :

- aan de infectieuse agentia gerelateerde factoren,
- aan de menselijke activiteit gerelateerde factoren,
- aan de dieren gerelateerde factoren,
- aan de milieuveranderingen gerelateerde factoren.

Elk domein omvat meerdere specifieke risicofactoren. De terminologie gebruikt voor het omschrijven van de risicofactoren werd zodanig gekozen dat die factoren aangepast zijn aan de verschillende gekozen voorbeelden van ziekten en dat interpretatieproblemen en afwijkende antwoorden op de vragen door de deskundigen minimaal zijn (zie Stap 3. Delphi-enquête).

	Aan de infectieuse agentia gerelateerde factoren	**Referenties**
1	Genetische variabiliteit (mutatie, recombinatie, enz.)	**Webster and Hulse (2004)**
2	Gebrekkige kennis van de pathogenese	
3	Wijziging in de pathogenese (= wijziging in de ontwikkeling van de ziekte bij de gastheer) (bijvoorbeeld stijging van de virulentie, verlengde incubatieperide, variatie in de interactie tussen gastheer en pathogeen)	**Morse (2004), Angulo (2004)**
4	Moeilijkheiden om de ziekte door vaccinatie te beheersen	
5	Mogelijkheid van verandering van het gastheerspectrum van een diersoort naar een andere diersoort (overschrijding van de soortspecifieke barrière)	
6	Mogelijkheid van verandering van het gastheerspectrum van dieren naar de mens	
7	Uitbreiding van de geografische spreiding van de ziektekiem	
8	Toename van de incidentie (nieuwe gevallen) in een of meer andere landen	
9	Persistentie van de ziektekiem in het milieu	**Slingenbergh (2004)**
	Aan de mensen gerelateerde factoren (menselijke activiteit)	
10	Wetgeving / gezondheidsvoorschriften	**Morse (2004)**
11	Veranderingen in de technologische en industriële processen	**Morse (2004), Slingenbergh (2004)**
12	Problemen om het opkomen van dierenziekten op te sporen (bijvoorbeeld moeilijkheid met de aangifte van de ziekte door de veehouders, slechte kenmerken van de diagnosetests)	
13	Toename van de interacties tussen compartimenten (populaties) van dieren	**Webster and Hulse (2004)**
14	Toename van de interacties tussen dierenpopulaties en mensenpopulaties	

[5] Verschillende modellen werden voorgesteld om de risicofactoren te klasseren. Het PERIAPT model betreft de opkomende risicos in de voedselketen. Het GENERALISE model betreft de zeldzame gebeurtenissen. Het CONVERGENCE model betreft (her-)opkomende zoönosen. Dit model deelt de potentiele risicofactoren in grote domeinen in (bijv. ecologische en milieufactoren, socio-economische factoren, biologische factoren, enz.), waarin de gedomesticeerde en wilde dieren, de mens en het milieu een rol spelen. Deze domeinen bevatten specifieke risicofactoren voor opkomen. De term « convergentie » is afkomstig van het feit dat er onderlinge afhankelijkheid bestaat tussen de domeinen, namelijk tussen de humane gezondheid, de dierlijke gezondheid en het milieu, wat grensgebieden creëert en wat aan de basis ligt van het concept “One Health”.

15	Demografische toename van de bevolking	**Brown (2004), Morse (2004), Slingenbergh (2004)**
16	Toename van de bij de ziekte betrokken dierenpopulatie	
17	Globalisering : meer reizen	**Slingenbergh (2004)**
18	Globalisering : meer toerisme	**Slingenbergh (2004)**
19	Globalisering : meer handelsverkeer	**Brown (2004), Morse (2004), Slingenbergh (2004)**
20	Globalisering : meer vervoer	**Brown (2004), Morse (2004), Slingenbergh (2004)**
21	Globalisering : meer terrorisme	**Brown (2004)**
22	Intensieve productiesystemen	**Webster and Hulse (2004), Slingenbergh (2004)**
23	Extensieve productiesystemen	
	Aan de dieren gerelateerde factoren	
24	Asymptomatische dragers (zonder klinische tekenen)	
25	Dierlijk reservoir	
26	Lange incubatieperiode bij het dier	
27	Contacten tussen gedomesticeerde dieren en wilde fauna	**Bengis *et al*. (2004), Slingenbergh (2004)**
28	Epidemiologische rol van de wilde fauna	**Bengis *et al*. (2004)**
29	Demografische toename en/of spreiding van de wilde fauna	**Bengis *et al*. (2004), Enria and Levis (2004)**
	Aan de milieuveranderingen gerelateerde factoren	
30	Klimaat- en weersveranderingen	**Brown (2004), de La Rocque *et al*. (2008), Gerdes (2004), Slingenbergh (2004)**
31	Veranderingen in ecosystemen door de mens	**Morse (2004), Slingenbergh (2004)**
32	Verstedelijking	**Slingenbergh (2004)**
33	Aanwezigheid van vector	**Chevalier *et al*. (2004), Slingenbergh (2004)**

Stap 3. Delphi-enquête

Er werd een enquête uitgevoerd bij Belgische deskundigen met het oog op het analyseren van de invloed van de gekozen risico- (of beschermings-)factoren op de verschillende voorbeelden van ziekten. In de eerste fase van de enquête werden de deskundigen apart ondervraagd. In de tweede fase werd aan diezelfde deskundigen gevraagd een voorstel van consensus te valideren gebaseerd op de antwoorden uit de eerste fase.

- **Fase 1**

De risicofactoren en de voorbeelden van ziekten werden ingevoerd in een Exceltabel met dubbele ingang zodat elke risico-(of beschermings-)factor tegenover elk voorbeeld van een ziekte kon worden geplaatst (**bijlage 2**).

Er werden 78 deskundigen uitgenodigd op basis van hun expertise. De deelnemingsgraad (aantal deskundigen die fase 1 hebben uitgevoerd / aantal

deskundigen dat werd gevraagd) ligt voor fase 1 op 64 % (50/78). **Bijlage 3** geeft een overzicht van de 50 deskundigen die hebben deelgenomen aan fase 1 van de Delphi-enquête met vermelding van de ziekten die ze beoordeeld hebben. Elke expert beoordeelde meerdere ziekten (minimum twee ziekten per expert) en elke ziekte werd door meerdere experts beoordeeld (tussen 2 en 15 experten per ziekte), behalve voor twee ziekten (boviene besmettelijke pleuropneumonie en pest) die door een enkel expert werden onderzocht (**bijlage 3**). De experten moesten, per ziekte, een evaluatie geven van alle risicofactoren van de lijst. Er werd een voorafgaande test uitgevoerd bij 5 deskundigen van de werkgroep van het Wetenschappelijk Comité om mogelijke interpretatieproblemen te kunnen vaststellen en verhelpen.

Het Exceldocument werd samen met een gedetailleerde handleiding per e-mail individueel opgestuurd naar elke deskundigen. De gedetailleerde handleiding is weergegeven als **bijlage 4**.
Daarna werd aan de deskundigen gevraagd om in het Exceldocument aan de hand van uitrolmenu's voor elke risico-/beschermingsfactor en voor de ziekten waarvoor zij werden uitgekozen de drie hierna vermelde vragen te beantwoorden, met mogelijkheid om hun keuze toe te lichten / te bewijzen.

Vraag 1 :
Bestaat de aangehaalde factor /is hij thans aanwezig in België voor de betreffende ziekte ? Antwoord met « ja » (factor aanwezig) of « neen » (factor afwezig). Het doel van deze vraag sluit aan op het feit dat de lijst van risicofactoren voor alle gekozen ziekten dezelfde is en dat het noodzakelijk is om de situatie eigen aan elke ziekte te analyseren. De vraag « is de factor een risico-/beschermingsfactor voor de ziekte? » diende nog niet te worden beantwoord omdat zij aan bod kwam in de tweede vraag.

Vraag 2 :
Deze vraag diende los van de eerste vraag, dus los van het feit of de risicofactor thans in België aanwezig is/bestaat/afwezig is, te worden beantwoord. Ook als de factor thans niet in België aanwezig is, moest de vraag worden beantwoord vanuit een theoretische redenering, dat wil zeggen dat men zich moest inbeelden dat de factor bestaat :
Is het zo dat de factor :
- het risico van opkomen van de betreffende ziekte verlaagt ? Als dat zo is gaat het om een beschermende factor tegen het opkomen van de ziekte (antwoorden met een « - »);
- het risico van opkomen van de betreffende ziekte verhoogt ? Als dat zo is gaat het om een risicofactor voor opkomen van de ziekte (antwoorden met een « + »);
- in sommige gevallen is het mogelijk dat de factor geen invloed heeft op het opkomen van de betreffende ziekte (antwoorden met een « 0 »).
Om deze vraag te beantwoorden moest de definitie van "opkomende ziekte" in de ruime betekenis worden opgevat. Voor « exotische » ziekten die thans niet voorkomen in België moest men bijvoorbeeld rekening houden met de invloed van de factor op het risico van opkomst (introductie en verspreiding) van de ziekte in België.

Vraag 3 :
Kwantificeer de invloed van elk van deze factoren op het opkomen van de ziekten volgens de hierna weergegeven scoretabel :

De invloed van de factor op het opkomen van de dierenziekte is:	risicofactor	beschermings-factor
Gering	+	-
Gemiddeld	++	- -

Groot	+++	- - -
Zeer groot	++++	- - - -

(Als er werd geantwoord met « 0 » wilde dat zeggen dat de factor geen invloed had op het opkomen van de ziekte en dan moest de invloed niet worden gekwantificeerd).

De lijst van de gestelde vragen aan de deskundigen is schematisch weergegeven als **bijlage 5**.

De eerste vraag (aanwezigheid/afwezigheid) heeft betrekking op België. De tweede vraag (risicofactor of niet) is louter theoretisch. De experten moesten op de twee vragen afzonderlijk antwoorden om te vermijden dat de criteria “aanwezigheid” met “risicofactor” en “afwezigheid” met “beschermingsfactor” met elkaar in verband worden gebacht. Bijvoorbeeld, een vector kan op een bepaald tijdstip afwezig zijn in België maar toch een risicofactor zijn voor een vectoriële ziekte. Aan de hand van de analyse van de combinatie van de antwoorden op beide vragen kan de theroretische notie naar de Belgische situatie worden geëxtrapoleerd en conclusies en aanbevelingen aanleveren die eigen zijn aan België. Met andere woorden, door beide vragen los van elkaar te laten beantwoorden wilde men het mogelijk maken om alle mogelijkheden via deductie in aanmerking te nemen en daaruit conclusies te trekken.

De afzonderlijke antwoorden van de deskundigen werden met elkaar vergeleken. De analyse van de antwoorden op de eerste vraag verliep als volgt : de keuze van de meerderheid van de deskundigen werd door de werkgroep gevolgd en, indien nodig (geen meerderheid, duidelijke interpretatieproblemen in de antwoorden, enz.) werd rekening gehouden met argumenten uit de wetenschappelijke literatuur.
De analyse van de antwoorden op de tweede vraag verliep als volgt : de keuze van de meerderheid van de deskundigen werd door de werkgroep gevolgd en, indien nodig werd rekening gehouden met argumenten afkomstig uit de wetenschappelijke literatuur. Voor de kwantificering werden numerieke gemiddelden van de scores van de deskundigen die de meerderheid uitmaakten berekend en voor het vervolg van de enquête omgezet in “teken” waarden (“+”, “++”, …). Op die manier werd voor elke ziekte en voor elke risico- en beschermingsfactor een voorstel van consensus geformuleerd in de vorm van een tekenwaarde, die voor elk gegeven overeenkomt met het gemiddelde van de meerderheid van de deskundigen.
Aan elk voorstel van consensus werd, door de werkgroep, een interpretatie in het Engels gekoppeld die werd ondersteund door de wetenschappelijke literatuur. Een voorbeeld hiervan is weergegeven als **bijlage 6**. De interpretaties en wetenschappelijke rechtvaardigingen hadden tot doel de ideeën die door de voorstellen voor consensus waren aangebracht uit te drukken om te vermijden dat interpretatiefouten in fase 1 worden herhaald in fase 2.

De wetenschappelijke verantwoordigen werden goedgekeurd en/of verbeterd door externe experten in virus- en bacteriële ziekten voordat met fase 2 van de enquête werd begonnen.

Het voorstel van consensus werd gebruikt als basis voor de tweede fase van de Delphi-enquête.

- **Fase 2**

De 50 deskundigen die aan de eerste fase hadden deelgenomen werden opnieuw uitgenodigd (brief met toelichting bijgevoegd als **bijlage 7)** om deel te nemen aan de

tweede fase van de enquête. De deelnemingsgraad voor fase 2 (aantal deskundigen die geantwoord hebben op fase 2 / aantal deskundigen die geantwoord hebben op fase 1) bedroeg 74 % (zie **bijlage 3**).

Het Exceldocument toegezonden aan de deskundigen vermeldde, voor elke ziekte waarvoor zij aanvankelijk waren uitgekozen en voor elke risico- of beschermingsfactor, de voorstellen van consensusscores en de bijhorende wetenschappelijke verantwoording (**bijlage 6**) die afkomstig waren uit de analyse van fase 1. Er werd hun gevraagd om de consensusvoorstellen en de wetenschappelijke verantwoording goed te keuren/te verbeteren/te becommentariëren. Elke ziekte werd door meerdere experten geanalyseerd, behalve voor bepaalde ziekten (zie bijlage 3 en punt 2.4.3). De experten moesten, per ziekte, de consensusvoorstellen valideren/becommentariëren voor alle risicofactoren van de lijst.

Op het einde van fase 2 werden aldus voor elke factor en voor elke ziekte unieke consensuswaarden verkregen met de bijbehorende wetenschappelijke verantwoording. Voor niet specifiek aan een ziekte gerelateerde factoren, waarvoor de aanwezigheid of afwezigheid niet kan variëren al naargelang van de ziekte (bijvoorbeeld toename van het toerisme, toename van het terrorisme, klimaatveranderingen, enz.), werd een horizontale analyse uitgevoerd om de antwoorden op de eerste vraag voor alle ziekten op elkaar af te stemmen. Bijvoorbeeld, de aanwezigheid van klimaat- en weersveranderingen varieert niet al naargelang de dierenziekten. Het antwoord “ja (aanwezigheid)” werd dus gegeven voor al de dierenziekten. Er werd daarbij ook rekening gehouden met de keuze van de meerderheid van de deskundigen.

Stap 4. Gegevensanalyse

De consensus tekenwaarden werden omgezet in consensus getalwaarden (bijvoorbeeld, « + » werd vervangen door « 1 » ; « ++ » door « 2 », « --- » door « -3 », enz.) en de beschrijvende statistieken (som, gemiddelde, standaardafwijking, variatiecoëfficient, standaardfout, betrouwbaarheidsinterval) werden berekend:

- hetzij voor alle ziekten (dierengezondheid als geheel),
- hetzij voor groepen van ziekten, al naargelang van :
  - de epidemiologische toestand (endemische ziekten, sporadische ziekten, ziekten waarvan de opkomst wordt vastgesteld, exotische ziekten met risico van opkomst),
  - het type ziekteverwekker (bacteriële ziekten, virale ziekten, parasitaire ziekten, prionziekten),
  - de wijze van overdracht (vectorziekten, ziekten die via de voeding, direct, indirect, door inademen, via het milieu enz. worden overgedragen) en
  - het feit of de ziekte al dan niet zoönotisch van aard is.

De risico- (of beschermings-)factoren werden naar afnemend belang gerangschikt op basis van het scoregemiddelde per groep. Op die manier werd een rangschikking verkregen van de risicofactoren al naargelang van het belang ervan voor de opkomst van dierenziekten voor enerzijds alle ziekten samen en anderzijds voor de verschillende groepen van ziekten.

3. Resultaten

3.1. Kwalitatieve evaluatie

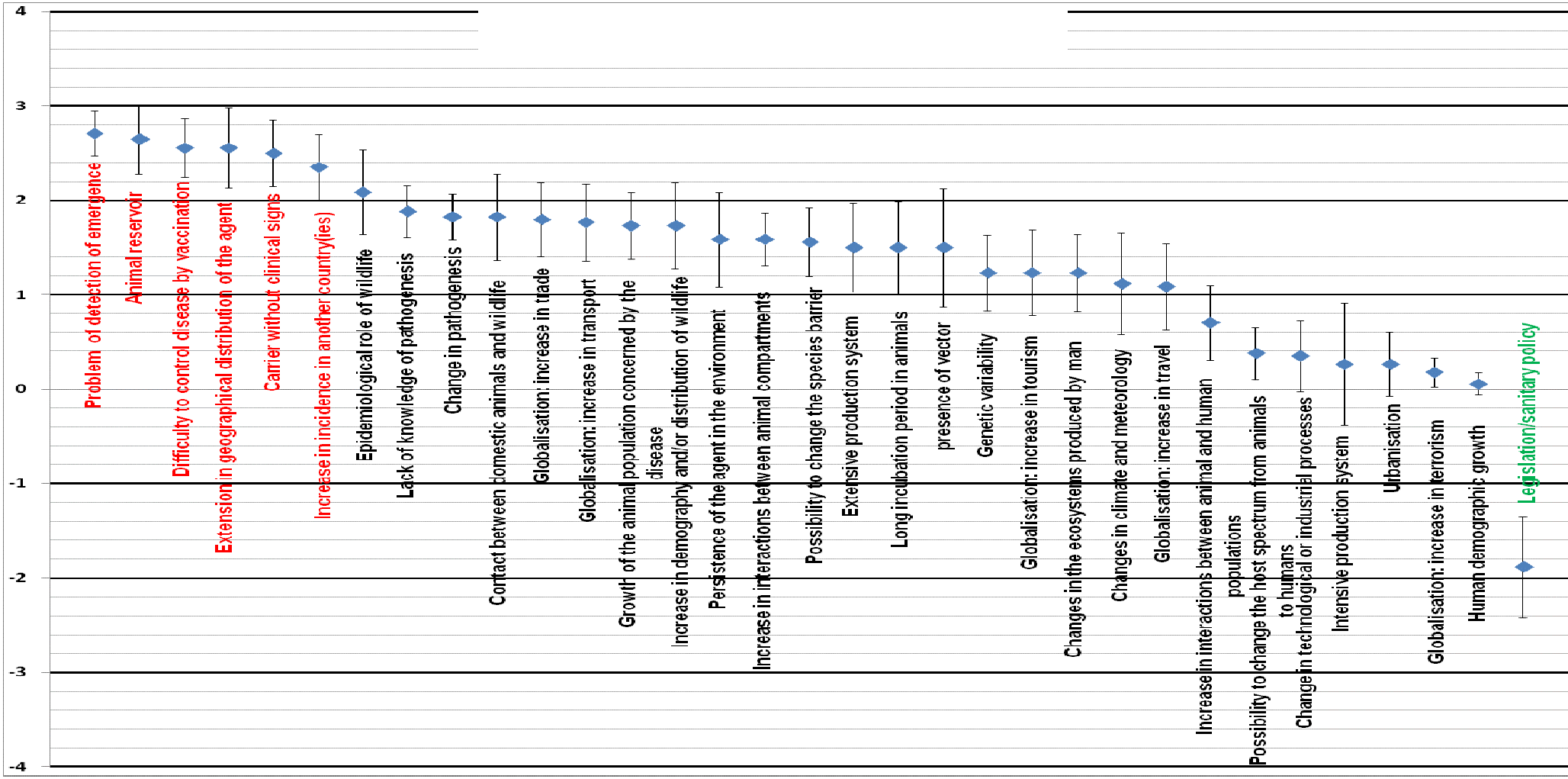
De consensuswaarden voor de invloed van de risico- / beschermingsfactoren op de voorbeelden van dierenziekten, met de bijbehorende wetenschappelijke verantwoording, zijn weergegeven als **bijlage 8**. Wegens de omvang van deze resultaten worden ze niet samengevat in de tekst van dit advies.

3.2. Kwalitatieve evaluatie van de impact van de risico- / beschermingsfactoren op het opkomen van infectieuze dierenziekten

Hieronder wordt het scenario van rangschikking van risicofactoren voor opkomen van ziekten voorgesteld waarbij de dierengezondheid als geheel wordt beschouwd (scenario 1):

Scenario 1. Rangschikking van risicofactoren voor opkomen van ziekten waarbij de dierengezondheid als geheel wordt beschouwd

De zes in het rood aangeduide risicofactoren zijn de meest voorkomende risicofactoren in alle scenario's. De in het groen aangeduide factor wordt als beschermingsfactor beschouwd.



Bijlage 9 vermeldt de andere rangschikkingscenario's:

- Scenario 2. Risicofactoren voor opkomen van zoönotische dierenziekten,
- Scenario 3. Risicofactoren voor opkomen van door levensmiddelen overgebrachte dierenziekten,
- Scenario 4. Risicofactoren voor opkomen van vectoriële dierenziekten,
- Scenario 5. Risicofactoren voor opkomen van endemische dierenziekten,
- Scenario 6. Risicofactoren voor opkomen van sporadische dierenziekten,
- Scenario 7. Risicofactoren voor opkomen van dierenziekten waarvan het opkomen werd vastgesteld,
- Scenario 8. Risicofactoren voor opkomen van exotische ziekten met risico op opkomen.

4. Onzekerheden

4.1. Interpretatieproblemen

Tijdens fase 1 van de Delphi-enquête hadden een aantal deskundigen problemen met de interpretatie van de vastlegging van sommige risicofactoren en met een gebrekkige « onafhankelijkheid » tussen de antwoorden op de eerste en die op de tweede vraag. Een aantal deskundigen beantwoordde de eerste vraag bijvoorbeeld alsof die luidde als « is de factor een risicofactor (antwoord met ja) of een beschermingsfactor (antwoord met neen) ?» en beantwoordden de tweede vraag met een kwantitatieve uitdrukking van het belang van de risico- / beschermingsfactor (+, ++, +++, enz.). Dat gaf aanleiding tot een zekere heterogeniteit in de antwoorden van de deskundigen en tot moeilijkheden bij de verwerking van de gegevens. Het probleem werd opgelost in aansluiting op het consensusvoorstel met de bijbehorende interpretaties en wetenschappelijke verantwoordingen, die uiteindelijk gevalideerd werden in fase 2.

4.2. Heterogeniteit binnen de groepen van ziekten

De ziektegroepen die werden samengesteld op grond van de epidemiologische toestand, van de zoönotische aard, het type ziekteverwekker en de wijze van overdracht zijn heterogeen, dat wil zeggen dat de ziekten die er deel van uitmaken geen gelijkaardige kenmerken vertonen als het gaat om de rol van de risicofactoren. In de groep van de exotische ziekten zitten bijvoorbeeld bacteriële, virale, parasitaire ziekten, ziekten overgedragen door vectoren of via de voeding, enz. De rol van bepaalde risicofactoren met betrekking tot het opkomen van virale ziekten is bijvoorbeeld niet gelijk aan de rol ervan met betrekking tot het opkomen van parasitaire ziekten.
Het meest volledige scenario bevat de 34 ziekten samen. De groepen van endemische, sporadische, opkomende, exotische, door vectoren overgedragen, door voeding overgedragen en zoönotische ziekten bestaan respectievelijk uit 7, 6, 6, 15, 13, 14 en 23 ziekten. De heterogeneiteit in de groepen met minder ziekten is relatief hoger dan deze in de groepen met meer ziekten omdat ze minder gelijkaardige ziekten bevatten. **Bijlage 10** geeft enkele voorbeelden van de invloed van de heterogeniteit van de groepen op de resultaten. Hoe meer ziekten in een groep zitten hoe stabieler de resultaten van de rangschikking zijn.

4.3. Aantal experten die de tweede fase hebben gevalideerd

Omwille van de beperkte beschikbaarheid van een aantal deskundigen werd de impact van de risicofactoren op bepaalde ziekten slechts door een beperkt aantal deskundigen gevalideerd in de tweede fase van de delphi enquete. Dit was het geval

voor *Echinococcus granulosus*, Epidemische hemorragische ziekte, Boviene besmettelijke pleuropneumonie, Rundertuberculose, Leishmaniose, Pest, door teken veroorzaakte Encefalitis en Dirofilariose die enkel werden gevalideerd door respectievelijk één of twee experten.

4.4. Onderlinge afhankelijkheid van sommige risicofactoren

Bepaalde risicofactoren zijn niet totaal onafhankelijk van elkaar. Bijvoorbeeld, de risicofactor betreffende de lange incubatieperiode, gedurende welke een dier asymptomatisch is maar wel in staat is om de ziekte over te dragen en een uitbraak te veroorzaken, is niet totaal onafhankelijk van de risicofactor betreffende de asymptomatische dragers van de ziekte. Een andere voorbeeld betreft de aanwezigheid van vectoren, die niet totaal onafhankelijk is van de klimaatveranderingen. Een laatste voorbeeld betreft “de epidemiologische rol van in het wild levende fauna” omdat deze risicofactor kenmerken omvat die gerelateerd zijn aan de risicofactor “reservoirdieren”.

5. Conclusies en aanbevelingen

Een inventaris van 33 risicofactoren voor opkomen van dierenziekten werd opgesteld. Deze risicofactoren werden bij meerdere scenario’s gerangschikt volgens hun belang op het opkomen van deze ziekten. In **bijlage 11** werden voor elk scenario van rangschikking de drie (willekeurige keuze van het aantal 3) belangrijkste risicofactoren hernomen. Het voorkomen van deze risicofactoren werd voor alle scenario’s geteld en de zes (willekeurige keuze van het aantal 6) meest voorkomende risicofactoren worden hierna in dalende volgorde vermeld :
- de aanwezigheid van reservoirdieren,
- problemen om het opkomen van ziekten op te sporen,
- moeilijkheden om de ziekte door vaccinatie te beheersen,
- de uitbreiding van de geografische spreiding van de ziektekiem,
- het voorkomen van asymptomatische dragers,
- de toename van de incidentie van de dierenziekte in andere landen.

Enkel deze zes meest voorkomende risicofactoren worden hier verder toegelicht wat niet wegneemt dat ook de andere risicofactoren belangrijk kunnen zijn.

De wetgeving, de gezondheidsvoorschriften en de intensieve productiesystemen werden geïdentificeerd als beschermingsfactoren tegen het opkomen van infectieuze dierenziekten.

In deze studie werden de risico- en beschermingsfactoren monofactorieel benaderd maar vaak zijn de redenen van het opkomen van een ziekte multifactorieel en een gevolg van de combinatie van meerdere risicofactoren van opkomen. Een toename van het transport kan bijvoorbeeld leiden tot de introductie van een vectorsoort die zich in onze ecosystemen kan handhaven dankzij een tweede risicofactor, bijvoorbeeld de opwarming van het klimaat. Sommige van de risicofactoren zijn complex en kunnen meerdere deelcategorieën omvatten (zie Aanbevelingen **bijlage 12**).

Het voornaamste belang van dit werk betreft de « early warning » aangezien een detectie van het optreden of van de toename in incidentie van een risicofactor de risicomanager kan waarschuwen voor het mogelijk opkomen van nieuwe pathogene agentia. Als een belangrijke risicofactor optreedt of toeneemt zou de aandacht moeten worden gevestigd op alle ziekten waarop die risicofactor betrekking heeft. Een grote toename in de tekenpopulatie in België kan bijvoorbeeld de opkomst

aankondigen van exotische ziekten of zelfs van onbekende ziekten die aan de licht kunnen gebracht worden.
Het Wetenschappelijk Comité legde reeds rangordes vast bij te bewaken zoönosen en dierenziekten op grond van het belang ervan (advies 22-2008 over de bewaking van zoönosen overgedragen via levensmiddelen, en adviezen 26-2009 (+ addendum), 05-2010, 10-2010 en 20-2012 over de bewaking van dierenziekten in het kader van het nieuwe sanitaire beleid). De hier gehanteerde benadering is complementair aangezien hier een rangschikking van risicofactoren wordt voorgesteld.
Bijgevolg is de boodschap van dit advies om naar een aanvullende vorm van de bewaking van dierenziekten te evolueren, namelijk een meer generische monitoring van de risicofactoren die de kans op opkomende dierenziekten beïnvloeden.
Hieronder worden enkele risicofactoren weergegeven die in het kader van een monitoring gemeten (voorkomen of toename) zouden kunnen worden:

- Uitbreiding van de geografische spreiding van de infectieuze agentia, via de analyse van internationale verslagen of via deelname aan internationale netwerken (SCOFCAH, OIE, ADNS, …);
- Toename van incidentie van de nieuwe gevallen van ziekten in de andere landen, via de analyse van inernationale verslagen (al lopend op Europees niveau) of via deelname aan internationale netwerken (SCOFCAH, OIE, ADNS, …);
- Toename van het percentage geïimporteerde levende dieren en/of dierlijke producten vanuit niet vrije derde landen, per diersoort;
- Evolutie van de demografie van de in het wild levende dieren in België. Met demografie wordt de densiteit van in het wild levende dierenpopulaties verbonden aan de geografische distributie van deze populaties bedoeld. Het waarnemen van een toename van demografie van een in het wild levende diersoort zou de risicobeheerder kunnen aansporen over te gaan tot een meer gerichte bewaking van de ziekten verbonden aan deze diersoort.
- Entomologische monitoring van vectoren van ziekten (opvolging van de populaties en bewaking van de infectie door arbovirussen) voor dewelke dit nog niet bestaat (bijv. bepaalde soorten muggen, teken).

Deze lijst wordt als voorbeeld weergegeven. Een haalbaarheidstudie met betrekking tot deze aanbeveling van monitoring van meetbare factoren kan later worden uitgevoerd in overleg met de risicobeheerders in het kader van een kosten/baten studie.

Het Wetenschappelijk Comité stelt meer specifieke aanbevelingen voor, met betrekking tot het management voor risicofactoren waarvoor dat mogelijk is (bijv. problemen van opsporing van het opkomen van ziekten), ofwel op het gebied van de bewaking, de waakzaamheid en het wetenschappelijk onderzoek.

In **bijlage 12** worden de aanbevelingen per risicofactor omstandig weergegeven. Hierna worden enkele voorbeelden van aanbevelingen weergegeven die geklasseerd zijn volgens verschillende thema's maar die niet geprioritiseerd worden. Er kan later een prioritisatie worden uitgevoerd in het kader van een haalbaarheids- en kosten/baten studie in overleg met risicobeheerders.

- Bewaking

- om het opsporen van ziekten te verbeteren:
  - de waakzaamheid op het terrein stimuleren voor wat betreft de detectie van dierenziekten en abnormale situaties, via bijvoorbeeld continue opleiding van dierenartsen, informatie aan de veehouders, enz.;

- een officieel systeem van peilpraktijkdierenartsen oprichten, zoals dit bestaat in de humane geneeskunde (Lobet *et al*., 1987; Stroobant *et al*., 1988);
- moleculaire epidemiologische bewaking van geïsoleerde ziektekiemen uitvoeren om genetische variaties op te sporen;

o vectoren :
  - de vectorpopulaties monitoren om toenames van de populaties te detecteren en om besmettingen door pathogene agentia op te sporen;
  - de vectoriële ziekten bewaken waarvan de vectorpopulatie toeneemt;

o serotheken[6] samenstellen van meerdere diersoorten met het oog op serologische analyses;

o Opvolgen van de status van de dierlijke gezondheid op internationaal vlak (waarschuwingen, wetenschappelijke literatuur, vergaderingen, symposia, niet-officiële bronnen, enz.);

o De sector van de hobbyhouders bewaken;

- Wetenschappelijk onderzoek

o de kwaliteit van de diagnostische tests verbeteren (gevoeligheid, termijnen, aspecifieke reacties);

o Onderzoek naar en ontwikkeling van vaccins;

o Alternatieve behandelingen voor de beperkingen op het toepassen van antibiotica en vaccins ontwikkelen;

o Wetenschappelijke studie uitvoeren van de contactnetwerken tussen (gedomesticeerde, wilde) dieren en risicogebaseerde bewaking opdrijven in de hot spots van die contactnetwerken;

o niet-specifieke multivalente screeningtests ontwikkelen om nieuwe onbekende ziekten op te sporen;

- Bioveiligheid

o Op bedrijfsniveau : het compartimenteren van diersoorten optimaliseren om overdracht van dierenziekten tussen verschillende gedomesticeerde diersoorten, alsook tussen gedomesticeerde diersoorten en in het wild levende dieren, te vermijden;

o Handel en vervoer:
  - informatie over bioveiligheid aan reizigers verstrekken (bijv. verbieden om vleesproducten of levende dieren in te voeren vanuit derde landen);
  - biociden in vervoermiddelen gebruiken ;
  - het vervoer (grenzen, GIP, havens, luchthavens), de intracommunautaire handel, en de importen verder controleren;

- Wetgeving

[6] Serotheken zijn banken van sera die tijdens meerdere jaren bij dieren van verschillende soorten verzameld worden en die worden gearchiveerd met het oog op retroactieve epidemiologische enquête in geval van opkomen van een dierenziekte.

- om de aangifte van ziekten door de terreinactoren (veehouders en dierenartsen) te verbeteren:
  - financiële compensaties en/of beloningen voor de opsporing van de « index case (eerst geval van een opkomende ziekte)»;
  - in geval van verdenking, de tijdelijke controlemaatregelen na de aangifte beperken tot het laboratoriumresultaat bevestigd is, om op die manier de drempel tot aangifte te verlagen (zie advies 12-2010 van het wetenschappelijk Comité voor meer uitleg);
  - een sociologische analyse uitvoeren naar de relaties tussen de terreinactoren (veehouders en dierenartsen) en het Agentschap om oplossingen te vinden voor het probleem van onderrapportering van ziekten. Op die manier zal het Agentschap concrete acties kunnen ontwikkelen om het vertrouwen met de operatoren te verbeteren.

- Wat import betreft:
  - herevaluatie van de Europese wetgeving uitgaande van risicobeoordeling bij import;

Voor het Wetenschappelijk Comité,

De Voorzitter,
Prof. Em. Dr. Pharm. C. Van Peteghem (Get.)

Brussel, 07/03/2013

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Wettelijk kader van het advies

Wet van 4 februari 2000 houdende oprichting van het Federaal Agentschap voor de Veiligheid van de Voedselketen, inzonderheid artikel 8;

Koninklijk besluit van 19 mei 2000 betreffende de samenstelling en de werkwijze van het Wetenschappelijk Comité ingesteld bij het Federaal Agentschap voor de Veiligheid van de Voedselketen;

Huishoudelijk reglement, bedoeld in artikel 3 van het koninklijk besluit van 19 mei 2000 betreffende de samenstelling en de werkwijze van het Wetenschappelijk Comité ingesteld bij het Federaal Agentschap voor de Veiligheid van de Voedselketen, goedgekeurd door de Minister op 09 juni 2011.

Disclaimer

Het Wetenschappelijk Comité behoudt zich, te allen tijde, het recht voor dit advies te wijzigen indien nieuwe informatie en gegevens ter beschikking komen na de publicatie van deze versie.

Bijlage 1. Belangrijkste kenmerken van de voor deze studie gekozen voorbeelden van ziekten

Ziekte	Etiologie	Zoö-nose	Gasthe(e)r(en)	Wijze(n) van overdracht
Ziekten die in België voorkomen, ofwel endemisch, ofwel sporadisch, en waarvoor een risico op opkomen (stijging van de incidentie) kan bestaan				
o **endemische ziekten**				
1. Boviene babesiose	*Babesia divergens* (piroplasmose)	ja	runderen	Vectorieel (teken)
2. Varkensbrucellose bij everzwijnen	*Brucella suis* type 2	Ja (type 2 << types 1 en 3)	Everzwijnen, gedomesticeerde varkens, (hazen)	Direct contact (speeksel, fecaliën, afscheidingen uit de neus), indirect contact (mechanische overdracht via besmette personen of materiaal), venerisch (sperma), besmet diervoer en water (slachtafval van besmette hazen, melk), aërosols
3. Ziekte van Lyme	*Borrelia burgdorferi*	ja	Mensen, honden, katten = toevallige gastheren	Vectorieel (teken)
4. Q-koorts	*Coxiella burnetii*	ja	Herkauwers (runderen, schapen, geiten) en andere zoogdiersoorten	Aërosols, direct contact, orale inname
5. Hantavirose	Hantavirus	ja	Gedomesticeerde en wilde knaagdieren	Contact met urine, inademen van besmet stof
6. Rundercysticercose	*Cysticercus bovis*, *Taenia saginata*	ja	Intermediaire gastheren : runderen ; definitieve gastheren : mensen	Runderen : orale inname via besmet weiland of oppervlaktewater ; mensen : eten van onvoldoende verhit rundvlees
7. Echinococcose	*Echinococcus multilocularis*	ja	Definitieve gastheren : vossen	Wilde en gedomesticeerde honden (definitieve gastheren worden besmet als gevolg van carnivorisme van besmette

			honden, (katten) intermediaire gastheren : wilde knaagdieren (paarden, everzwijnen, mensen)	knaagdieren (intermediaire gastheren). De intermediaire gastheren (knaagdieren, humanen) worden besmet bij orale inname van in de fecaliën van vossen/honden/katten uitgescheiden of in de besmette bodem (knaagdieren) en op fruit (mensen) aanwezige parasieten.
8. *E. Coli* O157:H7	*E. Coli* O157:H7 (niet de andere EHEC-serotypes)	ja	Runderen (+ andere)	Mensen : consumptie van onvoldoende verhit voedsel, direct contact met besmette dieren of met fecaliën van besmette dieren. Dieren : contact met fecaliën van besmette dieren.
o **sporadische ziekten**				
9. Rundertuberculose	*Mycobacterium bovis*	ja	Runderen*	Inademen van aërosols, contact, consumptie van besmet voedsel (rauwe melk).
10. Tularemie	*Francisella tularensis*	ja	Knaagdieren en lagomorfen **	Direct contact, vectorieel (teken), inademen van in het milieu aanwezige verontreinigingen, consumptie van onvoldoende verhit vlees of besmet water.
11. Leishmaniose	*Leishmania infantum*	ja	Vooral honden***	Vectorieel (Phlebotomiae)
12. Rabiës bij vleermuizen	Europees Lyssavirus 1 en 2	ja	Vleermuizen (wilde fauna) / andere (honden, katten, schapen, runderen,enz.)	Direct contact (speeksel, beten)
13. Anaplasmose	*Anaplasma phagocytophillum*	Ja (mens en zijn toevallige gastheren)	Een groot aantal zoogdieren (runderen, paarden, schapen, geiten, honden, katten, enz.)	Vectorieel (teken)
In België aanwezige ziekten waarvan de incidentie stijgt (vaststaande en vastgestelde opkomst)				
14. Bluetongue	Orbivirus serotype 8 + andere serotypes	neen	Gedomesticeerde en wilde herkauwers	Vectorieel (Culicoïdes) maar ook transplacentaire verticale overdracht

			(runderen, schapen)	
15. Echinococcose / Hydatidose	*Echinococcus granulosus*	ja	Definitieve gastheren : gedomesticeerde (honden) en wilde (vossen) hondachtigen; Intermediaire gastheren : schapen (runderen, geiten, varkens, wilde hertachtigen, everzwijnen, mensen)	Hondachtigen (definitieve gastheren) worden besmet door orale inname van slachtafval van besmette intermediaire gastheren (bijv. slachtafval van schapen). De intermediaire gastheren worden besmet door orale inname van met fecaliën van besmette hondachtigen verontreinigd gras of voer. De definitieve en intermediaire gastheren spelen een rol in de overdracht van de parasiet. Mensen worden toevallig besmet bij contact met besmette honden of orale inname van met fecaliën van besmette honden verontreinigd voedsel, maar spelen geen epidemiologische rol (geen overdracht van de parasiet).
16. Equine virale arthritis	Arterivirus	neen	paardachtigen	aërosol en contact (luchtwegen), sperma van chronisch besmette hengsten.
17. Necrotische enteritis bij pluimvee	*Clostridium perfringens* (alleen enkele voor pluimvee specifieke toxinotypes A van *C. perfringens* worden hier in aanmerking genomen)	Neen ****	pluimvee*****	*C. perfringens* toxinotype A is ubiquitair en comensaal van het maagdarmkanaal van pluimvee dat asymptomatische drager is. Men weet niet hoe de bacteriën van de normale darmflora pathogeen worden. Men veronderstelt dat de ontwikkeling van de pathologie (enterotoxemie) te wijten is aan nutritionele factoren.
18. Atypische TSE (kleine herkauwers)	prionen	neen	herkauwers	Voeder, direct (in geringe mate), vanuit het milieu
19. Atypische myopathie bij paardachtigen	onbekend	neen	paardachtigen	Onbekend (weiland) ; geen bewijs van overdracht van een infectieuze agens
Niet in België aanwezige (exotische) ziekten met risico van introductie en verspreiding in België (mogelijk (her-)opkomende ziekten of met risico van (her-)opkomst)				
20. Mond- en klauwzeer	Aphtovirus	neen	Runderen, varkens, geiten, schapen	Overdracht via de lucht (10 km, mogelijk vanuit Frankrijk naar het Verenigd Koninkrijk), direct contact (urine,

				sperma, fecaliën, speeksel), indirect contact (virus is zeer resistent in buitenmilieu, voertuigen, mensen die contact hebben met dieren, enz.)
21. Afrikaanse varkenspest	Asfivirus	neen	Varkens, gedomesticeerde en wilde everzwijnen	Direct contact, aërosols, indirect contact, vectorieel (zachte teken)
22. Klassieke varkenspest	Pestivirus	neen	Varkens, gedomesticeerde en wilde everzwijnen	Direct contact, aërosols, indirect contact
23. West-Nijlkoorts	Flavivirus	ja	Vogels, paarden, runderen, een groot aantal gedomesticeerde en wilde zoogdieren	Vectorieel (muggen, teken)
24. Riftdalkoorts	Bunyaviridae, Phlebovirus	ja	Gedomesticeerde en wilde herkauwers (runderen, schapen, geiten)	Vectorieel (muggen), direct contact met besmette weefsels (veehouders, dierenartsen)
25. Epidemische hemorragische ziekte	Orbivirus	neen	Runderen en wilde herkauwers (hertachtigen)	Vectorieel (Culicoïdes)
26. Chronic wasting disease bij hertachtigen (TSE)	prionen	neen	Gedomesticeerde en wilde hertachtigen	Voeding, persistentie in de bodem
27. Boviene besmettelijke pleuropneumonie	*Mycoplasma mycoides* subsp. *mycoides* variant Small Colony	neen	Gedomesticeerde runderen	Direct contact of aërosol op korte afstand
28. Hoogpathogene aviaire influenza	Influenzavirus subtype H5N1	ja	Gedomesticeerde en wilde vogels, varkens	Direct contact, aërosol

29. Cysticercose bij varkens	*Cysticercus cellulosae*, *Taenia solium*	ja	Intermediaire gastheren : gedomesticeerde varkens en wilde everzwijen ; definitieve gastheren : mensen	Varkens : orale inname van besmet keukenafval of van menselijke excrementen; Mensen : eten van onvoldoende verhit varkensvlees; Ook mogelijke intermenselijke cyclus : orale inname door mensen van met menselijke excrementen besmet(te) water, groenten of fruit
30. Klassieke rabiës (carnivoren)	Lyssavirus genotype 1	ja	Gedomesticeerde en wilde carnivoren, runderen, andere zoogdieren	Diect contact (speeksel, beet)
31. Pest	*Yersinia pestis*	ja	Gedomesticeerde en wilde knaagdieren (vooral ratten), katten, (konijnen, hazen)	Vectorieel (vlooien) (ratten → mens; mens → mens), inademen (mens → mens), contact, beten, krabben (kat → mens), orale inname (knaagdieren → katten)
32. Door teken veroorzaakte encefalitis	Virus van de TBE-groep (Flaviviridae)	ja	Vooral mensen en sylvatische soorten, runderen	Vectorieel (teken), van besmette runderen afkomstige melk
33. Atypische BSE	prionen (type H en type L)	ja	runderen	voeding
34. Dirofilariose	*Dirofilaria*	Ja ******	Gedomesticeerde en wilde hondachtigen	Vectorieel (muggen)

* Maar ook veel gedomesticeerde en wilde dieren (schapen, geiten, paarden, varkens, everzwijnen, honden, katten, vossen, dassen, ratten, fretten, herten, enz.).

** Knaagdieren en lagomorfen zijn het meest gevoelig en vormen het reservoir van de ziekte. Alle diersoorten alsook vogels, amfibieën en ongewervelde dieren kunnen gevoelig zijn.

*** Maar ook een groot aantal gedomesticeerde en in het wild levende diersoorten.

**** Mensen worden slechts besmet door bepaalde stammen van *C. perfringens* van toxinotype A die enterotoxinen produceren en die verschillen van de stammen die bij pluimvee enterotoxemie veroorzaken. Bij mensen zijn die stammen van toxinotype A vooral verantwoordelijk voor gasgangreen en collectieve voedseltoxi-infecties.

***** enterotoxemie bij pluimvee, runderen en varkens wordt veroorzaakt door verschillende stammen van het toxinotype A van *C. perfringens* (gastheerspecificiteit). In deze oefening worden alleen de stammen die pluimvee aantasten in aanmerking genomen

***** af en toe in endemische gebieden.

Bijlage 2 : Exceltabel met dubbele ingang (risicofactoren en ziekten)

Risk factors of animal disease emergence in Belgium

	Risk factors	A. Prevalent diseases (Belgium): endemic or sporadic									
		endemic									
		Bovine babesiosis (*Babesia divergens*)		Porcine brucellosis (boar) (*Brucella suis* type 2)		Lyme disease (*Borrelia burgdorferi*)		Q fever (*Coxiella burnetii*)		Hantavirosis (Hantavirus)	
	level of expertise (1, 2, 3 or 4)										
		Yes / No	"+", "-", "0"	Yes / No	"+", "-", "0"	Yes / No	"+", "-", "0"	Yes / No	"+", "-", "0"	Yes / No	"+", "-", "0"
	1. Factors related to the infectious agent										
1.1.	Genetic variability (mutation, recombination, etc.)										
1.2.	Lack of knowledge of pathogenesis										
1.3.	Change in pathogenesis (= change in development of the disease in the host) (e.g., increase in virulence, prolonged incubation period, variation in interaction host-pathogen)										
1.4.	Difficulty to control disease by vaccination										
1.5.	Possibility to change the host spectrum from one animal species to another animal species (species barrier)										
1.6.	Possibility to change the host spectrum from animals to humans										
1.7.	Extension in geographical distribution of the agent										
1.8.	Increase in incidence (new cases) in another country(ies)										
1.9.	Persistance of the agent in the environment										
	2. Factors related to human (activity)										
2.1.	Legislation/sanitary policy										
2.2.	Change in technological or industrial processes										
2.3.	Problem of detection of emergence (e.g. difficult declaration of the disease by farmers, weak performance of diagnostic tests)										
2.4.	Increase in interactions between animal compartments (populations)										
2.5.	Increase in interactions between animal and human populations										
2.6.	Human demographic growth										
2.7.	Growth of the animal population concerned by the disease										
2.8.	Globalisation: increase in travel										
2.9.	Globalisation: increase in tourism										
2.10.	Globalisation: increase in trade										
2.11.	Globalisation: increase in transport										
2.12.	Globalisation: increase in terrorism										

Bijlage 3. Detailgegevens over de verdeling van de deskundigen over de gekozen voorbeelden van ziekten

Alle vermelde deskundigen namen deel aan de eerste fase van de Delphi-enquête. De deskundigen die ook deelnamen aan de tweede fase zijn vetgedrukt. De plaats van de kruisen in de tabel geeft de door de deskundigen behandelde ziekten aan.

	Ziekten																																					
Expert	**Babesiose bij runderen**	**Varkensbrucellose**	**Ziekte van Lyme**	**Q-koorts**	**Hantavirose**	**Cysticercose bij rundren**	**E. multilocularis**	**Rundertuberculose**	**Tularemie**	**Leishmaniose**	**Rabiës bij vleermuizen**	**E. Coli O157:H7**	**Anaplasmose**	**Bluetongue**	**Echinococcus granulosus**	**Equine virale arthritis**	**Clostridium perfringens**	**Atypische TSE (kleine herkauwers)**	**Atypische myopathie bij paardachtigen**	**Mond- en klauwzeer**	**Afrikaanse varkenspest**	**Klassieke varkenspest**	**West-Nijlkoorts**	**Riftdalkoorts**	**Epidemische hemorragishce ziekte**	**Chronic wasting disease bij hertachtigen**	**Boviene besmettelijke pleuropneumonie**	**Hoogpathogene aviaire influenza**	**Cysticercose bij varkens**	**Klassieke rabiës (carnivoren)**	**Pest**	**Door teken veroorzaakte encefalitis**	**Atypische BSE**	**Dirofilariose**	**TOTAAL**
Expert 1																			x				x														**2**
Expert 2			x			x				x										x	x	x		x			x		x								**9**
Expert 3					x						x												x							x							**4**
Expert 4	x													x																							**2**
Expert 5																x						x															**2**
Expert 6							x								x																							**2**
Expert 7	x						x								x														x						x		**5**
Expert 8												x																										**1**
Expert 9		x		x									x	x								x																**5**
Expert 10														x									x															**2**
Expert 11			x			x	x	x	x			x			x		x	x								x			x								**11**
Expert 12														x						x				x	x													**4**
Expert 13														x																								**1**
Expert 14	x																		x																			**2**
Expert 15																				x		x						x										**3**
Expert 16						x	x					x																										**3**
Expert 17				x								x																										**2**
Expert 18						x	x								x														x									**4**
Expert 19	x	x	x														x																					**4**
Expert 20			x		x																																	**2**
Expert 21		x		x					x																													**3**
Expert 22						x	x						x		x														x									**5**
Expert 23														x														x										**2**
Expert 24								x																														**1**
Expert 25	x												x	x																								**3**
Expert 26																	x																					**1**
Expert 27														x									x															**2**
Expert 28					x								x																									**2**
Expert 29												x					x																					**2**
Expert 30				x					x			x																										**3**
Expert 31																					x	x																**2**

Expert 32			x	x													x															**3**
Expert 33	x					x	x			x			x		x														x			x	**8**
Expert 34		x																			x											**2**
Expert 35														x														x		x			**3**
Expert 36														x						x													**2**
Expert 37																x				x	x	x											**4**
Expert 38			x									x																					**2**
Expert 39				x														x													x		**3**
Expert 40				x																		x											**2**
Expert 41																		x								x						x	**3**
Expert 42	x	x						x	x					x				x								x							**7**
Expert 43					x						x			x		x		x		x	x	x	x	x	x	x		x		x		x		**15**
Expert 44																							x					x						**2**
Expert 45							x				x																			x				**3**
Expert 46																		x								x						x		**3**
Expert 47						x	x																						x					**3**
Expert 48																			x				x											**2**
Expert 49		x																													x			**2**
Expert 50																							x	x										**2**
Totaal fase 1	**7**	**6**	**6**	**7**	**4**	**7**	**9**	**3**	**4**	**2**	**3**	**7**	**5**	**12**	**6**	**3**	**5**	**6**	**3**	**6**	**4**	**9**	**8**	**4**	**2**	**5**	**1**	**5**	**7**	**4**	**1**	**2**	**2**	**2**	
Totaal fase 2	**4**	**5**	**5**	**4**	**3**	**4**	**4**	**1**	**3**	**0**	**3**	**6**	**4**	**9**	**2**	**3**	**5**	**4**	**3**	**4**	**4**	**8**	**8**	**3**	**1**	**4**	**1**	**5**	**3**	**4**	**1**	**1**	**2**	**0**	

Bijlage 4. Gebruiksaanwijzing voor fase 1 van de enquête

Geachte expert,

U hebt zich bereid verklaard om mee te werken aan een studie van het Wetenschappelijk Comité van het Federaal Agentschap voor de Veiligheid van de Voedselketen (FAVV) die tot doel heeft **de risicofactoren in verband met het opduiken van dierenziekten in België te identificeren**. De leden van de werkgroep danken u bij voorbaat voor uw wetenschappelijke bijdrage.

Binnen het bestek van deze studie wordt de volgende definitie van « opduikende ziekte » gehanteerd : ziekte waarvan de reële incidentie (aantal nieuwe gevallen) significant stijgt binnen een welbepaalde populatie in een welbepaalde streek en tijdens een welbepaalde periode, in vergelijking met de epidemiologische toestand die deze ziekte gewoonlijk vertoont. Deze definitie omvat niet de seizoensgebonden verschillen in incidentie.

De werkgroep die voor deze studie verantwoordelijk is, besloot te werken op basis van een **lijst van voorbeelden** van dierenziekten.
Er werden 32 **dierenziekten** uitgekozen en verdeeld over een aantal groepen en deelgroepen (zie Excel document, blad Risk factors) :
(1) ziekten die in België voorkomen, ofwel endemisch, ofwel sporadisch (en voor welke een risico van opduiken kan bestaan);
(2) ziekten waarvan wordt vastgesteld dat ze in België opduiken, en
(3) ziekten die niet voorkomen in België (exotische) en waarvoor het risico bestaat dat ze in België worden binnengebracht en zich verspreiden (potentieel opduikende ziekten).
Gelijklopend daarmee selecteerde de werkgroep 33 **risicofactoren** en deelde ze in over 4 groepen (zie Excel document, blad Risk factors) :
(1) factoren die gerelateerd zijn aan de kiem ;
(2) factoren die gerelateerd zijn aan de mens (en zijn activiteit) ;
(3) factoren die gerelateerd zijn aan de dieren, en
(4) factoren die gerelateerd zijn aan veranderingen in het milieu.
In het Excel document zijn een aantal verklaringen betreffende bepaalde risicofactoren weergegeven onder de vorm van commentaren toegevoegd bij de cellen (rode driehoek). Om de commentaren te kunnen lezen, gelieve de cursor in de cel te plaatsen > rechter muisklik > tonen opmerking.

De bedoeling van deze oefening bestaat erin om, van de 33 voorgestelde factoren, deze **aan te duiden** die **risicofactoren** zijn **voor** of **beschermende factoren** zijn **tegen** het opduiken van de verschillende dierenziekten of die hierop geen invloed hebben. De bedoeling bestaat er ook in de omvang te kwantificeren van de invloed van de risico- (of beschermings-) factoren op het opduiken van die ziekte(n).

Er wordt u sterk aanbevolen om deze handleiding en de **instructies** in het Excel document (blad « Instructies ») volledig te lezen voordat u met de oefening begint.

Met het oog op de latere statistische verwerking van de gegevens is het noodzakelijk dat elke expert de tabel voor minimum twee ziekten invult. Er wordt u daarom gevraagd om deze oefening te doen voor de ziekte(n) die u voorgesteld is(zijn) (in het rood in het Excel document, pagina Risk factors) alsook voor elke andere ziekte van uw keuze. Er wordt u tevens gevraagd om uw expertiseniveau te kwalificeren voor elke van deze ziekten (1: lage expertise; 2: matige expertise; 3: grote expertise; 4: zeer grote expertise; lijn 7 in het Excel document, pagina Risk factors).

Opdat elke expert de oefening op dezelfde manier zou interpreteren, wordt u gevraagd om bij het beantwoorden van de vragen u te baseren op de **huidige kennis**, hierbij alleen rekening houdend met het opduiken van **dieren**ziekten (en niet met het opduiken van ziekten bij mensen in het geval van zoönose) en alleen in **België** (en bijvoorbeeld niet in Europa).

Met het oog op een maximale objectiviteit wordt u aangeraden om de Excel tabel in verticale richting af te werken (per afzonderlijke ziekte).

De **eerste vraag** is:
Is de factor thans in België aanwezig voor de betreffende ziekte? Antwoord “ja” (aanwezigheid van de factor) of “nee” (afwezigheid van de factor) in de gele kolom met behulp van het rolmenu.
Er wordt gevraagd te antwoorden op deze vraag onafhankelijk van de aanwezigheid of de afwezigheid van de ziekte op dit moment in België. Een risicofactor kan inderdaad aanwezig zijn in België zonder dat de ziekte er aanwezig is.

De **tweede vraag** is o**nafhankelijk** van het antwoord op de eerste vraag.
- Doet de factor het risico voor het opduiken van de betreffende ziekte afnemen ? Indien het antwoord “ja” is, dan gaat het om een **beschermingsfactor**. Vul « - » in in de blauwe kolom van de Excel tabel met behulp van het rolmenu;
- Doet de factor het risico voor het opduiken van de betreffende ziekte toenemen? Indien het antwoord “ja” is, dan gaat het om een **risicofactor**. Vul « + » in de blauwe kolom van de Excel tabel in;
- Heeft de factor geen invloed op het opduiken van de betreffende ziekte? In dit geval, vul « 0 » in.

Het antwoord op de tweede vraag moet gebeuren onafhankelijk van het antwoord op de eerste vraag. Met andere woorden, zelfs als de factor op het moment niet aanwezig is in België, moet u toch de tweede vraag beantwoorden, afgaand op een theoretische situatie, namelijk dat de factor voorkomt.

Het is noodzakelijk de tweede en de derde vraag samen te beantwoorden.

Voor wat betreft exotische ziekten die op dit moment niet aanwezig zijn in België (C. Diseases at risk of introduction and dissemination in Belgium), moet de invloed van de factor op het risico van het opkomen van de ziekte in België beschouwd worden.

Ten derde (blauwe kolommen, in te vullen samen met de tweede vraag) wordt u gevraagd om het **belang van de invloed** van elk van deze factoren op het opduiken van deze dierenziekten te **kwantificeren** d.w.z. volgens de hierna weergegeven scoretabel de kracht te ramen van de relatie tussen de factor en het risico van opduiken (of bescherming tegen opduiken) van de dierenziekte :

De invloed die de factor heeft op het opduiken van de dierenziekte is …	risicofactor	beschermings-factor
klein	+	-
gemiddeld	++	- -
groot	+++	- - -
zeer groot	++++	- - - -

(Als u een « 0 » had ingevuld, betekent dit dat de factor geen invloed heeft op het opduiken van de ziekte en dat u dus niet moet kwantificeren).

Aandachtspunten :
- de keuze van de antwoorden gebeurt met behulp van de lijsten in het rolmenu;
- om u te helpen om de factoren van de lijst te interpreteren, vindt u in bijlage een literatuurlijst over risicofactoren voor opduikende ziekten;
- indien nodig en/of van toepassing kunt u uw keuze verantwoorden of toelichten door een commentaar in te vullen (plaats de cursor in de cel en klik in het menu “Invoegen”, op « Opmerking »). U kunt ook bibliografische verwijzingen invullen met deze commentaarfunctie. Op het einde van elke regel en onderaan elke kolom van de tabel is er ook ruimte waarin u uw commentaar of suggesties kwijt kunt;
- gelieve geen vakken leeg te laten. In geval van twijfel, gelieve te antwoorden en een commentaar toe te voegen.

Na een eerste analyse van de ontvangen resultaten zal u een feed-back gegeven worden.

De resultaten van deze studie zullen de werkgroep in staat stellen om voor elke ziekte, voor elke groep van ziekten (bijv. potentieel opduikende ziekten) of in het algemeen voor alle ziekten (risico-/beschermings-)factoren te identificeren. De kwantificering van de factoren zal het mogelijk maken ze naar belang te rangschikken. Zo kan het Wetenschappelijk Comité dan een advies uitbrengen met aanbevelingen in verband met « early warning », waakzaamheid, toezicht, monitoring, bestrijding, enz.

De resultaten van deze studie zullen enerzijds dienen als basis voor het uitbrengen van een advies van het Wetenschappelijk Comité en zullen anderzijds worden gebruikt voor een wetenschappelijke publicatie. Wij rekenen dus ook op uw medewerking in verband met het vertrouwelijk behandelen van dit dossier. Als u hiertegen geen bezwaar hebt zullen wij uw naam vermelden in het advies van het Wetenschappelijke Comité, bij de experts die eraan hebben meegewerkt.

Wij willen, indien mogelijk, uw resultaten graag ontvangen tegen **1 juni 2009**.

Als u wenst kunnen wij u met de post een papieren versie van het Excel document toezenden om de oefening te vergemakkelijken.

Aarzel niet om, als u nog vragen hebt, contact op te nemen met Dr. Sabine Cardoen (sabine.cardoen@afsca.be - 02/211.87.01), of met Dr. Xavier Van Huffel (xavier.vanhuffel@favv.be - 02/211.87.20).

De leden van de werkgroep danken u bij voorbaat voor uw bereidwilligheid,

Prof. E. Thiry, Dr. K. Dierick, Prof. D. Berkvens, Dr. H. Imberechts, Prof. R. Ducatelle, Prof. C. Saegerman, Dr. J. Dewulf, Dr. T. van den berg, Dr. P. Heinen, Dr. X. Van Huffel en Dr. S. Cardoen.

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Vorou R.M., Papavassiliou V.G. and Tsiodras S. Emerging zoonoses and vector-borne infections affecting humans in Europe. Epidemiol. Infect., 2007, 135, 1231-47.

Bijlage 5. Schema met de vragen van fase 1

Risk factors of emergence of animal diseases in Belgium

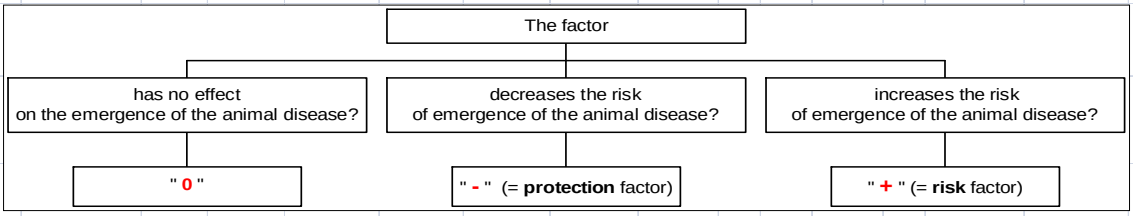
Scientific Committee of the Federal Agency for the Security of the Food Chain (FAFSC)

Working group: E. Thiry, D. Berkvens, H. Imberechts, K. Dierick, C. Saegerman, R. Ducatelle, T. van den Berg, J. Dewulf, X. Van Huffel, P. Heinen, S. Cardoen.

Instructions for page 2 (Risk factors):

1. Yellow columns: for each disease for which you make the exercise, answer the following question: Is the factor present (yes) or absent (no) for the concerned disease at the present time in Belgium ?

2. Blue columns: for each disease for which you make the exercise, answer the questions in the table below, based on the CURRENT knowledge, considering emergence of ANIMAL diseases IN BELGIUM, and theoretically (i.e. independently from the answer on question 1):



If necessary / if applicable, justify your choice by introducing a comment (Menu Insertion > Comment) at the cell : ++

3. Blue columns: for each positive ("+") (or negative ("-")) answer, weight the importance of the risk factor (+, ++, +++ or ++++) (or of the protection factor (-, --, --- or ----)) for the emergence of the disease:

		The relation/influence between/of the (risk or protection) factor and/on the emergence of the animal disease is:
"+"	"-"	low
"++"	"- -"	moderate
"+++"	"- - -"	high
"++++"	"- - - -"	very high

4. Line 7: estimate your own level of expertise for each disease for which you completed the exercise:

1	weak
2	moderate
3	high
4	excellent

Bijlage 6. Voorbeeld van voorstel van consensus als basis voor fase 2 van de Delphi-enquête
Voorbeeld : West-Nijlkoorts.

1. Factors related to the infectious agent			
Genetic variability (mutation, recombination, etc.)	yes	"++"	There exist more virulent strains. For example the severity of the expansion in the USA was due to (1) the immunologically naive status of the US population and (2) a particularly virulent strain. Genetic variability is a risk factor if the
Lack of knowledge of pathogenesis	yes	"++"	There is lack of knowledge of the pathogenesis which could explain some emergences: for example, the poorly known role of vectors in the cycle maintenance-dissemination of the virus, the molecular determinism of the
Change in pathogenesis (= change in development of the disease in the host) (e.g., increase in virulence, prolonged incubation period, variation in interaction host-pathogen)	yes	"+++"	There are changes in pathogenesis depending on the genetic variability. For example, the American strain is more virulent than the European one. The change of pathogenesis is a risk factor for emergence.
Difficulty to control disease by vaccination	yes	"++"	There is an available and authorized vaccine for horses in Belgium, but vaccination of the horses will not control emergence since horses are dead-end hosts. Vaccination of (wild) birds is impossible. Difficulty to vaccinate
Possibility to change the host spectrum from one animal species to another animal species (species barrier)	yes	"+++"	The virus can infect numerous receptive bird species which are capable to transmit the virus effectively. This is a risk factor for emergence. The virus can also infect other mammals, but these are dead-end hosts which do not contribute to the propagation of the disease and consequently have no
Possibility to change the host spectrum from animals to humans	yes	"++++"	The disease is transmissible to humans, and this is a risk factor for emergence of the disease in the human population. But since humans are dead-end hosts, this has no influence on the risk for emergence and
Extension in geographical distribution of the agent	yes	"++++"	There are more and more cases in the South of France, Italy, Hungary, Romania and recently in Austria. The emergence in the North of Europe is a
Increase in incidence (new cases) in another country(ies)	yes	"+++"	There is an increase in incidence in the South of France, Italy, Hungary, Romania, Austria. This is a risk factor for emergence in Belgium.
Persistence of the agent in the environment	no	"0"	The virus can not persist in the environment outside the vector. Even if it was able to persist in the environment, this should have no influence of the risk for

Bijlage 7. Verklarende brief voor fase 2

Beste expert,

Vorig jaar heeft u een vragenlijst ingevuld over de risicofactoren van opkomende dierenziekten, in het kader van een door het Wetenschappelijk Comité van het FAVV voorgestelde Delphi enquête, en dit voor de volgende dierenziekten:

- Ziekte 1
- Ziekte 2
- Ziekte 3
- Enz.

Verscheidene andere experten hebben deze vragenlijst eveneens ingevuld voor dezelfde ziekten en alle antwoorden werden geanalyseerd.

De tweede (en laatste) fase van deze Delphi studie bestaat erin een consensus te vinden tussen de scores gegeven door de verschillende experten.

Een voorstel van consensus kunt u in het bijgaande Excel document terugvinden. De consensus houdt rekening met de ontvangen antwoorden van de experten. Omdat er soms interpretatie problemen zijn vastgesteld bij de eerste fase van de Delphi enquête, is aan het voorstel van consensus een wetenschappelijke argumentatie toegevoegd teneinde meer informatie te verschaffen over de achtergrond van de scores.

Wij verzoeken u de voorstellen van de consensus scores en de wetenschappelijke argumentatie te valideren en/of er een commentaar aan toe te voegen op de gele lijnen? Indien u deze opdracht aanvaard verzoeken wij u, het Excel document voor 31 maart terug te sturen. Gelieve ons eveneens op de hoogte te brengen indien u aan deze tweede ronde van de enquête niet meer wenst deel te nemen.

Om u de inhoud en de principes dan deze Delphi studie terug in herinnering te brengen maken wij u, in bijlage, de gebruiksaanwijzing terug over, die wij u bij de vorige ronde hadden overgemaakt.

De term « opkomende dierenziekte » moet in deze enquête algemeen worden geïnterpreteerd : stijging van incidentie ; introductie en bevestiging in België als de ziekte exotisch is ; verspreiding als de ziekte al aanwezig is, etc.

Samenvattend hebt u tijdens de eerste fase twee vragen onafhankelijk van elkaar beantwoord :

- in de gele kolom : is de factor in kolom B op dit ogenblik aanwezig in België voor de beschouwde dierenziekte ? « Yes » of « No ». De vraag « is de factor een risicofactor ? » dient hier niet beantwoord te worden want deze vraag is het voorwerp van de blauwe kolom.
- in de blauwe kolom : (onafhankelijk van het antwoord op de eerste vraag, dus onafhankelijk van de huidige aanwezigheid of afwezigheid van de factor, en in de veronderstelling dat de factor bestaat): is de factor een risicofactor voor het opkomen van de dierenziekte (met kwantificatie: +, ++, +++ of ++++), of daarentegen eerder een beschermende factor tegen het opkomen van de dierenziekte (met kwantificatie: : -, --, --- of ----), of heeft de factor geen invloed op het opkomen van de dierenziekte (« 0 ») ?

Het onafhankelijk antwoorden op deze twee vragen zal ons toelaten de juiste conclusies te trekken.

Bijvoorbeeld, indien een factor op dit ogenblik aanwezig is in België (« Yes ») en als deze factor een risicofactor is (« ++ »), dan moeten wij meteen waakzaam zijn op de mogelijkheid van het opkomen van de ziekte.

Bijvoorbeeld, indien een factor tegenwoordig afwezig is (« No ») en als het bovendien een risicofactor zou zijn (« +++ ») in geval van aanwezigheid, dan zullen wij deduceren dat, wanneer deze factor zou verschijnen, men waakzaam zou zijn op de mogelijkheid van opkomen van de ziekte.
Bij voorbeeld, indien een factor aanwezig is (« Yes ») en als het om een beschermingsfactor ("---") gaat, dan zal men waakzaam moeten zijn wanneer het zou verdwijnen.
Etc.

De resultaten van deze studie zullen verwerkt worden in een advies van het Wetenschappelijk Comité alsook gepubliceerd worden in een wetenschappelijk tijdschrift.

De werkgroep dank u bij voorbaat voor uw bereidwillige medewerking,
E. Thiry, K. Dierick, D. Berkvens, H. Imberechts, R. Ducatelle, C. Saegerman, J. Dewulf, T. van den Berg, X. Van Huffel en S. Cardoen.

Bijlage 8. Kwalificatieve detailopgave (wetenschappelijke verantwoording) van de invloed van de risico- / beschermingsfactoren op de bestudeerde dierenziekten

Het nummer staat voor het nummer van de risicofactor zoals weergegeven in de tekst (punt 2.2, stap 2).

Babesiose bij runderen (*Babesia divergens*)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	There are at this moment no indications for genetic variability of the causative agent. A genetic variability would have no influence on the risk for emergence of this disease.
2.	no	"++"	There is no lack of knowledge on the pathogenesis. Lack of knowledge on the pathogenesis is always a risk factor for emergence of the disease (for example, lack of detection of the disease).
3.	No	"++"	There are no changes in the pathogenesis, which represent a protection factor against the emergence of the disease. Changes in the pathogenesis would represent a risk factor for emergence of the disease.
4.	yes	"+++"	No vaccines available in Belgium. There are live vaccines which have provoked outbreaks with passage of the species barrier. Inactivated vaccines are harmless but are less efficient than live vaccines. These difficulties represent a risk factor for emergence of the disease.
5.	No	"+"	The parasite is able to infect several types of mammals, but these are resistant and are not considered as reservoirs and have no epidemiological role. So, there is no passage of the species barrier. The possibility to cross the species barrier and to infect a non resistant animal species would represent a risk factor for emergence.
6.	Yes	"0"	The parasite is zoonotic (especially dangerous for splenectomized persons). But this has no influence on the risk for emergence of the disease in animals because humans do not retransmit the parasite and do not play an epidemiological role.
7.	yes	"+++"	There is a geographical expansion of the disease: the disease is now enzootic in France and in the South of Belgium. The vector (Ixodes ricinus) can extend to more than 1500m of height in the Alps. This represents a risk factor for emergence of the disease.
8.	yes	"++"	There is an increase in incidence of the disease in other countries and this represent a risk factor for propagation and emergence of the disease in Belgium.
9.	no	"0"	The bacteria is not capable to persist in the environment (outside the vectors). If the bacteria was capable to persist in the environment outside the vectors, this would have no influence on the risk for emergence because the transmission of the bacteria needs the action of a vector bite.
10.	no	"0"	There is no legislation/ sanitary policy concerning this disease. Such measure would have no influence on the risk for emergence because the disease is tick-borne, and ticks are difficult to control.

11.	No	"0"	The disease is not concerned by the changes in the technological or industrial processes.
12.	Yes	"+++"	The lack of mandatory declaration might delay the detection of emergence. There can exist difficulties of diagnostic in non endemic regions (difficulties of detection). A lack of detection of the presence of the disease represent a risk factor for emergence of the disease.
13.	yes	"++"	There are increases in interactions between cattle and ticks, whose population increases and expand. This represents a risk factor for emergence of the disease.
14.	no	"0"	There are no increases in contacts between humans and cattle. An increase in contacts would have no influence of the risk for emergence because contacts are not necessary for the transmission of this tick-borne infection.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic growth.
16.	no	"+"	There is no growth of the cattle population in Belgium. An increase would represent a little risk factor for emergence of the disease.
17.	yes	"0"	Human traveling is increasing, but this has no influence on the risk for emergence of the disease in the bovine population.
18.	yes	"0"	Human tourism is increasing, but this has no influence on the risk for emergence of the disease in the bovine population.
19.	Yes	"+"	There is an increase in trade. This increases the risk for emergence via the risk of introduction of infected animals in free cattle exploitations.
20.	Yes	"++"	There is an increase in transport. This increases the risk for emergence via the risk of introduction of infected animals in free cattle exploitations.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are intensive cattle production systems in Belgium. This represent a protection factor against emergence because there are less contacts between indoor kept cattle and ticks.
23.	yes	"++"	There are extensive cattle production systems in Belgium. This represent a risk factor for transmission and for emergence of the disease because of the increased possibilities of contact between outdoor kept cattle and ticks.
24.	yes	"++"	There are recovered cattle with a persistent asymptomatic parasitemia, which can serve as source of infection for ticks and other animals. This represents a risk factor for transmission and for emergence of the disease.
25.	yes	"++"	Babesia can infect numerous domestic and wild mammals but since they are resistant, they are not a reservoir of the disease. Recovered cattle with persistent parasitemia can serve as reservoir and source of parasite for infection of ticks. This is a risk factor for transmission and emergence of the disease. If ticks are considered as animals, then they represent the most important non-bovine animal reservoir. Actually, Babesia is able to survive several years (4 years) in ticks (trans-ovarian and trans-stadial transmission), even in absence of cattle. This represents also a risk factor for emergence of the disease.
26.	no	"+"	There is no long incubation period in cattle. A long incubation period would allow the transmission of the disease without detection and without taking appropriate measures, and would represent a risk factor for transmission, dispersion, and emergence of the disease.
27.	yes	"+++"	If ticks are considered as wild animals, then there is an increase in contacts between cattle and ticks, of which the population increases. This is a risk factor for transmission and for emergence of the disease.

28.	yes	"+++"	If ticks are considered as animals of the wild fauna, then the wildlife plays an important epidemiological role because Babesia is able to survive several years (4 years) in ticks (trans-ovarian and trans-stadial transmission), even in absence of cattle. Because the wild life is difficult to control, this represent a risk factor for emergence of the disease.
29.	yes	"++"	There is an increase in, an expansion of the geographical distribution of, and an increase in activity of the tick population. Because of the epidemiological role of the ticks, this represent a risk factor for emergence of the disease.
30.	yes	"+++"	There are climatic and meteorological changes. The global warming can be at the origin of an increase in the tick population and of a modification of the geographical distribution of the ticks (ticks coming from the South). The ticks are 2-fold more active when the weather is warm and dry. Because of the important epidemiological role of the ticks, this represent a risk factor for emergence of the disease.
31.	yes	"+++"	There are changes in the ecosystems (draining, forest fragmentation, etc.), increase in humidity, favoring the tick populations. This represents a risk factor for emergence of the disease.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. This can represent a protection factor against infection of humans, but it has no influence on the risk for emergence in cattle.
33.	yes	"++++"	The disease is tick-borne (Ixodes ricinus), whose population and activity increase. This represent an important risk factor for emergence of the disease.

Varkensbrucellose bij everzwijnen (*Brucella suis* type 2)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	Swine brucellosis is caused by B. suis bv1 bv2 and bv3. Genetic studies tend to show that bv1 and bv3 are undistinguishable, while bv2 is different. Intra-biovar genetic variability is currently unknown. All bv2 strains isolated from boars seem to be very similar, but this has not been shown in detailed studies. So we consider that there is no genetic variability of the biovar type 2. A genetic variability would have no influence on the risk for emergence.
2.	no	"+"	There is sufficient knowledge of the pathogenesis. A lack of knowledge represents always a risk factor for emergence.
3.	no	"0"	There are no changes in the pathogenesis (due to the genetic stability). A change in the pathogenesis would have no influence on the risk for emergence of the disease.
4.	yes	"++"	There is no effective vaccine against porcine brucellosis, due to the fact that the bacteria grows optionally intracellular. This represents a risk factor for emergence of the disease.
5.	yes	"++"	There are 6 different species of Brucella which have each a main host. Each animal species can be (very rarely) infected by a "foreign" Brucella. For ex., the biovar type 2 infects mainly pigs and boars, and can infect humans to a lesser extent. Because the

			possibility exist, this represents a "theoretical" risk factor for emergence. However, because Brucella are genetically stable, the probability of a "change" of the host spectrum is weak. The possibility to change the host spectrum represents a risk factor for emergence of the disease
6.	yes	"0"	Brucella suis type 2 can be transmitted to humans, but is rarely pathogenic for humans (contrary to the 1 and 3 biovars which are very pathogenic for humans). Because humans do not retransmit the infection to the animals, the possibility of human infection has no influence on the risk for emergence in the animal population.
7.	yes	"++"	There is a geographical expansion of the agent which follows the expansion of the wild boar population. The biovar 2 is widespread in the boar (and hare) populations in whole Europe and is endemic in the Southern of Belgium. This constitutes a risk factor for emergence in the domestic pig population.
8.	yes	"++"	The last years, there is an increase in incidence of infected boars, namely in France, with outbreaks of porcine brucellosis in domestic pigs bred outside. There has also been a case in Belgium. Increases in incidence in neighbouring countries represent a risk factor for emergence of the disease in our country.
9.	yes	"++"	The bacteria can multiply inside or outside the host, and can survive several days or months in the external environment. This is a risk factor for emergence of the disease in the outside bred domestic pig population.
10.	yes	"-"	There are sanitary policy measures such as the control of the sperm production by testing the donors, the interdiction to feed pigs with offal, the compulsory declaration of the disease, but there is no official surveillance. But these measures provide only a weak protection factor against the emergence of the disease in the domestic pork populations because of the high number of possible transmission pathways and because of the implication of the wild fauna as source of infection.
11.	yes	"+++"	There have been changes in the industrial processes of pork production (surrender of inside breeding and replacement by outside breeding processes, mainly in the South of Belgium). This constitutes a risk factor for emergence in the domestic pig population because of the possibilities of contacts with wild boars.
12.	yes	"++"	There are problems of detection of the emergence (unapparent or discrete clinical signs, asymptomatic carriage, ...). Because the disease is transmissible, this represents a risk factor for emergence.
13.	yes	"++"	There are increases in interactions between the wild boars (and hares) and the domestic pigs bred outside (see point 2.2). Because of the possibility of transmission by direct contact, this represents a risk factor for emergence of the disease in the domestic pork populations in regions where outside breeding is practiced.
14.	yes	"0"	Due to the increase in the boar population, there are increases in interactions between boars and humans (hunters, forest warders, personnel of the slaughterhouses, butchers, veterinarians, etc.). But because humans do not play any role in the epidemiology of the disease (do not transmit the infection to animals), this has no influence of the risk for emergence of the disease in the animal population.
15.	no	"0"	There is no significant demographic growth in Belgium. Because humans do not play a role in the epidemiology of the disease, a human demographic growth would have no influence on the risk for emergence of the disease.
16.	yes	"++"	There is an increase in the wild boar population, which can be infected. This constitutes a risk factor for emergence of the disease. An increase in the domestic pig population (not currently the case) would also represent a risk factor, due to the problems of detection (see point 2.3).

17.	yes	"0"	Human traveling is increasing. This can increase the risk for infection of humans when traveling includes contact with asymptomatic infected animals. But because humans do not play an epidemiological role, this has no influence on the risk for emergence in the animal populations.
18.	yes	"0"	There is an increase in touristic activities (farm tourism, animal parks, etc.). This can increase the risk for infection of humans, but because humans do not play any epidemiological role, this has no influence on the risk for emergence in the animal populations.
19.	yes	"++"	The intra-EU exchanges of living pork's (including reproductive animals) and of sperm are intensive and increasing. This represent a risk factor for introduction of infected living pigs or sperm in pig exploitations and of emergence of the disease in the domestic pig population. The origin of the infection in wild boars in our regions could be importations of boars from Eastern Europe.
20.	yes	"++"	The intra-EU transports of living swine (including reproductive animals) and of sperm are intensive and increasing. This represents a risk factor for introduction of infected living pigs or sperm in pig exploitations and of emergence of the disease in the domestic pig population.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are many intensive (inside) production systems of swine in Belgium. This is one of the most important protection factor against the emergence because of the limitation of the most important risk factor: the contacts with the wild fauna (boars). The industrialization of swine production has resulted in the disappearance of brucellosis in swine in France since 1981. But because of the high diversity of possible transmission routes, this protection is not complete.
23.	yes	"+++"	There are extensive production systems of pigs in Belgium, with access to an outside course, mainly in the South of the country. This is an important risk factor for introduction of the disease in the domestic swine population, due to the possibility of infection by contact with wild boars which are the wild reservoir of the disease.
24.	yes	"++"	Wild boars and domestic pigs can be asymptomatic carriers. In boars, the disease is frequently unapparent. In domestic pigs, the clinical signs are more present, but can also be unapparent: in sows, the abortions occur only during the last third of the gestation. early abortions are most of the time not noticed; domestic male pigs are often asymptomatic chronic carriers. This represent a risk factor of marketing of undetected infected pork's in the EU, and a risk factor for emergence of the disease.
25.	yes	"+++"	Wild boars (and hares to a lesser extend) represent the animal reservoir of the biotype 2. They represent a potential source of infection for the domestic pigs. This is a risk factor for emergence of the disease in the domestic pigs.
26.	yes	"++"	Brucellosis is mostly characterized by a slow development. This represents a risk factor of non detection of contagious animals, and consequently a risk factor for emergence of the disease.
27.	yes	"++++"	There are contacts between domestic pigs (with an outside course) and wild boars. Direct contact is the most important transmission route in domestic pigs. This is a very important risk factor for emergence of the disease in the domestic pig population.
28.	yes	"++++"	Wild boars (and hares) are the reservoir of the bacteria (in France, there is a seroprevalence of 10% in boars). They represent the main source of infection of the domestic pigs. This is a very important risk factor for emergence of the disease in the domestic pig population.
29.	yes	"+++"	There is an increase in the wild boar population in Europe, and the infection by the biovar 2 follows this increase. This represents a risk factor for emergence of the disease in the wild and domestic populations of suidae.

30.	yes	"+"	There are climatic and meteorological changes. Since a decade, we observe an increase in wild boars populations due to enhanced fertility and better natural feeding (abundance of natural feed as acorns, rodents, …). Changes in climate constitute a risk factor of emergence of the disease.
31.	yes	"++"	For example, the interdiction to shoot wild boars, animal parks, development of crow culture change the ecosystem and give more chance to increase wild boars populations. This is a risk factor for emergence of the disease (see point 3.6).
32.	yes	"-"	There is an ongoing urbanisation in Belgium. This constitutes a protection factor because more cities represent less forests and less wild fauna.
33.	no	"0"	The disease is not vector-borne

Ziekte van Lyme (*Borrelia burgdorferi*) (Bengis *et al*., 2004 ; Higgins, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+++"	There exist an antigenic variability of B. burgdorferi sensu lato, based on genetic modifications. New strains (and even new species) may develop. It is a major difficulty to follow the evolution of the disease because it is difficult to have efficient diagnostoc tools or prophylaxis as vaccine. This constitutes a risk factor for emergence.
2.	yes	"+"	The last years, the genome of the bacteria has been sequenced, animal models and vaccines have been developed, etc. However, despite a good knowledge of the bacteria, the pathogenesis in the several hosts is less known: true virulence factors, intervention of the immune response, links with histocompatibility factors, etc. The lack of knowledge represents always a risk factor for emergence.
3.	yes	"++"	The genetic variability can be responsible for changes in the pathogenesis (specially through changes in the surface antigens). This is a risk factor for emergence of the disease.
4.	yes	"+++"	There are difficulties to control the disease by vaccination. The human vaccine in the USA is not active against the European strains of the bacteria and the vaccine was redrawn from the market because of secondary effects. There is a vaccine for dogs available in France but vaccination is little practiced (contrary to Switzerland, Austria, Germany) and the vaccine is not active against all the Borrelia species. There is lack of knowledge concerning the role of the immune response in the pathogenesis. These difficulties concerning the vaccination represent risk factors of emergence of the disease.
5.	yes	"+++"	Borrelia can be transmitted to humans, dogs, cows, but also to a series of other animal species, including the wild fauna. Depending of the epidemiological role of these new target species (end-host or relay of the infection), the possibility of infection of other animal species and specially of the wild fauna (which is an animal reservoir) constitutes a risk factor for emergence of the disease.
6.	yes	"0"	The disease is transmissible to humans, in which the bacteria is pathogenic. But humans do not retransmit the infection. Therefore, humans do not play any epidemiological role in the maintenance of the disease, and human infections have no influence on the risk for emergence of the disease in the animal population.

7.	yes	"+++"	The disease is already present in France, Switzerland, Germany, Austria and is also endemic in Belgium. There has been an extension of the geographical distribution from Southern countries, and the disease is in full development in Europe. An extension of the geographical distribution of the disease is always a risk factor for emergence of the disease.
8.	yes	"++"	Each year, 60.000 human cases are diagnosed in Europe (155 cases/100.000 habitants in some countries); 5.000 to 10.000 human cases per year in France (the incidence has increased since the years 1980 in France); also cases in Belgium; the Lyme borreliose has become the most frequent tick-borne disease in the Northern hemisphere. The disease is in full development in Europe. The number of (infected) ticks has rapidly increased in Europe (30% of infected ticks in France, 60% in Austria). Because infected ticks can infect humans and animals, the increase in incidence in infected ticks is a risk factor for emergence of the disease.
9.	no	"0"	The bacteria is not capable to persist in the environment (outside the vectors). If the bacteria was capable to persist in the environment outside the vectors, this would have no influence on the risk for emergence because the transmission of the bacteria needs the action of a vector bite.
10.	no	"0"	There is no legislation and no official sanitary measures. There exist only recommendations to avoid human infections (avoid the endemic zones and the tick bites via protection clothes), which protects against infection in humans, but not against infection in the animal population. It is impossible to control the infection in the tick population. The existence of a legislation for animals would have no influence on the risk for emergence of the disease in the animal populations.
11.	no	"0"	The disease is not concerned by technological or industrial processes.
12.	yes	"++"	The disease is frequently under-diagnosed and is underestimated in humans (diagnostic tests are less sensitive, patients forget to declare the tick-bite during anamnesis, diagnostic is based on few specific or attenuated clinical signs and is difficult to establish, long incubation time of the disease after the tick bite) and in animals (90% of the dogs are asymptomatic, veterinarians and breeders are poorly informed). Problems of detection in humans and in domestic animals are risk factors for emergence because if better detection, better treatment or prevention for domestic animals and humans. Also, a lack of diagnosis could mask a change in virulence or clinical expression of the disease.
13.	yes	"++"	There are increases in interactions between the (infected) tick populations (increase in incidence of infected ticks, see factor 1.8; more ticks in our regions) and other animal populations (for ex. wild fauna). This is a risk factor for emergence of the disease in the animal population (wild fauna) because proximity increases the risk for tick bite.
14.	no	"0"	There is no increase in interaction between the animal/tick populations and the human population in Belgium. Increase in interaction between the human's and the tick's/animal's populations would increase the risk for infection in the human population, but this would have no influence on the risk for emergence in the animal population because humans do not retransmit the infection.
15.	no	"0"	There is no significant demographic growth in Belgium. A demographic growth would have no influence on the risk for emergence because humans are dead-end hosts.
16.	no	"++"	There is no growth of the dog/cattle population in Belgium. If intermediate hosts (wild or domestic animals) are increasing, there are more ticks and more contaminated ticks. Thus increase of the risk.
17.	yes	"++"	Human traveling is increasing. This could have an influence on the risk for infection of humans (infection in a country with a high

			prevalence). This is also a risk factor of emergence for the animal population via importation of ticks in luggages and via importation of new strains of *Borrelia*.
18.	yes	"++"	Human tourism is increasing. This is a risk factor for emergence in humans (activities in forests, infection in a country with a high prevalence) and in domestic animals (dogs) which accompany their master.
19.	yes	"++"	There is an increase in general trade. This is a risk factor via importation of ticks with other products in new countries, and via importation of new strains of *Borrelia*.
20.	yes	"++"	There is an increase in general transports. This is a risk factor via importation of ticks with other products in new countries, and via importation of new strains of Borrelia.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are intensive production systems of production animals (cows) and horses. Intensive production systems allow to reduce contacts with ticks, and therefore can protect these production animal against infection.
23.	yes	"++"	There are extensive production systems of production animals (bovines) and horses. Extensive production systems allow contact with ticks, and is a risk factor of infection of these production animal.
24.	yes	"++"	The infection can be asymptomatic in all the susceptible animal species. Because only the wild fauna plays an epidemiological role (the other animal species are dead-end hosts), the role of the asymptomatic carriage in the risk for emergence of the disease concern only the asymptomatic infected wild animals (and not the domestic animals). The infected asymptomatic wildlife can transmit the infection and this represent a risk factor for emergence of the disease.
25.	yes	"+++"	There is an animal reservoir in the wild fauna in Europe (sylvatic mammals, mice, voles) which can retransmit the bacteria to the ticks. Dogs and birds can disseminate infected ticks and enlarge the endemic zones. These are risk factors of emergence of the disease. Numerous domestic mammals (dogs, bovines, horses) are susceptible to the infection, but are not responsible for the maintenance of the disease in a region, because there are accidental hosts which are not capable to transmit the infection.
26.	no	"0"	There is no long incubation period in the animals. A long incubation in the animals would have no influence on the risk for emergence because ticks are capable to transmit the bacteria between two animals without needing the presence of clinical signs. Moreover, asymptomatic animals are capable to transmit the infection.
27.	yes	"++"	There are contacts between domestic animals and wildlife. Direct contacts between these two animal populations are not necessary for the transmission of the infection, because the transmission is tick-borne. However, indirect contacts between these two animal populations via their respective ecosystems containing ticks favor the transmission of the disease by infected ticks and represent a risk factor for emergence of the disease in the domestic animal population.
28.	yes	"+++"	The wild fauna (small sylvatic mammals, cervidae) has a fundamental epidemiological role because it is the reservoir of the bacteria and can re-infect the ticks. This is a risk factor for emergence of the disease because of the difficulties to control the wild fauna.
29.	no	"+++"	There is no increase in the demography / distribution of the wildlife (except wild cervidae). An increase in the wild fauna population is a risk factor for emergence of the disease because of the epidemiological role of the wildlife (see factors 3.2. and 3.5)
30.	yes	"++"	There are climatic and meteorological changes (more rains in the winter and more dryness in the summer, for example) which can induce changes in the distribution and activity of the ticks. Ixodes ricinus live in temperate regions (biotope: high humidity), and the

			ticks are twofold more active and mobile when the weather is warm and dry. Climatic changes could constitute a risk factor for emergence of the disease via a modification of the ecosystems which could become more favorable to the proliferations of the vector.
31.	yes	"+++"	For example, in the USA, the emergence of the Lyme disease resulted from the combined action of several factors: reforestation, which increased the density of the cervidae (preferred host of the ticks) and ticks populations, the temperature, and the movement of the humans in these zones (suburbs), which increases the risk for transmission to the humans. There are (similar?) changes in the ecosystems produced by man in Belgium. The increase in the density of the cervidae and ticks populations is a risk factor for emergence of the disease.
32.	yes	"+"	There is an ongoing urbanisation in Belgium. Urbanisation is associated to more frequent contact between men and wild fauna (as foxes in towns) because urbanisation destroy, encroach the habitat of wild fauna. Urbanization in the suburbs can increase the possibilities of contact with the ticks. Urbanisation is a risk factor. However, urbanization is also a protection factor against infection of humans and domestic animals (dogs) because of the less frequent possibilities of contact with the ticks.
33.	yes	"++++"	The vector (ticks Ixodes ricinus) is present in Belgium and this is the main risk factor for emergence of the disease.

Q-koorts (*Coxiella burnetii*)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"++"	There are several strains of C. burnetii, with different geographical distributions, of which certain could be more virulent than others. However, the genetic variability of obligate intracellular bacterial species is weak. Moreover, the lack of knowledge of the biology of the bacteria impedes the measure of the consequences of the genetic variability in this bacterial species. A genetic variability represents always a risk factor for emergence.
2.	yes	"++"	There is a lack of knowledge of the pathogenesis of the disease (biology of the bacteria, changes of phase, formation of resistant pseudospores, etc.). This represents a risk factor for emergence of the disease.
3.	yes	"++"	There are changes in the pathogenesis of the disease (but the reasons of this are unknown) (for example, the circulation of a potential hyper-virulent strain in the Netherlands). Changes in pathogenesis are always risk factors for emergence of the disease.
4.	Yes	"+++"	In 2010 there was limited access to vaccins in Belgium. The efficacy of the vaccine is limited as it protects again clinical signs but do not prevent infection or excretion, so propagation of the infection, even if vaccination, is possible. Moreover, the efficiency of the vaccine has yet to be demonstrated against the different strains. The difficulties concerning the vaccination are risk factors for emergence of the disease.
5.	Yes	"++"	There are possibilities of passage of the species barrier, due to the fact that Coxiella may infect many mammal species, and to the possibilities of changes in pathogenesis (see factor 1.3.). This possibility represents a risk factor for emergence of the disease in a new animal species.
6.	Yes	"0"	The disease is zoonotic. However, because humans do not retransmit the disease to animals, this has no influence on the risk for

			emergence of the disease in the animal population.
7.	yes	"+++"	The bacteria are already present all over the world except in New Zealand. The bacteria are already spread worldwide. This is a risk factor for infection of new herds by new strains and a risk factor for emergence.
8.	yes	"+++"	There have been several outbreaks in the Netherlands (humans, goats), a neighbouring country. This represents a risk factor for emergence of this (potentially hyper-virulent) strain in our country.
9.	yes	"+++"	Coxiella burnetii, in the form of a pseudospore, is highly resistant in the environment and is particularly volatile. This is a risk factor of dispersion of the pathogenic agent and consequently a risk factor for emergence.
10.	yes	"-"	Instructions have been transmitted to reduce the risk for human infection and of dispersion of the bacteria; the surveillance (monitoring) is compulsory; the notification is compulsory; measures have to be taken in positive exploitations; etc. The legislation is only a weak protection factor against the expansion if the disease because the infection is already endemic.
11.	Yes	"0"	There are changes in technological and industrial processes. These can be risk factors or protection factors. The breeding of goats is a developing sector. If mores sheep/goats would be breeded, risk for those people may increase. If fecal material would be better processed or injected into the ground, exposure would be less. Some technics as pasterisation could destroy the bacteria in food.
12.	yes	"+++"	Before 2010 (at the time of this survey) , there was no official surveillance and notification was not compulsory. This is not the case currently. There has also be a sensibilisation of the sector since 2010, but there are always problems of declaration by the breeders. Problems of detection always represent a risk factor for emergence.
13.	yes	"++"	Almost all mammal species can be infected, although little develop the disease. There are increases in interactions between the different animal compartments, which increase the risk for transmission of the disease and the risk for emergence.
14.	yes	"0"	Educational farms are more and more widespread. This represent a risk factor of infection of humans. There exists an indirect carriage of humans: food or livestock dealers, vets which go form one fram to another. These are risk factors of dispersion of the disease.
15.	no	"0"	There is no significant human demographic growth in Belgium. Since humans do not retransmit the disease, this factor has no influence on the risk for emergence of the disease in the animal populations.
16.	yes	"++"	All the mammal species are concerned by the infection (more studies have to be done to identify which animal species are excretory and via which pathways), but the ruminants are currently the main host species. The breeding of goats is a developing sector. A high goat density is a risk factor for emergence of the disease.
17.	yes	"0"	Human traveling is increasing but because humans are terminal hosts (do not retransmit the infection to animals), this has no influence on the risk for emergence of the disease in the animal population.
18.	yes	"0"	There are increases in tourism but because humans are terminal hosts (do not retransmit the infection to animals), this has no influence on the risk for emergence of the disease in the animal population.
19.	yes	"++"	There is an increase in trade of ruminants. Because there is no European legislation imposing a control concerning Q fever, an increase in trade in (small) ruminants is a risk factor for emergence (risk for importation of infected animals, risk for importation of a hyper-virulent strain). Food or livestock dealers, vets which go form one fram to another, can dispers the disease and are also risk factors. Since the bacteria are already ubiquitous and spread worldwide, the quantification of the risk is difficult.

20.	yes	"++"	There is an increase in transport of (small) ruminants, which is a risk factor of infection of free herds
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"+++"	There are intensive productions systems for (small) ruminants. Intensive breeding is a risk factor for the transmission and circulation of the bacterium in closed spaces (indoor)
23.	yes	"++"	There are extensive production systems for (small) ruminants (outdoor breeding). This is a risk factor of dispersion of the disease in the environment via dry matters (dry abortion products, feaces, etc.)
24.	yes	"+++"	Out of the abortion periods, there are no clinical signs in (small) ruminants, which complicated the detection of the disease and the taking of measures. The asymptomatic infected animals can be transported and infect free herds. This is a risk factor of dispersion of the disease and of emergence.
25.	yes	"+++"	There is an animal reservoir (mostly small ruminants and cattle). The bacterium is maybe the most widespread bacterial species in the world. This is a risk factor for emergence of the disease.
26.	yes	"++"	There is a long incubation period before the abortion, which allows the dissemination of the undetected infection. This is a risk factor for emergence.
27.	yes	"++"	There are possibilities of contact between the domestic ruminants (bred outdoor) and the wild fauna. This represents a risk factor of infection because the disease is transmissible by direct contact.
28.	yes	"++"	The wild fauna could play an epidemiological role (transmission of the disease to domestic animals or to other wild animals). There is no described introduction of Q fever in herds from the wild fauna, but this should be studied. The infected wild fauna could represent a risk factor for emergence. The role of the wild fauna should have to be more studied.
29.	no	"+"	There is no demographic growth of the wild fauna (except wild cervids). A demographic growth of the wild fauna could be a risk factor for emergence of the disease because it is capable to transmit the disease to domestic animals.
30.	yes	"0"	There are climatic and meteorological changes. An increase in warm and dry periods represent a risk factor of dissemination of Q fever (dry matters from abortion products containing the bacterium can be dispersed by the wind) and consequently of emergence. On the contrary, heavy rainfall and floodings may decrease Q fever risk. The result is "0".
31.	yes	"++"	There are changes in the ecosystems. For example, a return to earlier production systems (outside breeding, etc.) or increases in domains for the wild fauna could represent a risk factor for emergence of the disease.
32.	yes	"- -"	There is an ongoing urbanisation in Belgium. This represents a protection factor against emergence in humans because it decreases the possibilities of aerogen transmission from animals. The urbanisation has no influence of the risk for emergence in the animal populations.
33.	yes	"+"	Ticks can transmit the disease, but this infection pathway seems to be less important. This is a potential risk factor for emergence because certain strains could adapt to the vectors (see point 1.3: possibility to change in pathogenesis)

Hantavirose (Hantavirus) (Bengis *et al*., 2004 ; Zeier *et al*., 2005; Enria and Levis, 2004)

Factor	Presence (yes) / absence	Impact (risk / protection	Scientific justification

	(no)	/ no effect)	
1.	no	"0"	There is no genetic variability. A genetic variability should have no influence on the risk for emergence.
2.	yes	"++"	There is lack of knowledge of the pathogenesis. This is a risk factor for emergence.
3.	yes	"++"	According to Zeier *et al*. (2005), altough rodents are the main reservoir, there is a possibility of transmission of the disease to non natural hosts, such as dogs, cats, etc., and this can influence the virulence and the pathogenicity. This is a risk factor for emergence in new animal populations under a more pathogenic form. If the virus adapts to domestic animal populations, this represent a risk factor for infection of humans.
4.	yes	"++"	There are difficulties to vaccine wild rodents. This is a risk factor for emergence.
5.	yes	"++"	According to Zeier *et al*. (2005), altough rodents are the main reservoir, there is a possibility of transmission of the disease to non natural hosts, such as dogs, cats, pigs, cattle, etc. Altough this is at the present time not yet demonstrated, this represent a potential risk factor for adaptation of the virus in these unnatural hosts. This is a risk factor for emergence of the disease in new animal species. If the virus adapts to domestic animal populations, this is a risk factor for infection of humans.
6.	yes	"0"	The disease is zoonotic. Because humans have no epidemiological role, this has no influence on the risk for emergence in the animal populations.
7.	yes	"++"	The distribution of the virus is wide in Europe. This is a risk factor for emergence because transmission through wildlife has no boundaries.
8.	yes	"++"	There are increases in incidence in other countries (which countries?). This is a risk factor for emergence because transmission through wildlife has no boundaries.
9.	yes	"+++"	Hantaviruses are resistant in the environment (soils, litters, etc.). Because transmission occurs principally through inhalation of contaminated dust, this is a risk factor for transmission and of emergence both for animals and humans.
10.	no	"0"	There are no legislation nor sanitary policy measures against hantaviroses. These should have no influence of the risk for emergence because the virus is in wild rodents and there is no possible control.
11.	no	"0"	No influence of changes in technological or industrial processes for the risk for emergence of this disease.
12.	yes	"++"	Because the disease concerns the wild fauna, there are problems of detection of the emergence. Problems of detection of the emergence is a risk factor for emergence.
13.	no	"++"	There are no increases in interactions between wild rodents and other animal populations. Interactions between animal populations are a risk factor for transmission to domestic animal populations (cats, dogs, pigs, cattle) and of viral adaptation to these new hosts. This is a risk factor for emergence in new animal populations. If the virus adapts to these domestic animal populations, this is also a risk for transmission to humans.
14.	yes	"+++"	Diverse human activities are increasing, such as the capture of rodents, the breeding of rodents, fight against vermin, hunting, etc. These are risk factors of infection of humans and of emergence in the human population.
15.	no	"0"	There is no significant demographic growth in Belgium, and a demographic growth should have no influence on the risk for emergence of the disease.
16.	yes	"+++"	There is a growth of the rodent population in Belgium. A growth of the rodent population is a risk factor for emergence of the disease.

17.	yes	"+"	Human traveling is increasing. This increases the risk for importation of an infected animal (risk for emergence in the animal population) or the risk for infection of human travellers (risk for emergence in the human population).
18.	yes	"+"	Human tourism is increasing. This increases the risk for importation of an infected animal or the risk for infection of human travellers (risk for emergence in the animal population). Tourism (rural, walks) favours the contact with dejections of infected rodents and increases the risk for emergence in the human population.
19.	no	"0"	The increase in trade does not concern the wild rodents population.
20.	no	"0"	The increase in transport does not concern the wild rodents population.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	Rodents are wild fauna, which is not concerned by the production systems. No influence of this factor on the risk for emergence.
23.	no	"0"	Rodents are wild fauna, which is not concerned by the production systems. No influence of this factor on the risk for emergence.
24.	yes	"+++"	The infection is chronic and asymptomatic in wild natural hosts (rodents). This is a risk factor for emergence (absence of clinical signs favours the transmission rate, absence of detection of asymptomatic animals)
25.	yes	"++"	The animal reservoir is constituted by the wild rodents (bank voles (campagnols roussâtres), brown rat (rat surmulot)). Because it concerns the wild fauna, difficult to control and to watch, this is a risk factor for emergence.
26.	no	"++"	There is no long incubation period. A long incubation period would represent a risk factor for emergence (possibility of viral transmission before being detained by clinical signs).
27.	yes	"0"	There are possibilities of contact between domestic and wild rodents, but the disease does not concern domestic animals. The contacts between domestic and wild animals have no influence on the risk for emergence.
28.	yes	"+++"	The wild rodents (bank voles (campagnols roussâtres), brownn rat (rat surmulot)) play an epidemiological role because they are the reservoir of the virus. This is a risk factor for emergence because the control of the wilf fauna is difficult.
29.	yes	"+++"	There is a growth of the rodent population in Belgium. A growth of the rodent population is a risk factor for emergence of the disease.
30.	yes	"++"	There are climatic and meteorological changes. A climatic change accompanied by an increase in precipitations leads to an increase in rodent population density, which is a risk factor for emergence of the disease.
31.	yes	"++"	There are changes in the ecosystems. This is a risk factor for emergence in humans because rural and wooded zones increase the risk for contact with infected wild rodents.
32.	yes	"++"	There is an ongoing urbanisation in Belgium. Urbanisation of previous rural areas favours the contact between humans and infected rodents.
33.	no	"0"	Hantavirosis is not a vectorial (insect) disease. Insects have no influence on the risk for emergence.

Cysticercose bij runderen (*Cysticercus bovis*, *Taenia saginata*)

Factor	Presence (yes) / absence	Impact (risk / protection	Scientific justification

	(no)	/ no effect)	
1.	no	"0"	There is no genetic variability. A genetic variability would have no influence on the risk for emergence of this disease.
2.	no	"+"	There is no lack of knowledge on the pathogenesis of this disease. A lack of knowledge represents always a risk factor for emergence.
3.	no	"+"	There is no change in the pathogenesis of the disease. A change in pathogenesis could always represent a risk factor of emergence of the disease.
4.	yes	"+++"	There exists a vaccine offering a protection of 99.8%, but which is not commercially available. The lack of available vaccine is a risk factor for emergence of the disease (Lightowlers MW, Rolfe R, Gauci CG. Taenia saginata: vaccination against cysticercosis in cattle with recombinant oncosphere antigens. Exp Parasitol 1996; 84:330-338.)
5.	no	"0"	There is no possibility of passage of the species barrier and this has no influence on the risk for emergence of the disease
6.	yes	"+"	The disease is zoonotic (humans are host for the adult stages of taenia saginata). Because humans can occasionnally retransmit the infection, this is a risk factor for emergence of the disease.
7.	no	"0"	There is no geographical extension of the disease. A geographical extension would have no influence on the risk for emergence of the disease in Belgium because the transmission of the parasite by ingestion stays geographically localized.
8.	no	"0"	There is no increase in incidence in other countries or neighbouring countries. An increase in incidence in other countries would have no influence on the risk for emergence of the disease because the transmission of the parasite by ingestion stays geographically localized.
9.	yes	"+++"	The parasite can persist in the environment (pastures, surface waters: 2 months during the summer and 5 months during the winter) and this contributes to the transmission cycle by ingestion of infested grass. This represents a risk factor for emergence of the disease.
10.	yes	"- -"	The existing legislation (interdiction of spreading of human excrements on pastures, inspection and refusal of infected carcasses at the slaughterhouse) is a protection factor against emergence of the disease.The protection is weak because the current meat inspection detects only a small percentage (10-20%) of the infected carcasses.
11.	Yes	"- - -"	There are changes in the technological processes in bovine industry (serological detection in abattoirs)and this contributes to the protection against the emergence of the disease
12.	Yes	"+++"	There are detection problems of the disease (live animals are asymptomatic; weak sensitivity of the visual inspection at the slaughterhouse) and this can impede the detection of a possible increase in incidence. This represents a risk factor for emergence of the disease.
13.	No	"0"	There is no increase in interactions between the concerned animal populations (cattle populations). An increase in such interactions would have no influence on the risk for emergence of the disease because the transmission cycle of the parasite involves an indirect relation between humans and cattle and no direct relation between cattle.
14.	No	"+++"	There is no increase in interactions between cattle and human populations. Such an increase would represent a risk factor for emergence of the disease because the transmission cycle of the parasite involves (indirect) interactions between humans and cattle.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic

			growth.
16.	no	"0"	There is no growth of the cattle population in Belgium. Such an increase would have no influence on the risk for emergence of the disease.
17.	Yes	"0"	Human traveling is increasing. This has no influence on the risk of emergence in the cattle population.
18.	Yes	"+"	Human tourism is increasing. Increased tourism by backpackers or wild campers defecating in pastures might have an influence on the risk of emergence
19.	yes	"+"	There is an increase in trade of cattle. This represents a risk factor of emergence of the disease because the more cattle have the possibility to graze different pastures, the more the probability of infection is higher.
20.	yes	"+"	There is an increase in transport of cattle. This represent a risk factor of emergence of the disease because the more the cattle have the possibility to grass different pastures, the more the probability of infection is higher.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are intensive cattle production systems in Belgium. This contributes to the protection against the emergence of the disease because cattle kept indoor receive feed less at risk than cattle kept on pastures.
23.	Yes	"+++"	There are extensive cattle production systems in Belgium. This represents a risk factor for emergence of the disease because of the cattle kept outdoor (pastures).
24.	yes	"+++"	Live cattle are asymptomatic and this represents a risk factor for emergence (lack of detection).
25.	yes	"+++"	There exists an animal reservoir (cattle) and this represents a risk factor for emergence of the disease.
26.	no	"0"	There is no long incubation period in cattle but the incubation period has no influence on the risk for emergence because only slaughtered animals (meat) are capable to transmit the disease to humans. During its live the animal is not infectious.
27.	yes	"0"	There are contacts between domestic cattle and wildlife but this has no influence on the risk for emergence because the transmission of the parasite (ingestion of infected grass) does not involve a direct contact between animals and because wildlife does not play an epidemiological role.
28.	No	"0"	The wild fauna does not play an epidemiological role. If the wildlife did play an epidemiological role, this would have no influence on the risk for emergence because infection of domestic cattle comes from humans.
29.	no	"0"	There is no demographic growth of the wild fauna concerned by the disease. Because the wild fauna does not play an epidemiological role in the transmission of the disease to domestic cattle, such an increase would have no influence on the risk for emergence of the disease.
30.	Yes	"0"	There are climatic and meteorological changes but this has no influence on the risk for emergence of the disease
31.	Yes	"0"	There are changes in the ecosystems produced by man but without effect on the risk of emergence of the disease.
32.	Yes	"+"	There is an ongoing urbanization in Belgium. Due to the urbanisation there are water floodings which can spread eggs of the parasite. This is a risk factor.
33.	no	"0"	Non vectorial disease

Echinococcose (*Echinococcus multilocularis*) (Mas-Coma *et al*., 2008)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	There is no genetic variability. A genetic variability would have no influence on the risk for emergence of this disease.
2.	yes	"+"	There are still important gaps in the factors that influence survival of the eggs in the environment and the way that intermediate hosts, especially an aberrant host such as humans, become infected with the eggs: is this by ingestion of contaminated berries, working in contaminated soil or by petting an infected pet dog,….? More knowledge on the transmission pathways and their risk factors are needed. A lack of knowledge represents always a risk factor for emergence.
3.	No	"+"	There is no change in the pathogenesis. A change in pathogenesis could always represent a risk factor of emergence of the disease.
4.	yes	"+++"	Vaccination against parasites is mostly problematic (efficiency, etc.). This is an important risk factor for emergence of the disease because in endemic zone, all canids have to be considered as infected and able to transmit the parasite.
5.	No	"++"	The parasite can already infect several animal species but, due to the absence of genetic variability, there is no possibility to infect additional animal species. A passage of the species barrier would represent a risk factor for emergence of the disease.
6.	Yes	"0"	The disease may be accidentally zoonotic. Since humans do not excrete the parasite in the feces (no definitive host) and consequently are not capable to retransmit the disease, there is no influence of the risk for emergence in the animal population.
7.	yes	"+++"	There is a geographical expansion of the disease (endemic from the South of the Meuse and in the Ardennes). This represents a risk factor for further expansion and for emergence of the disease in free regions.
8.	yes	"++"	There is an increase in incidence in neighboring countries and this represent a risk factor for emergence of the disease.
9.	yes	"+++"	The infectious parasite can persist in the environment in the feces of the definitive hosts and be ingested by the intermediate hosts (wild rodents or humans); this is a risk factor for emergence of the disease in the animal population.
10.	no	"0"	The parasite is on the list of zoonotic diseases to monitor in the EC zoonoses Directive. However, there is no official surveillance. There are no measures taken in definitive and intermediate hosts which could limit the expansion of the disease and decrease the risk for emergence. Because the parasitic cycle involves wild animals difficult to control, the absence of control measures has no influence on the risk for emergence of the disease.
11.	no	"0"	The disease is not concerned by changes in technological or industrial processes.
12.	yes	"++"	There are problems of detection of the emergence: no official surveillance programme (only prevalence studies in the frame of scientific research) which could help to detect an increase in incidence, the parasitic cycle concern wild animals difficult to monitor, the disease is asymptomatic in the definitive hosts, etc. These difficulties of detection are risk factors for emergence of the disease.
13.	yes	"++"	There is an increase in interaction between the animal compartments concerned by the disease (ex. increase in the foxes population). This represents a risk factor for emergence of the disease.
14.	no	"0"	There is no increase in interaction between foxes and humans. An increase would have no influence on the risk for emergence in

			the animal population because humans do not retransmit the parasite.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic growth, because humans are not capable to retransmit the parasite.
16.	Yes	"+++"	There is an increase in the fox population. Because foxes are important definitive hosts of the disease, this represent a risk factor for emergence of the disease
17.	Yes	"0"	Human traveling is increasing. This has no influence on the risk for emergence of the disease
18.	Yes	"0"	Human tourism is increasing. This has an influence on the risk for emergence in the human population (fruit picking), but not in the animal population.
19.	No	"0"	There is no increase in trade of foxes or rodents. No influence on the risk for emergence of the disease.
20.	No	"0"	There is no increase in transport of foxes or rodents. No influence on the risk for emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	There are no intensive foxes production systems in Belgium. No influence on the risk for emergence of the disease.
23.	no	"0"	There are no extensive foxes production systems in Belgium. No influence on the risk for emergence of the disease.
24.	Yes	"+++"	The infection is asymptomatic in carnivores (definitive hosts). This allows the dissemination of the parasite in the environment and infection of the intermediate hosts. This is an important risk factor for emergence of the disease.
25.	Yes	"+++"	Foxes and domestic canids are the reservoir of the parasite. Because of their epidemiological role in the transmission of the disease and the possibility of asymptomatic carriage, this represent a risk factor for emergence of the disease
26.	no	"0"	There is no long incubation period. Because the excretion of the parasite and transmission of the disease does not depend on the presence of clinical signs, a long incubation period would have no influence on the risk for emergence of the disease.
27.	yes	"++"	There are contacts between domestic and wild animals concerned by the disease. The wild (foxes) or domestic (dogs and cats) definitive hosts get infected by eating infested wild rodents. There is also a possibility for foxes to eat some died infected small ruminants. Wild rodents get infected by ingesting parasite eggs via feces of infected definitive hosts. This has an influence on the continuation of the parasitic cycle and represents a risk factor for emergence of the disease.
28.	Yes	"+++"	Because foxes are the reservoir and the main definitive hosts responsible for the transmission of the parasite, the wildlife plays an important epidemiological role. This is a risk factor for emergence of the disease.
29.	yes	"+++"	The last ten years, the population of foxes has increased, and their distribution has extended (have established in Flanders, and in peri-urban zones). This represent a risk factor for dissemination and for emergence of the disease in free regions.
30.	Yes	"- -"	There are climatic and meteorological changes. The global warming could have a protective effect against the risk of emergence because the survival of the parasite is increased under cold climates (Northern hemisphere).
31.	yes	"0"	There are changes in the ecosystems produced by humans, with a higher risk of emergence of the disease. Control of rodents, such as musk rats, can on the other hand decrease the infection rate of foxes. The result is "no influence".
32.	yes	"0"	There is an ongoing urbanisation in Belgium, and foxes move from the country side to the city. This increases the risk of infection for the human urban population, but not for the animal population.
33.	no	"0"	Non vectorial disease.

***E. Coli* O157:H7(Schlundt *et al*., 2004)**

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+"	There are several strains of EHEC O157:H7 showing differences, but the true variability sensu stricto as consequence of genetic modifications has not been studied. However, it is considered that there are variabilities concerning the presence of different virulence factors; the presence of different serotypes; of different strains which differ in their ability to induce a disease in humans or to survive in the environment. This represents a risk factor for emergence. On the other hand, the absence/presence of pathogenicity is due to absence/presence of the receptor expression for the toxin in ruminants, and genetic variability will not change this.
2.	yes	"+"	There is lack of knowledge of the pathogenesis (for example, concerning the colonization, namely of cattle, but particularly of other ruminants), the host specificity of the different identified clones, etc. This lack of knowledge can be a risk factor mainly for the healthy carriers.
3.	No	"++"	Currently there are no changes in the pathogenesis of the disease. A change in pathogenesis in ruminants could only occur if receptors for the toxin would suddenly appear in endothelial cell in ruminants. Such a change in pathogenesis would represent a risk factor for the emergence of the disese in ruminants.
4.	yes	"+++"	Concerning the vaccination, the human aspects have to be differentiated from the animal aspects. In humans, the disease is mainly caused by a toxin. Despite the principles of the vaccination against these toxins are clear, its practical application is not yet evident. In animals in which the toxins do not play any role because they are mostly healthy carriers, the targets of vaccine are represented by colonization factors. However, many characteristics remain to be discovered about these colonization factors and about the immune response of these "healthy carriers", and consequently, the principles of the vaccination in animals remains unclear. These uncertainties about the effect of the vaccination in animals and the lack of vaccines represent risk factors for emergence of the disease.
5.	Yes	"++"	The possibility of passage of the species barrier (from cattle to sheep, goats, pigs, turkeys, or to a lesser extend: to dogs, cats, birds, etc.) could exists, but assuming that the genetic variability truly exists in our timescale. Such strains could acquire virulence factors allowing them to colonize non primate and non ruminant hosts and induce diarrhea or more if endothelial cells of these "new" hosts own receptors specific to the toxins of these EHEC strains. Adaptation to new animal hosts could increase the risk
6.	Yes	"++"	The disease is zoonotic. This is a risk factor for emergence of the disease in humans. Transmission from humans to humans has been described, and to animals is a possibility which will rarely occur. This is a risk factor for emergence.
7.	No	"0"	There is no geographical extension of the bacterium because it is already widespread worldwide. A geographical extension has no effect on the risk of emergence because the bacteria are already widespread.
8.	no	"+"	There is no really increase in incidence of new cases in neighbouring countries. In recent years, there seems to be an incraese in Belgium. An increase in incidence of new cases in neighbouring countries would represent a risk factor for emergence because it

			would mean an increase in the number of carrier animals and, because of the trade, it would mean an increasing prevalence in our cattle and an increased risk for contamination of humans.
9.	yes	"++++"	The bacterium can survive for a long time (several months) in the environment, principally in organic matters (soils, feces in which it can multiply, water, plants) independently of the presence of carrier animals. This is a risk factor of dispersion and of emergence of the disease namely when animals are placed on pastures on which manure has been expanded during the 6 previous weeks. Persistence in the environment is an important risk factor since reinfection of cattle occurs via this route and since human infection via vegetables, drinking water etc.. is going via that route.
10.	Yes	"- -"	There is a legislation (for ex. Directive zoonoses). This is a protection factor against emergence, to be reinforced in case of emergence in animals.
11.	yes	"++"	Some strains of E. coli contaminate the meat or meat products during the processes of food production. For example, accidental contaminations can be amplified by the process and spread in numerous batches of minced meat or hamburgers. So this factor is a risk factor. Some modifications of breeding practices or of alimentary habits could also lead to the emergence of the disease. Otherwise, some changes in the technological or industrial processes could also have protective effects (for example, some technologies, better hygienic conditions in the slaughterhouse)
12.	yes	"+++"	There exist some problems of detection of emergence. For example, in animals, the prevalence is probably underestimated, due to the fact that animals are asymptomatic healthy carriers, that the number of bacteria per gram of sample is sometimes below the detection limit of the test, and because of the intermittent shedding. In humans, there is still no reimbursment of diagnosis for O157:H7 by INAMI and these analyses are not included in the RIZIV nomenclature. As a consequence, only a few specialists ask an analysis for EHEC O157:H7 even in presence of blood diarrhea and only a few laboratories detect this pathogen. In case of large food-borne outbreak, the lack of a rapid diagnostic will impede rapid reactions and control measures. Otherwise, the diagnostic tests are very efficient for the diagnosis of O157:H7. The problems of detection of emergence are risk factors of emergence of the disease.
13.	No	"+"	There are no increases in interactions/contacts between the ruminant populations (cattle). Increases in interactions (for example, via animal purchases of healthy carriers, which increase the risk for infection of the cattle herds) would represent a risk factor, but minor because the bacteria is prevalent in the environment and (re)infections can occur from the environment. This type of reinfection is as important as reinfection due to contact with other animals. Walking around on a farm is enough to spread the infection and the dose needed to infect/reinfect an animal is low. It is much more important to prevent shedding in the environment than to prevent contact between animal compartments.
14.	yes	"+"	There are increases in interactions between (small) ruminants and humans, for example in ecological farms and educational farms for children. In Denmark it has been shown that infections occur around areas with concentrations of cattle farm. So when human and cattle regions come closer in contact, this is a risk factor. These increases in interactions represent a risk factor for emergence. It is a weak risk factor because the most important way of transmission to humans remains the food-borne infection, and not the direct contact.
15.	No	"0"	There is no significant demographic growth in Belgium and the emergence of the disease is not concerned by a human demographic growth, except if such a growth does modify certain breeding practices or alimentary habits (see factor 2.2.)

16.	no	"++"	There is no growth of the cattle population in Belgium. Such a growth would represent a risk factor for emergence of the disease (increase in the infection pressure)
17.	yes	"++"	Human traveling is increasing. This is probably the cause of worldwide distribution of the bacteria between 1982 and 1995. The bacteria are spread in the environment and can infect cattle. This represent a risk factor of emergence of the disease in the animal population.
18.	yes	"++"	Human tourism is increasing. Humans can get infected for example in touristic farms through consumption of farm raw products (vegetables, fruit, milk) contaminated by feces from carrier animals or through narrow contacts with healthy carrier animals (mostly children, who do not wash their hands). The human tourism is probably the cause of worldwide distribution of the bacteria between 1982 and 1995.The bacteria are spread in the environment and can infect cattle. This represent a risk factor of emergence of the disease in the animal population.
19.	yes	"++"	There is an increase in trade of ruminants. This increases the risk for importation of healthy carrier animals, and represents a risk factor for emergence.
20.	yes	"+"	There is an increase in transport and of movements of ruminants. This increases the risk for introduction of healthy carrier animals in free herds and represents a risk factor for emergence of the disease.
21.	yes	"+"	There is an increase in terrorism worldwide. The bacteria could be used and increase the risk.
22.	yes	"+"	There are intensive production systems concerning the ruminants. They represent a risk factor of expansion and of emergence of the disease, because the bacteria present in small quantities can spread easily in high dense herds or when cattle from different origins is gathered in big production units.
23.	yes	"0"	There are extensive production systems for ruminants in Belgium, but these have no influence on the risk for emergence of the disease in the animal populations.
24.	yes	"+++"	Bovine are asymptomatic healthy carriers and can excrete the bacteria for a long time without being detected. This is an important risk factor for emergence of the disease.
25.	yes	"+++"	The most important animal reservoir is cattle, but pigs, wild ruminants, turkeys, goats, sheep, boars can also be rarely carriers of virulent germs, and domestic animals, birds, rodents can also be sporadically carriers. There are "hypershedder" carrier animals harboring high amounts of bacteria in their intestines during long periods. The animal reservoir represent an important risk factor for emergence of the disease.
26.	no	"0"	The incubation period does not have any influence of the risk for emergence because the animals are healthy asymptomatic carriers capable to excrete the bacteria without the presence of clinical signs.
27.	yes	"++"	There are contacts between domestic and wild animals, with possibilities of reciprocal transmission of the germs by direct contact, since the wild fauna is also reservoir. There are several recent studies showing the important prevalence of the bacteria in wild animals. This represents a risk factor of transmission of the disease and so of emergence
28.	yes	"+"	The wild fauna can play an epidemiological role because it is a reservoir and it can transmit the infection to domestic animals. O157 has been isolated from deer, wild pigs, birds, rats etc. There are several recent studies showing the important prevalence of the bacteria in wild animals even for birds such as sparrows the bacterium could be isoltated from their excreta and they could be followed flying from one farm to another. This represents a risk factor for emergence of the disease. The quantification of the risk is

			difficult in absence of real studies concerning the role of the wild fauna in the epidemiology of the disease.
29.	no	"+"	There is no increase in the demography or distribution of the wild fauna concerned by the disease. Such an increase would represent a light risk factor for emergence because of the possibility of epidemiological role in the transmission of the disease. More studies are needed concerning the epidemiological role of the wild fauna.
30.	yes	"0"	There are climatic and meteorological changes, but the disease is not concerned by climatic changes
31.	no	"0"	The disease is not concerned by ecological changes.
32.	yes	"+"	There is an ongoing urbanisation in Belgium. If this urbanisation is accompagnied with closer contact between farms and housing of people as demonstrated in Denmark, this consitites a risk factor.
33.	no	"0"	Non vectorial disease.

Rundertuberculose (*Mycobacterium bovis*) (Bengis *et al*., 2004 ; Abalos and Retamal, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"++"	Mycobacteria are relatively genetically stable. A genetic variability would represent a risk factor for emergence of new strains.
2.	no	"+"	Much is known about the pathogenesis of the disease, except concerning some molecular aspects of the bacteria. Lack of knowledge on the pathogenesis is always risk factors for emergence of the disease.
3.	no	"+++"	Currently, there are no known changes in the pathogenesis of the disease. Changes in the pathogenesis of the disease such as an increase in the virulence for humans, or for a domestic animal species (dog, cat, horse, ...), which is a theoretical possibility, would represent a risk factor for emergence of the disease in these animal species.
4.	yes	"+++"	Vaccination is practiced in human medicine but is not practiced preventively in animals because the efficiency of the existing veterinary vaccines is variable and because the vaccination impedes the attempts of eradication of the disease. These difficulties represent risk factors for re-emergence of the disease.
5.	no	"++"	There are many target animal species but because of the weak genetic variability, the probability of a "change" in the host spectrum is weak. An increase in virulence for an already existing target animal species is more probable. A passage of the species barrier would represent a risk factor for emergence of the disease in a new animal species.
6.	yes	"0"	The disease is zoonotic, but the probability of retransmission of the disease from humans to animals is quasi inexistent. The zoonotic character has no influence on the risk for emergence of the disease in the animal population.
7.	no	"+++"	The disease is already present worldwide, so there is no geographical extension anymore. A geographical extension is always a risk factor of (re)emergence of the disease.
8.	yes	"++"	There are increases in incidence in neighbouring countries (France, United Kingdom, Ireland) and this represent a risk factor of re-emergence in Belgium.

9.	yes	"+++"	The bacterium is very resistant everywhere in the environment. This is a risk factor of re-emergence of the disease.
10.	yes	"- - -"	The legislation/sanitary policy/surveillance (detection, slaughtering, post-mortem inspection with tracing back in the herd of origin, compulsory notification, control of the animal movements, etc.) are protective factors against re-emergence. A decrease in the surveillance or of the measures could favor a re-emergence, particularly since the disease is yet sporadically present.
11.	yes	"0"	There are changes in the technological and industrial processes, but these have no influence on the risk for re-emergence in cattle. The pasteurisation/sterilisation of the milk is has a protective effect for humans.
12.	yes	"++"	There are problems of detection of the emergence (weak clinical signs; the interpretations of the tuberculinations are not always homogenous; problems of notification; no test on the wild fauna, the tests are efficient in cattle but not in other sensitive animal species such as dogs and cats for example, ...). A lack of detection represents always a risk factor for (re)emergence of infectious diseases.
13.	yes	"++"	There is an increase in interaction between the different sensitive animal species. Because M. tuberculosis is not strictly host-specific, increases in contacts between different animal populations represent a risk factor for emergence of the disease.
14.	no	"0"	There is no increase in interaction between domestic (and wild) host animal populations and humans. Because the probability that humans retransmit the infection to animals is very low, an increase would have no influence on the risk for emergence in the animal population.
15.	no	"0"	There is no significant demographic growth in Belgium. A demographic growth has no influence on the risk for emergence of the disease in the animal population.
16.	no	"+"	There is no growth of the cattle population. An increase in the domestic animal population concerned by the disease would represent a risk factor of emergence.
17.	yes	"0"	Human traveling is increasing. Human traveling increase the risk for human infection in endemic countries, but because the reverse zoonosis is very rare, this has no influence on the risk for emergence in the animal populations.
18.	yes	"0"	Human tourism is increasing. Tourism increases the risk for human infection in endemic countries, but because the reverse zoonosis is very rare, this has no influence on the risk for emergence in the animal populations.
19.	yes	"++"	There is an increase in trade of the concerned animal species (cattle) in Belgium. Because of the risk for importation of infected animal from endemic countries if the animals are not tested at importation (note that the test is obligatory), this represent a risk factor of introduction of the disease in the country and a risk for emergence.
20.	yes	"+++"	There is an increase in animal (cattle) transports in Belgium. Because the disease can spread via movements of undetected infected animals, and because there are several cases in Belgium each year, this represents a risk factor for emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"+"	There are intensive cattle production systems in Belgium. Although the introduction of the bacteria in such intensive (mostly closed) systems can be easily controlled, the promiscuity of the cattle in closed spaces can favor the transmission of the bacteria once introduced. Intensive production systems are a weak risk factor for emergence of the disease.
23.	yes	"+++"	There are extensive cattle production systems in Belgium. Because of the possibilities of contact with the wild fauna, this represents a risk factor of introduction of the infection in the herd, and a risk factor for emergence.

24.	yes	"++"	Although there can be intern lesions due to M. tuberculosis (detection on the carcass at the slaughterhouse), most of cattle are asymptomatic, which allows the transmission of the infection without being detected. This is a risk factor for dispersion and for emergence of the disease.
25.	yes	"+++"	There is an animal reservoir in the wild fauna (badgers) (in cattle, the domestic animal reservoir, the disease is mostly eradicated). This is a risk factor for emergence of the disease.
26.	yes	"+++"	There can be a long period between infection and appearance of clinical signs (months or years) and the animals can transmit the infection to many animals before being detected. This is a risk factor for emergence of the disease.
27.	yes	"++++"	There are contacts between cattle and the wild fauna. This represent a risk factor of infection of cattle (from the wild fauna) and of the wild fauna (from cattle), and a risk factor for emergence.
28.	yes	"+++"	The wild fauna (infected badgers), being a wild reservoir of the disease, plays an epidemiological role in the maintenance of the bovine tuberculosis and in complicating the complete eradication of the disease. This is a risk factor for emergence.
29.	yes	"+++"	There is an increase in the number of badgers and, because of its epidemiological role, this is a risk factor for emergence of the disease.
30.	yes	"0"	There are climatic and meteorological changes but this has no influence on the risk for emergence of the disease.
31.	yes	"++"	There are changes in the ecosystems produced by man. In relation to their implication with the wild fauna, this can be a risk factor for emergence of the disease.
32.	yes	"+"	There is an ongoing urbanisation in Belgium and this is a risk factor for emergence (mechanism?)
33.	no	"0"	Bovine tuberculosis is not a vectorial disease.

Tularemie (*Francisella tularensis*) (Bengis *et al*., 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"+"	There are several strains with different virulence levels (for example, the most virulent biovar is the A type in the USA, the European type B biovar being less virulent), but there is no genetic variability leading to the appearance of new strains, which is a protection factor against emergence. Because of its high growth exigencies, this bacterium is genetically stable. A genetic variability would represent a risk factor for emergence of new strains.
2.	yes	"++"	There is lack of knowledge of the pathogenesis (because only dead animals are found in the wild fauna, lack of knowledge of the interactions with the hosts, of the molecular pathogenesis, etc.), and it is a risk factor for emergence of the disease.
3.	no	"+"	Considering the lack of knowledge of the pathogenesis, it is difficult to answer this question, but it is assumed that there is currently no change in the pathogenesis. A change in the pathogenesis would represent a risk factor for emergence of the disease.
4.	yes	"+++"	As for each facultative intracellular bacteria, the classical vaccination is not very efficient. It is difficult to vaccine wild fauna. There is no authorized vaccine commercially available for animals. These difficulties concerning the vaccination represent a risk factor for

			emergence of the disease.
5.	yes	"+"	The disease concern mainly rodents and lagomorphs, but theoretically, all the mammal species are sensitive to the bacteria. This possibility of passage of the species barrier increases the risk for establishment of the disease in an uncommon animal species and is a risk factor for emergence of the disease in a new animal species.
6.	yes	"0"	The disease is zoonotic, but humans do not retransmit the disease to the animal populations. The zoonotic character of the disease has no influence of the risk for emergence of the disease in the animal populations.
7.	no	"++"	Because the disease is already present in Belgium, in France, etc., there is no true geographical expansion. A geographical expansion is always a risk factor for emergence. The sporadic presence of the disease is a risk factor for emergence.
8.	yes	"++"	There have been several outbreaks in humans the last years in neighbouring countries. For example, there has been an outbreak with more than 500 human cases in Sweden in 2003; there is a general increase in outbreaks in Europe (undetermined cause); there are 20 to 70 human cases per year in France, etc. If they correspond to a change in the pathogenesis or to an increased presence of the bacteria, these increases in incidence in neighbouring countries could represent a risk factor for emergence of the disease in Belgium.
9.	yes	"++"	The environment is contaminated essentially by dejections of rodents and the bacteria can persist several months at temperatures below 0°C in water, sludge or on plants and a few days at temperatures above 5°C. Because of the possibility of infection by inhalation, this persistence in the environment is a risk factor for emergence of the disease.
10.	no	"- -"	There is no legislation/sanitary policy for tularemia. Measures such as the screening/detection of epizooties in hare and wild rodents, the regulation of importations of rodents and lagomorphs, the protection of the exploitations against intrusion of wild rodents, the compulsory declaration of all the suspicions of tularemia in man and in animals, etc. should protect against the risk for emergence.
11.	no	"0"	The disease is not concerned by changes in industrial or technological processes.
12.	yes	"+++"	There are problems of detection of emergence (wild fauna, lack of knowledge by breeders, by the veterinary and medical world, no compulsory declaration). These problems of detection represent a risk factor for emergence of the disease.
13.	yes	"++"	There are increases in interactions between the animal compartments (mainly the wild fauna, during the hunting period for example). Because the disease is transmissible by direct contact, inhalation, ingestion, etc., this represent a risk factor for emergence of the disease.
14.	no	"+"	There is no real increase in interactions between humans and lagomorphs (except during the hunting period), but because the disease is zoonotic, an increase in interaction (for example, manipulation of the carcasses during the hunting) could represent a risk factor of seasonal transmission to man. Because humans only rarely retransmit the disease, the risk factor for emergence of the disease in the animal population is weak.
15.	no	"0"	There is no significant demographic growth in Belgium. The disease is not concerned by a demographic growth.
16.	yes	"++"	There is a growth of the animal populations concerned by the disease (wild fauna: lagomorphs, rodents, ticks) in Belgium. This is a risk factor for emergence of the disease.
17.	yes	"+"	Human traveling is increasing but this has no influence on the risk for emergence of the disease in the animal population (only weak risk for emergence in the human population)

18.	yes	"+"	Human tourism is increasing. This has no influence on the risk for emergence in the animal population, but represents a little risk for infection of humans (via increased risk for contact with ticks, ecological and bucolic tourism, increase of hunting restaurants and game meals.
19.	yes	"++"	There is an increase in trade of lagomorphs (see point 2.9: increase in game meals during the hunting period, etc.). This is a risk factor for emergence of the disease in the human population, but not in the animal population.
20.	yes	"++"	There is an increase in transport of lagomorphs (during the hunting period). This is a risk factor for emergence of the disease in the animal population.
21.	yes	"+"	Tularemia is concerned by the bio-terrorist threats because the bacteria are transmissible to humans through healthy skin or by inhalation and because the infectious dose is very weak. This represents a risk factor for emergence for humans, but not for animals. Note that the bacterium is very difficult to cultivate and that the risk is weak.
22.	yes	"- - -"	There are intensive production systems of rabbits, because there is no contact with the wild fauna, which is the reservoir of the germ, this constitutes a protection factor against emergence.
23.	yes	"++"	There are extensive production systems of rabbits. The possibility of contacts with the wild fauna and its dejections is a risk factor for emergence
24.	yes	"+"	Most of domestic (cats) and many wild animals (foxes, boars, mustelidae) are frequently asymptomatic carriers of the bacteria. Cats can transmit the bacteria to humans. Because the weak epidemiological role of these species, it represents a weak risk factor for the emergence of the disease.
25.	yes	"+++"	Hares and rodents represent the wild reservoir of the disease. Prairie dogs, sporadically present in Belgium since 1980, also. There is a possible trans-ovarian transmission in ticks, which are also considered as reservoir. Because the wild fauna is difficult to control, the wild animal reservoir is an important risk factor for emergence of the disease.
26.	no	"+"	There is no long incubation period in the most sensitive animal species: rodents and lagomorphs die after 1 to 2 weeks (short period). The length of the incubation period has no influence on the risk for emergence of the disease.
27.	yes	"+++"	Wild rodents can enter stables of domestic animals, which is a risk factor of infection of domestic mammals and a risk factor for emergence of the disease.
28.	yes	"+++"	The animal reservoir is a wild reservoir (hares, rodents). Because the wild fauna is difficult to control, this represent an important risk factor for emergence of the disease.
29.	yes	"+++"	There is a growth in the demography of the lagomorphs and of the wild rodents. A growth in demography of the wild fauna is a risk factor for emergence of the disease because the wild fauna is difficult to control.
30.	yes	"0"	There are climatic and meteorological changes, but they can have protective and/or risk effects on the emergence. For example, a softening of the climatic conditions with more rain (soft winters) will favor the survival of the bacteria and also the possibilities of transmission, because of the multiplication of the bacteria and of the target or intermediary animal species (mammals and arthropods) = risk factor. On the other hand, colder conditions (hard winters) represent a protection factor because animal and bacterial populations do not multiply (or to a lesser extend), and consequently the infectious and epidemiological pressures do not increase.
31.	no	"+"	Changes in the eco-landscaped structure of the forests (ex. North of America) favor the ticks pullulation. This would represent a

			risk factor for emergence, but such changes in ecosystems do not exist in Belgium.
32.	yes	"--"	There is an ongoing urbanisation in Belgium. Urbanisation has protective effects against emergence (decrease contacts between humans and wild fauna, decrease of the forest areas and of the wild fauna population).
33.	yes	"++"	There exist a vectorial transmission of the disease via ticks, but the quantification of their role in the transmission of the disease is difficult to estimate. Tick transmission is a risk factor for emergence of the disease.

Leishmaniose (*Leishmania infantum*) (Gallego, 2004 ; Dujardin, 2006)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	Very little is known at present about genetic variability because (i) there is little agreement on the exact taxonomy of *L. infantum* sl. and (ii) there is little precise information about the importance of the 'sexual' part (genetic recombination) in the lifecycle (as is the case for all trypanosomatids). A genetic variability would have no influence on the risk for emergence of this disease.
2.	Yes	"++"	There exists considerable confusion on the division between cutaneous leishmaniosis (CL) and visceral leishmaniosis (VL). E.g. there is a so-far unpublished thesis from Rabat University that shows that *L. tropica*, traditionally considered cause of TL, also causes VL in Morocco. A lack of knowledge represents always a risk factor for emergence.
3.	No	"+++"	There is no change in the pathogenesis. Changes in the pathogenesis would represent a risk factor for the emergence of the disease. For example, selection of parasites resistant to the drugs would increase the risk of emergence of resistant Protozoa. Dogs can constitute an important reservoir for the emergence of resistant strains because their teatment is difficult.
4.	Yes	"++++"	There are treatment difficulties and absence of available vaccine. These are risk factors for emergence.
5.	Yes	"+++"	Leishmania can infect different domectic and sylvatic animals, which become infectious. This is a risk factor for emergence and expansion of the disease.
6.	yes	"0"	The disease is zoonotic but humans are dead-end hosts and can not infect the vector, except in the case of immunocompromised persons where the parasite is dermotrope. In case of co-infection with the VIH (immunosuppression), there is a possibility of selection of drug-resitstant organisms, which can constitute a risk factor for emergence of potentially first line drug resistant leishmaniosis.
7.	Yes	"+++"	There is a geographical extension of the disease around the Mediterranean. There are sporadic human cases in Belgium (10 human cases per year, of which one Belgian case in 2007, with the other cases originating from all the continents, Europe included (Italy, Spain, Turkey). Recent expansion in the North of Italy. Ectopic outbreaks in France due to the frequent movements of dogs (in the Loire, etc.), which could stabilise in the future. Climatic evolution models indicate the possibility of outbreaks in the South of the United-Kingdom in 2030. The geographical extension of the agent represents a risk factor of emergence of the disease in Belgium.
8.	Yes	"++"	There are increases in incidence of the disease in other countries. This represents a risk factor of emergence of the disease in Belgium.

9.	No	"0"	The Protozoan does not persist in the environment (only persistence in the vector). A persistence in the environment would have no influence on the risk for emergence.
10.	Yes	"- - -"	There is a surveillance system in Belgium for humans (Tropical Medicine Institute) but not for animals. The existence of surveillance systems are protection factors against emergence.
11.	No	"0"	Disease not concerned by changes in technological or industrial processes.
12.	Yes	"+++"	There are problems of detection of the emergence (examples?). This represents a risk factor for emergence.
13.	Yes	"++"	The peri-urbanisation and the more frequent contacts of the citizen / dogs with the nature increase the proximity between dogs and larval forms of phlebotomes. This represents a risk factor for emergence of the disease.
14.	Yes	"++"	There is a proximity between domestic dogs and humans. The role of dogs as infection source for humans has been established, but this occurs via a vectorial bite, without needing a direct interaction. There are more frequent contact of the citizen with the nature. This increases the risk of bite by phlebotomes and the risk for human infection. These are risk factors for emergence of the disease in humans, but not in animals, because humans can not retransmit the disease to animals
15.	No	"0"	There is no significant demographic growth in Belgium. A human demographic growth would have no influence on the risk for emergence of the disease in the animal population.
16.	no	"+++"	There is no true increase in the dog population in Belgium. An increase in the reservoir animal population would represent a risk factor for emergence of the disease.
17.	yes	"++"	Human traveling is increasing. The mobility allows the colonisation by new species of Leishmania. This represent a risk factor of emergence of the disease.
18.	yes	"++++"	Human tourism is increasing. There are imported human cases of leishmaniasis in Belgium due to touristic activities (trips). This is a risk factor of emergence of the disease in humans, but not in the animal populations.
19.	Yes	"++"	There is an increase in trade of dogs. This represents a risk factor of emergence of new species of Leishmania.
20.	Yes	"++"	There is an increase in transport of dogs. This represents a risk factor of emergence of new species of Leishmania.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	No	"0"	The disease is not concerned by the production systems
23.	No	"0"	The disease is not concerned by the production systems
24.	Yes	"++++"	The dogs do not present clinical signs. As a consequence, they are not treated and can retransmit the disease. This represents a risk factor for emergence of the disease.
25.	yes	"++++"	Dogs are the main animal reservoirs, but there is also a high number of implicated sylvatic and domectic animal species (62 different mammals, foxes, wolves, renards, loups, jackals, ...), but not in Belgium. Cats (exceptionally). This represents a risk factor of emergence of the disease.
26.	Yes	"++++"	The long incubation period without clinical signs allows the transmission of the disease via the phlebotomes. This constitutes a risk factor of emergence of the disease.
27.	yes	"+++"	There are numerous susceptible sylvatic mammals. The possibility of contacts between domestic dogs and cats and these sylvatic mammals favours the transmission of the disease. This represents a risk factor of emergence of the disease in the animal population.

28.	yes	"+++"	There are numerous susceptible wild mammals able to transmit the infection to the domestic animals and humans via the phlebotomes. This represents a risk factor of emergence of the disease.
29.	no	"+++"	There is no increase in the wild fauna population in Belgium. Because wild animal can retransmit the disease, an increase would represent a risk factor for emergence of the disease.
30.	Yes	"++++"	There are climatic and meteorological changes. The climatic changes (warming) constitute an important risk factor for geographical extension of the disease towards temperated regions via modifications in the distribution of the vectors (extension towards the North), via an increase in the density of vectors (lenghtening of the activity period with the increase in temperature), and via an increase in the number of infected vectors. Thanks to the increase in temperature, the phlebotomes can overwinter at larvae stadia. This represents a risk factor for emergence of the disease.
31.	no	"++"	Natural and human-induced changes in the ecosystems (for ex. deforestation) can lead to modifications in the range and density of the vectors and the reservoirs and represent a risk factor for emergence of the disease. But such changes in ecosystems do not occur at present in Belgium.
32.	Yes	"++"	There is an ongoing urbanisation in Belgium (peri-urbanisation). This is a risk factor for emergence of the disease in dogs because it increases the contacts between dogs and vectors.
33.	Yes	"++++"	The implicated phlebotomes are present in Belgium. Once infected, the phlebotome remains infected all the life (during months). The vectorial activity is concentrated in the summer perio. The vectors move below 1 km from the larvae form, situated mainly near the herbivore farms. The presence of the vector is an important risk factor of emergence of the disease.

Rabiës bij vleermuizen (Europese Lyssavirussen 1 en 2) (Bengis *et al*., 2004 ; Cliquet and Picard-Meyer, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+++"	Lyssaviruses are RNA viruses which typically have a high mutation rate. 4 new genotypes have been recently isolated in bats in Asia and in East Europe. A mutation that changes the disease characteristics in bats toward more agression, might facilitate transmission the transmission to humans or to other anial species. Genetic variability is a risk factor for emergence.
2.	yes	"+++"	There is lack of knowledge of the pathogenesis. Bats are protected species and especially the insectivorous European species are difficult to keep in captivity. For these reasons, there are almost no experimental infection studies in bats and there is limited knowledge on the behaviour of these lyssaviruses in their reservoir host, the bat. Studies are necessary to study the ecology of bats and and the viral transmission between bats. The lack of knowledge in pathogenesis is a risk factor for emergence of the disease.
3.	no	"++"	Currently, there is no observed change in the pathogenesis. Transmission to ther species, such as men, is rare although the viruses are relatively prevalent in certain European bat species. This is probably due to the fact that the typical rabid aggressive behaviour is seldomly seen in European bats. Probably this is because the pathogenesis of European bat lyssaviruses is different

			from the classic rabies virus. A mutation might change the pathogenesis, what should represent a risk factor, because it might change the behaviour of these lyssaviruses towards the phenotype of the classic rabies virus, with an increased appearance of rabid behaviour (agressivity) in bats and transmission to humans (as is the case in the USA) = variation in the interaction host-pathogen.
4.	yes	"++"	It is difficult to vaccine wild species (bats). This is a risk factor for emergence.
5.	yes	"+++"	Several cases of transmission to other species have been described in Europe (1 marten in Germany, 2 house cats in France, 2 sheep in Denmark). The possibility to pass the species barrier is a risk factor for emergence in new animal populations.
6.	yes	"0"	The bats can transmit the infection to humans. But since humans do not retransmit the virus, they are dead-end hosts. The zoonotic character of the disease is not a risk factor for emergence (no influence).
7.	yes	"++"	The disease is present in all Europe. This is a risk factor for emergence.
8.	yes	"++"	There are increases in incidence in other countries than Belgium. These increases have a direct influence on the risk for emergence in Belgium because bats (wild life) are capable to move from one country to another independently of the borders. The increase in incidence in the other countries is a risk factor for emergence.
9.	no	"0"	The virus is not able to persist in the environment. The possibility of viral persistence in the environment should have no influence on the risk for emergence because transmission requires a contact between animals.
10.	yes	"++"	Bats are protected by law. This implies that epidemiological research or other types of research are only allowed after specific derogation by the competent authorities. In this case, the legislation represents a risk factor for emergence. In 1999, an infected bat transited through Belgium from Africa towards France. The legislation about importation should be reinforced and the controls should be more rigourous.
11.	no	"0"	No influence of changes in technological or industrial processes for the risk for emergence of this disease.
12.	yes	"+++"	It is dificult to obtain samples for analysis and surveillance. Bat conservationist groups in Belgium are rather protective and it is difficult to gain their confidence and cooperation with regard to obtaining samples of diseased or dead specimens for analysis. Bats are wildlife species. This can lead to a problem of detection of emergence and is a risk factor for emergence.
13.	no	"++"	There is no specially increase in interactions between bats populations and other animal populations, but favourising contacts between bats and other animal species increases the risk for transmission and of emergence in other species.
14.	yes	"0"	Bat conservationists are at highest risk for being contaminated by bats. Several groups are active in Belgium with growing numbers of members. Disappearance of natural biotopes (abandonned buildings, forrests,...) may force bat colonies to move nearer to human dwellings. Since men do not retransmit the infection (dead-end host), the increase in interactions between humans and animals has no influence on the risk for emergence in the animal population.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not concerned by a demographic growth, because humans are dead-end hosts.
16.	no	"++"	There is no growth of the bat species population which is the most concerned (Eptesicus serotinus). A growth should represent a risk factor for emergence of the disease in this animal population.
17.	yes	"0"	Human traveling is increasing, but bats are not concerned by human travels. No influence of this factor on the risk for emergence of the disease in this animal population.

18.	yes	"0"	Human tourism is increasing, but bats are not concerned by human tourism. No influence of this factor on the risk for emergence of the disease in this animal population.
19.	no	"0"	Bats are not concerned by trade. This factor has no influence on the risk for emergence. Note that in 1999, an infected bat transited through Belgium from Africa towards France.
20.	no	"0"	Bats are not concerned by transport. This factor has no influence on the risk for emergence. Note that in 1999, an infected bat transited through Belgium from Africa towards France.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	Bats are wild fauna, which is not concerned by the production systems. No influence of this factor on the risk for emergence.
23.	no	"0"	Bats are wild fauna, which is not concerned by the production systems. No influence of this factor on the risk for emergence.
24.	yes	"+++"	There are asymptomatic infected bats. This is a risk factor for emergence because asymptomatic animals can transmit the disease without being detected.
25.	yes	"+++"	The animal reservoir is the wild bats population. Since wild life is difficult to control/watch, this is a risk factor for emergence.
26.	yes	"+++"	Infections by Lyssaviruses are characterised by a long incubation period. A long incubation period allows the viral transmission without being detected, which increases the risk for emergence of the disease.
27.	yes	"+++"	There are contacts between bats and sensible animal species. Since the passage of the species barrier is possible, this constitutes a risk factor for emergence of the disease in these other animal species.
28.	yes	"+++"	The wildlife has an epidemiological role since wild bats are the reservoir. Wildlife is dificult to control. This is a risk factor for emergence of the disease.
29.	no	"+++"	There is no growth of the bat species population which is the most concerned (Eptesicus serotinus). Since bats are the main host of the disease, a grouwth would represent a risk factor for emergence of the disease.
30.	yes	"+"	There are climatic and meteorological changes. Bats can be migratory. Changes in climate may change their natural territory. Soft winters and abundance of insects are ideal to increase bat populations. The changes in climate and meteorology are risk factor for emergence of the disease.
31.	yes	"++"	There are changes in biotopes produces by man. Reduction of natural biotopes may force bats to live nearer to human dwellings or other animal populations. It can have an influence on the risk for infection of humans or other animal populations, but not on the risk for emrgence in the bat population.
32.	yes	"++"	There is an ongoing urbanisation in Belgium. Some bat species are good adapted to the urban environment. That can increase the risk.
33.	no	"0"	Non vectorial disease. No influence on the risk for emergence.

Anaplasmose (*Anaplasma phagocytophillum*)

Factor	Presence (yes) /	Impact (risk /	Scientific justification

	absence (no)	protection / no effect)	
1.	No	"+"	There is no genetic variability of the bacteria. A genetic variability of the bacteria should represent a risk factor for emergence of the disease.
2.	yes	"++"	There is a general lack of knowledge of the pathogenesis of the obligate intracellular bacteria. A lack of knowledge of pathogenesis represents a risk factor for emergence of the disease.
3.	No	"++"	There is no known change in the pathogenesis of anaplasmosis. A change in the pathogenesis should represent a risk factor for emergence of the disease.
4.	yes	"+++"	There are questions concerning the efficacy of vaccination (due to the lack of knowledge on pathogenesis, and to the fact that the bacteria grow intracellularly). The difficulty to control the disease by vaccination represents a risk factor for emergence.
5.	Yes	"++"	The bacteria are capable to infect numerous mammal species, which can all re-infect the ticks. This represents a risk factor for emergence.
6.	Yes	"0"	The bacteria can be transmitted to humans. Because humans are accidental hosts (dead-end hosts not capable to retransmit the infection to the ticks), this has no influence on the risk for emergence.
7.	Yes	"+++"	There is a geographical extension of the pathogenic agent which is largely distributed in North of America, in Europe and in Asia. This is a risk factor for emergence.
8.	No	"++"	There is no significant increase of incidence in neighboring countries. An increase in incidence would represent a risk factor.
9.	No	"0"	The bacteria grow strictly intracellularly and are not capable to survive in the environment outside the vector (the ticks are not considered as "environment"). The persistance in the environment would have no effect on the risk of emergence because the transmission necessitates a vector bite.
10.	No	"0"	There is no legislation and there are no official sanitary measures. Knowing the epidemiology of the disease (the transmission is obligatory vectorial and ticks are difficult to control by legislation; impossibility to control the infection of the animal population by ticks), the existence of a legislation for animals would have no influence on the risk for emergence of the disease in animals.
11.	No	"0"	The disease is not influenced by changes in technological or industrial processes.
12.	Yes	"+++"	There are problems of detection of the emergence (lack of knowledge by the breeders, veterinarians and by the medical world, resulting in a lack of diagnosis and an underestimation of the disease. Mammals remain asymptomatic carriers for life). The lack of detection of the disease is a risk factor for emergence of the disease.
13.	Yes	"++"	There are increased interactions between the animal compartments concerned by the disease. The proximity between the several animal hosts increases the probability of bites by infected ticks. This is a risk factor for emergence of the disease.
14.	No	"0"	There is no increase in the interaction between the concerned animal populations and humans. Such an increase would incease the risk for bite of humans by infected ticks, and sould be a risk factor for infection in humans. But because humans do not retransmit the infection (accidental host), this would not represent a risk factor for emergence of the disease in the animal population.
15.	No	"0"	There is no significant demographic growth in Belgium. Human demographic growth should have no influence on the risk for emergence because humans are accidental hosts and do not retransmit the infection.

16.	No	"++"	There is no growth of the animal populations concerned by the disease. Due to the increase of the infection pressure, an increase in animal populations would represent a risk factor of emergence for the disease.
17.	Yes	"0"	Human traveling is increasing. This increases the risk for human infection, but this has no influence on the risk for emergence in the animal populations in Belgium because humans are accidental hosts.
18.	Yes	"+"	Human tourism is increasing. There are certain touristic activities (in forest), increasing the risk for infection in humans and in their companion animals.
19.	Yes	"0"	There is a general increase in trade, but this has no influence on the epidemiology of the disease nor on the risk for emergence. Since the disease is already prevalent in Belgium, the risk for importation of infected animals has no influence on the risk for emergence of the disease.
20.	yes	"0"	There is a general increase in transport, but this has no influence on the epidemiology of the disease nor on the risk for emergence. Since the disease is already prevalent in Belgium, the risk for transport of infected animals has no influence on the risk for emergence.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are intensive production systems (cattle, etc.). Intensive productrion system avoids contact with the vector in natural biotopes and acts as protector factor.
23.	yes	"++"	There are extensive production systems (cattle, etc.). Extensive production system allows and enhances contact with the vector environment and then constitutes an effective risk factor.
24.	Yes	"++"	Many mammal hosts remain, once infected, asymptomatic carriers for life, ensuring a reservoir role capable to retransmit the infection to the ticks. This is a risk factor for emergence of the disease.
25.	yes	"++"	Many mammal hosts remain, once infected, asymptomatic carriers for life, ensuring a reservoir role capable to retransmit the infection to the ticks. This is a risk factor for emergence of the disease.
26.	yes	"++"	The incubation period can be long in animals. This is a risk factor for emergence because these animals are not detected and have more chances to retransmit the disease before becoming diseased.
27.	yes	"++"	There are contacts between domestic animals and wildlife. This is a risk factor for emergence because proximity favors the vectorial transmission by the ticks, especially when the wildlife is asymptomatic.
28.	Yes	"++"	Numerous wild mammal species (cervidae, foxes, rodents, maybe birds) constitute the natural reservoir of the bacteria in Europe. This is a risk factor for emergence of the disease.
29.	No	"++"	There is no increase in the demography of the wild fauna concerned by the disease. Since the wild fauna plays a role of natural reservoir of the disease, an increase in demography of the wild life would constitute a risk factor for emergence of the disease.
30.	Yes	"++"	There are climatic and meteorological changes,(more rains in the winter and more dry periods in the summer, for example) which can induce changes in the distribution and activity of the ticks. Ixodes ricinus live in temperate regions (biotope: high humidity), and the ticks are twice more active and mobile when the weather is warm and dry. Climatic changes could constitute a risk factor for emergence of the disease via a modification of the ecosystems which could become more favorable to the proliferations of the vector.
31.	Yes	"+++"	There are changes in the ecosystems produced by man. Modifications of the soils state or occupation (drainage, forest

			fragmentation, short cut, etc.) and the humidity favor the populations of ticks. These are risk factors for emergence.
32.	Yes	"0"	There is an ongoing urbanisation in Belgium.The urbanization is a protection factor against infection of humans and domestic animals (dogs) because of the less frequent possibilities of contact with the ticks. Attention, urbanization in the suburbs can increase the possibilities of contact with the ticks. Urbanization has no influence on the risk for emergence of the disease because humans are accidental hosts
33.	Yes	"++++"	The vector (ticks Ixodes ricinus) is present in Belgium and this is the main risk factor for emergence of the disease.

Bluetongue (Orbivirus serotype 8 + andere serotypes)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+"	There exists a genetic variability in the RNA viruses, associated with a risk for reassortment. Other serotypes than serotype 8 are currently absent in Belgium, but are prevalent in neighbouring countries (France for ex.). Genetic drift and shift may increase (but also decrease) the virulence of the disease. Serotype alone does not determine the virulence of individual field strains of BTV.
2.	yes	"++"	There is lack of knowledge of the pathogenesis of the disease (for the several serotypes). This lack of knowledge is a risk factor for emergence (lack of detection, for example)
3.	yes	"++"	There have been changes in pathogenesis, namely concerning serotype 8. Changes in pathogenesis can affect the intensity of clinical signs in some sensitive animal species (namely cattle) or induce new features on transplacental infections. This is also possible for other serotypes. Changes in pathogenesis are a risk factor for emergence.
4.	yes	"++"	In Belgium vaccination against BTV8 came too late, and most susceptible animals were already infected by the natural way. Duration of protection after vaccination is not exactly known but limited in time. Natural infection however would give lifelong immunity. Concerning other emergent serotypes, the unavailability of specific vaccines is a risk factor. Moreover, we cannot anticipate the emergent serovar and we cannot prevently vaccine the animals again all serotypes. Difficulties related to the vaccination represent a risk factor for emergence of viral diseases.
5.	yes	"0"	Not only ruminants may be infected: many carnivores and some rodents may also be infected. But since their role in the epidemiology of the disease seems to be insignificant, the change of the host spectrum has no influence on the risk of emergence of the disease.
6.	no	"0"	The disease is not zoonotic. There is no influence of this factor on the risk for emergence.
7.	yes	"++++"	The several serotypes of Bluetongue viruses (can) spread geographically. This is a risk factor for emergence of new strains in Belgium.
8.	yes	"+++"	In other countries (neighbouring countries and other), there are increases in incidence of serotypes absent in Belgium (for example, serotype 1). This is a risk factor for emergence due, for example, to an increase in the risk for importation of an animal infected by a serotype absent in Belgium.
9.	no	"0"	The virus can not persist in the environment outside the vector. Even if it was able to persist in the environment, this should have

			no influence of the risk for emergence since transmission involves the action of a vector.
10.	yes	"- -"	There are sanitory policy measures (mandatory vaccination, restrictions of movements, mandatory notification, screenings, etc.). These are protection factors against emergence.
11.	no	"0"	Bluetongue is not concerned by changes in technological or industrial processes.
12.	yes	"+++"	There have been problems of detection of the serotype 8 in 2005-2006 (difficulties to recognise and diagnose unusual clinical signs, difficulties of declaration by farmers and veterinarians, etc.). Problems of detection of infectious disease are risk factors of emergence because it results in a spread of the disease without control measures.
13.	yes	"++"	There are increasing interactions between animal compartments, for example through and transport. Moving infected animals in free areas is a risk factor for emergence of the disease in the uninfected animal populations.
14.	no	"0"	There are increasing interactions between the ruminant populations and the humans. Since the disease is not zoonotic, an increase in such interactions will not influence the risk for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. This should have no influence on the risk for emergence since the disease is not zoonotic.
16.	no	"++"	There is no increase in the ruminant population in Belgium. An increase in the animal population concerned by the disease should represent a risk for emergence of the disease (higher transmission rates).
17.	yes	"0"	Human traveling is increasing, but humans are not involved in the risk of spread of the disease (only risk of transport of infected vectors)
18.	yes	"0"	Human tourism is increasing, but humans are not involved in the risk of spread of the disease (only risk of transport of infected vectors).
19.	yes	"+++"	Animal trade is increasing. This is a risk factor for emergence, through the risk for importation of animals infected by serotypes against which the animal population is not immunised.
20.	yes	"+++"	Animal transport is increasing. This is a risk factor for emergence through the risk for transport of animals infected by serotypes against which the animal populations are immunologically naive.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"++"	There are intensive production systems for ruminants in Belgium. The high density of the animal population increases the risk for infection (higher transmission rates) and of emergence. Moreover, in Belgium usually more C.obsoletus/scoticus were captured inside than outside the stables.
23.	yes	"++"	There are extensive production systems for ruminants in Belgium. The presence of animals on pasture increases the risk for contact with the vectors and the risk for emergence
24.	yes	"+++"	There are asymptomatic carriers, which can disseminate the infection without being detected, confined or treated. This is a risk factor for emergence.
25.	yes	"++"	The animal reservoirs are the domestic and wild ruminants, but wildlife has no important reservoir function, since seroprevalence decreased in Belgian deer in 2008 (mostly in juveniles) (Linden *et al*. Emerging Inf dis 16, 833-836, 2010). A wild reservoir is a risk factor for spread of the disease because it is difficult to control. A domestic animal reservoir is also a risk factor for spread of the disease.

26.	no	"0"	The incubation period of Bluetongue disease is not especially long. The length of the incubation period has no influence on the risk for emergence because the vectors do not need the presence of clinical signs to bite animals and transmit the viruses.
27.	yes	"++"	There are possibilities of (proximity) contacts between domestic and wild ruminants. Proximity between the two animal populations favours the viral transmission through culicoïdes. This is a risk factor for dispersion of the disease.
28.	yes	"++"	The wild fauna (ruminants) has an epidemiological role in the transmission of the disease because it is a (not very important) reservoir. It is a risk factor because wild fauna is difficult to control and vaccine.
29.	yes	"+"	There is an increase in the wild cervids population. Since wildlife plays a (not important) epidemiological role, this is a risk factor for emergence.
30.	yes	"++"	There are climatic and meteorological changes. Global warming is a risk factor for emergence because higher temperatures increase the vectorial capacity and competence for BT virus, increase the survival and activity of the vectors, change the geographical distribution areas of these vectors (Northern hemisphere). In Belgium, these changes are not so important, and Culicoides was already there since a long time.
31.	yes	"+"	There are (few) changes in the ecosystems favouring the presence of culicoides. This is a (weak) risk factor for viral propagation.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Urbanisation has no influence on the risk of emergence of the disease. Culicoides have been seen in farms and barns. Consequently, urbanisation does not decrease nor increase the presence of culicoides.
33.	yes	"++++"	The vectors responsible for the transmission of the disease are present in Belgium (Culicoides). This is an important risk factor for establishment and expansion of new viral serotypes in Belgium if such new serotypes are introduced.

Echinococcose (*Echinococcus granulosus*)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	There is no genetic variability. A genetic variability would have no influence on the risk for emergence of this disease.
2.	no	"+"	There is no lack of knowledge on the pathogenesis. A lack of knowledge represents always a risk factor for emergence.
3.	No	"+"	There is no change in the pathogenesis. A change in pathogenesis could always represent a risk factor of emergence of the disease.
4.	yes	"+++"	Vaccination against parasites is mostly problematic (efficiency, etc.). This is a risk factor of emergence of the disease.
5.	No	"++"	The parasite can already infect several animal species but, due to the absence of genetic variability, there is no possibility to infect additional animal species. A passage of the species barrier would represent a risk factor for emergence of the disease.
6.	yes	"0"	The disease may be accidentally zoonotic. Since humans do not excrete the parasite in the feces (no definitive host) and consequently are not capable to retransmit the disease, there is no influence of the risk for emergence in the animal population.
7.	No	"++"	There is currently no geographical extension of the disease. A geographical extension would increase the risk for dispersion and for emergence of the disease.

8.	No	"++"	There is no increase in incidence in other countries. An increase in incidence in other countries would represent a risk factor of emergence of the disease in our country.
9.	yes	"++"	The infectious parasite can persist in the environment in the feces of the definitive hosts (for ex. in pastures) and be ingested by the intermediate hosts; this is a risk factor for emergence of the disease in the animal population.
10.	yes	"- -"	There are legislations and measures: the parasite is on the list of zoonotic diseases to be monitored (zoonoses Directive); post mortem inspection of ruminant carcasses at the slaughterhouse; destruction of offal at the slaughterhouse to avoid infection of dogs; but there is no official surveillance in the definitive hosts and no measures in wild and domestic canids. The legislation and the sanitary policy measures are always protection factors against emergence.
11.	no	"0"	The disease is not concerned by changes in technological or industrial processes.
12.	yes	"++"	There are problems of detection of emergence (no true surveillance programme aiming at detecting an increase in incidence but only punctual prevalence studies for research activities; the disease is asymptomatic in the definitive hosts). These problems are risk factors for emergence.
13.	yes	"++"	There is an increase in interaction between the animal compartments concerned by the disease (dogs and sheep). This represent a risk factor for transmission of the disease and for emergence.
14.	yes	"0"	There is an increase in interactions between canids and humans. This has no influence on the risk for emergence in the animal population because humans do not retransmit the parasite.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic growth.
16.	no	"+++"	There is no growth of the animal populations concerned by the disease. Such a growth would represent a risk factor for emergence of the disease.
17.	Yes	"0"	Human traveling is increasing. This has no influence on the risk for emergence of the disease in the animal population since humans do not retransmit the parasite to animals.
18.	Yes	"++"	There is an increase in touristic activities. This is a risk factor for emergence of the disease in dogs (increased probability of eating offal of intermediate hosts such as sheep carcasses).
19.	Yes	"+"	There is an increase in trade of dogs. This can be a risk factor for importation of infected dogs and a weak risk factor for emergence ("weak" because the disease is already endemic in Belgium)
20.	Yes	"+"	There is an increase in transport of dogs. This can be a risk factor for dispersion of infected dogs and a weak risk factor for emergence ("weak" because the disease is already endemic in Belgium)
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"- -"	There are no intensive sheep production systems in Belgium. Intensive production systems can protect against emergence by decreasing the possibilities of interaction of these domestic intermediate hosts with pastures potentially contaminated by feces of infected definitive hosts (dogs or foxes)
23.	Yes	"+++"	There are extensive sheep production systems in Belgium. This is a risk factor for emergence of the disease because it allows sheep to graze on pastures potentially contaminated by feces of infected dogs.
24.	Yes	"++"	The dogs (and foxes) are asymptomatic carriers. This allows the dissemination of the parasite in the environment and infection of

			the intermediate hosts. This is a risk factor for emergence of the disease.
25.	Yes	"+++"	The canids are the reservoir of the disease. Because of their epidemiological role in the transmission of the disease and the possibility of asymptomatic carriage, this represents a risk factor for emergence of the disease
26.	Yes	"0"	There is a long incubation period in animals, linked to the asymptomatic carriage. Because the excretion of the parasite and transmission of the disease does not depend on the presence of clinical signs, this has no influence on the risk for emergence of the disease.
27.	Yes	"0"	There are possibilities of direct contact between the intermediate domestic hosts (for example sheep kept outside) and definitive wild hosts (foxes). However, direct contacts are not necessary to keep going the parasitic cycle because infection of canids occurs via ingestion of offal of infected sheep and infection of domestic intermediate hosts (sheep) occurs via grazing or ingesting feed contaminated by feces of infected canids. Moreover, foxes play only a minor role as definitive host in comparison with dogs. Consequently, it is considered that the contacts between domestic animals (sheep) and wildlife (foxes) has no influence on the risk of emergence.
28.	no	"++"	Wild foxes (definitive hosts) play only a minor epidemiological role in the transmission cycle of the parasite in comparison with domestic dogs. Wild cervids (intermediate hosts) can be a source of infection for the dogs. Nevertheless, the epidemiological role of the wild fauna is minor in comparison with the role of dogs and sheep in the transmission cycle of the disease. If they had a more important epidemiological role, the wild definitive and intermediate hosts, because they are able to transmit the parasite, would represent a risk factor for emergence of the disease.
29.	Yes	"0"	The last ten years, populations of foxes have increased and extended (in Flanders and in peri-urban zones). There is also an increase in the populations of wild cervids. Because wildlife does not play an important epidemiological role, this has no influence on the risk for emergence of the disease.
30.	Yes	"0"	There are climatic and meteorological changes, but the emergence of the disease is not concerned by such changes.
31.	no	"0"	There are no changes in ecosystems allowing the emergence of the disease
32.	Yes	"++"	There is an ongoing urbanisation in Belgium. Foxes in cities could increase the risk of emergence of th disease
33.	no	"0"	Non vectorial disease.

Equine virale arthritis (Arterivirus)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+++"	There exists a genetic variability. This is a risk factor for emergence.
2.	yes	"++"	There is lack of knowledge of the pathogenesis. This is a risk factor for emergence
3.	yes	"++"	There are changes in pathogenesis with emergence of more virulent variants, namely in France in 2007. There are differences between Europe and USA, where there have been abortion "storms". These changes in pathogenesis are risk factors of emergence.

4.	yes	"+++"	There are few vaccines, which are few tested (but which seem to have an effect of reduction of the viral excretion). These difficulties to control disease by vaccination are risk factor for emergence of the disease.
5.	no	"+++"	There is no passage of the species barrier, and this is a protection factor against emergence. A passage of the species barrier (infection via the respiratory way) would represent a risk factor for emergence.
6.	no	"0"	The disease is not transmissible to humans.
7.	yes	"+++"	There is an extension of geographical distribution. This is a risk factor for emergence.
8.	yes	"+++"	An increase in incidence is observed since several years, associated with an increase in animal movements and transport of sperm. This is a risk factor for emergence because it increases the risk for infection.
9.	no	"0"	There is no persistence of the virus in the environment. According to the transmission pathways, a persistence in the environment should not be a risk factor for emergence.
10.	yes	"- - - -"	There is a control at importation of stallions (certificates). This is a protection factor against emergence.
11.	no	"0"	This disease is not concerned by this factor
12.	yes	"+++"	Due to the chronic asymptomatic carriage, there are difficulties of detection of the disease, which represents a risk factor for viral dissemination. The difficulty of detection is a risk factor for emergence.
13.	yes	"++"	There is an increase in interactions between horse populations because horses travel more and more internationally (races, jumpings, etc.). An increase in interactions between horses population represent a a risk factor for emergence.
14.	no	"0"	There is no increase in interactions between horses and humans populations. This would have no influence on the risk for emergence of the disease.
15.	no	"0"	There is no significant demographic growth in Belgium. This disease is not concerned by a human demographic growth.
16.	no	"0"	There is no growth of the horse population. According to the transmission pathways, a growth of the horses population would not influence the risk for emergence.
17.	yes	"0"	Human traveling is increasing. According to the transmission pathways and to the fact that the disease is not zoonotic, such an increase would have no influence on the risk for emergence.
18.	yes	"0"	Human tourism is increasing. According to the transmission pathways and to the fact that the disease is not zoonotic, such an increase would have no influence on the risk for emergence.
19.	yes	"+++"	There is an increase in trade of horses and of sperm. This represents a risk factor for emergence of the disease.
20.	yes	"+++"	There is an increase in transport of horses and of sperm. This represents a risk factor for emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	Horses are not concerned by production systems
23.	yes	"0"	There are extensive production systems for horses in Belgium (pasture). This has no influence on the risk of emergence of the disease.
24.	yes	"++++"	There is a life asymptomatic carriage by chronic infected stallions. Because these stallions are not systematically detected, this is a risk factor for emergence.
25.	no	"0"	There is no animal reservoir; an animal reservoir should not represent a risk factor for emergence.

26.	no	"++"	The incubation period is not especially long for this disease. A long incubation period would represent a risk factor for emergence of the disease because is should allow the diffusion of the virus without detection of the infection. However, the legislation (certificates) would limit this risk.
27.	no	"0"	Disease not concerned by the wildlife
28.	no	"0"	Disease not concerned by the wildlife
29.	no	"0"	Disease not concerned by the wildlife
30.	yes	"0"	There are climatic and meteorological changes. Disease not concerned by climatic changes
31.	no	"0"	Disease not concerned by changes in ecosystems
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Disease not concerned by urbanisation
33.	no	"0"	Non vectorial disease

Necrotische enteritis bij pluimvee (*Clostridium perfringens*)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"++"	There are variants (toxinotypes) depending on the strains. In a same toxinotype, varaition of pathogenicity could be observed, especially linked to the ability of toxin expression and level of expression. Moreover, some genes coding for toxins are situated on mobile elements (plasmids) capable to be transferred, but this possibility is not studied. The genetic variability represents a risk factor for emergence of new variants.
2.	yes	"+++"	There is a lack of knowledge of the pathogenesis of the disease. During years, the pathogenesis was thought to be understood at the bacteriologic level (toxin alpha), but today, contradictory results concerning the implicated toxins are published. The circumstances of the apparition of the enterotoxaemia in the animals are not well understood. The most difficult is to determine with precision the management and feeding conditions allowing the start of pathology. These lacks of knowledge of the pathogenesis constitute risk factors of emergence of the disease (for example by impeding to take adequate prevention measures).
3.	no	"++"	There are no changes in the pathogenesis (see point 1.1: there is no genetic variability), which represent a protection factor against the emergence of the disease. Changes in the pathogenesis would represent a risk factor for emergence of the disease.
4.	yes	"++"	There are practical difficulties to control the disease by vaccination. Moreover, new research results are published, calling previous theories into question. These difficulties concerning the vaccination represent a risk factor for emergence of the disease.
5.	no	"0"	The possibility of passage of the species barrier is unknown (the basis of a potential host specificity is unknown), but it is considered that the pathogenic strains of C. perfringens are host-specific. The origin of the pathology is the own intestinal flora of the animal, in a specific flock. So, there is no influence of a possible passage of the species barrier on the risk of emergence.
6.	yes	"0"	The disease is not considered to be zoonotic (the strains are host specific; the pathogenesis of the disease in humans is totally different from the one in poultry), but the possibility exists. If the possibility existed (in theory), this would have no influence on the

			emergence in the animal population.
7.	no	"0"	Clostridium perfringens are commensal bacteria which are already present everywhere in the intestines of the animals and in the environment. So, there is no geographical extension of the agent possible. However, there is a geographical extension of the "disease". Because the bacteria is already ubiquitous, a geographical extension of the disease has no influence on the risk for emergence.
8.	yes	"0"	There is an increase in incidence of the disease in other countries, but this has no influence on the emergence of the disease in Belgium, because the bacteria are already ubiquitous in the intestines of the animals and in the environment.
9.	yes	"0"	The type A is ubiquitous and can survive in soil and dust, and also in the intestine of animals. The persistence in the environment has no influence on the risk for emergence of the disease because the bacteria is already commensal and ubiquitous in the intestine of the animals.
10.	yes	"++"	There is no specific legislation about necrotic enteritis in poultry, but the re-emergence of the disease is associated to the interdiction of using some antibiotics as additive in poultry feed (this decision is founded on human health protection, inter alia to limit extension of antibiotics resistance). Interdiction of using antibiotics as additive represents a risk factor of emergence of the disease.
11.	yes	"+++"	There are changes in the technological and industrial processes related to poultry production, for example, in relation with their nutrition (prohibition of use of antibiotic growth promoters) The best known predisposing factor is mucosal damage, caused by coccidiosis. Diets with high levels of indigestible, water-soluble non-starch polysaccharides, known to increase the viscosity of the intestinal contents, also predispose to necrotic enteritis). This represents a risk factor for enterotoxaemia in the animals, and consequently a risk for emergence of the disease.
12.	yes	"++"	There are problems of detection of the emergence (the disease is under-diagnosed in animals because the clinical signs are unspecific). However, anatomopathologic lesions and bacteriological count are known. Problems to detect the disease represent a risk factor for emergence of the disease, because under-detection delays the taking of preventive measures.
13.	no	"0"	There is no increase in interactions between the animal compartments concerned by the disease (poultry, cows, pigs). Such an increase would have no influence of the risk for emergence because the pathogenic strains of C. perfringens are host-specific and an increase in interaction should not result in a passage of the species barrier. Increases in interactions between different poultry populations would have no influence of the risk for emergence of the disease in the poultry populations because the bacteria are already ubiquitous.
14.	no	"0"	There is no increase in interactions between poultry and humans. Such an increase would have no influence of the risk for emergence because the pathogenic strains of C. perfringens are host-specific and an increase in interaction should not result in a passage of the species barrier.
15.	no	"0"	There is no significant demographic growth in Belgium. The disease is not concerned by a human demographic growth.
16.	no	"0"	There is no growth of the poultry population in Belgium. Such an increase would have no influence on the risk of emergence because the origin of the pathology is the own intestinal flora of the animal.
17.	Yes	"0"	Human traveling is increasing. The disease is not concerned by an increase in human traveling.
18.	Yes	"0"	Human tourism is increasing. The disease is not concerned by the increase in tourism.

19.	Yes	"0"	There is an increase in trade of poultry, but because the bacteria is ubiquitous, this has no influence on the risk for emergence of the disease. However, because the pathogenesis is no entirely known, the importation of more sensitive poultry for example cannot be excluded.
20.	Yes	"0"	There is an increase in transport of poultry, but because the bacteria is ubiquitous, this has no influence on the risk for emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	Yes	"+++"	There are intensive poultry production systems, which constitute risk factors for emergence of the disease linked to the changes in nutrition processes (exact mechanism unknown).
23.	Yes	"- -"	There are extensive poultry production systems, which are protective against emergence of the disease (mechanism?).
24.	yes	"++"	The strains of the toxinotype A are usual commensal germs of the intestine of the animals. Potentially all poultry is a carrier as typa A is a normal inhabitant of intestinal flora. This is a risk factor for emergence of the disease because the strains of the toxinotype A which are responsible for the enterotoxaemia are particular (other toxins? other factors?) and are not present in all the exploitations.
25.	yes	"+"	The intestines of the poultry are a natural reservoir of the host specific toxinotype A of C. perfringens, in addition to soils and environment. This is a risk factor for emergence because if additional factors are added (nutrition?), the disease can occur.
26.	no	"0"	In the case of C. perfringens, there is no incubation period, but rather a normal asymptomatic carriage. The development of the pathology is due to additional (nutritional) circumstances.
27.	yes	"0"	There can be contacts between domestic poultry and wildlife, but this has no influence on the risk for emergence because wildlife does not play any epidemiological role.
28.	no	"0"	The wildlife does not play any epidemiological role, and this has no influence on the risk for emergence of the disease.
29.	no	"0"	The disease is not concerned by the wild life demography
30.	yes	"0"	There are climatic and meteorological changes, but this does not have any influence on the emergence of the disease.
31.	yes	"0"	There are changes in the ecosystems produced by man, but this does not have any influence on the emergence of the disease.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of the urbanisation on the risk of emergence
33.	no	"0"	Non vectorial disease.

Atypische TSE bij kleine herkauwers (prionen)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+++"	Strains of different profiles exist. The breeding for genetic resistance could lead to the selection of hypervirulent atypical strains. This can represent a risk factor for emergence.
2.	yes	"+++"	There is lack of knowledge of the pathogenesis (due to the weak number of observed cases, to the difficulty to realise

			experiments). The lack of knowledge of pathogenesis is a risk factor for emergence.
3.	yes	"++"	The atypical TSE present different characteristics than the classical TSE. A modification in their pathogenicity could modify the epidemiology of the disease and favor emergence.
4.	yes	"++"	There is no vaccine. If no vaccination, no protection and higher risk of emergence.
5.	yes	"++"	There is a possibility of transmission between the ruminant species. It is a risk factor for emergence.
6.	no	"0"	Atypical scrapie is considered as being not zoonotic. Even if the disease was transmissible to humans, this should not have any influence on the risk for emergence because humans should be dead-end hosts and should not retransmit the disease.
7.	yes	"++"	There is an extention in the geographical distribution of the agent. Since a geographical extension reveals an extension of the contamination via the animal of via contaminated matters from the animal, this represents a risk factor for emergence.
8.	yes	"++"	There is an increase in incidence of the disease in other countries. An increase in incidence in other countries increases the risk for emergence in Belgium, due to the risk for transport of infected animals or animal products.
9.	yes	"++++"	The prion can persist in the environment. This favours the transmission between animals and is a risk factor for emergence.
10.	yes	"- - -"	The existing legislation is an important protection factor against the emergence of the disease.
11.	yes	"+++"	There are changes in the technological or industrial processes. BSE appeared namely because of the changes in the industrial processes of production of meat and bone meals. This is a risk factor for emergence of prion diseases. Technological changes could also lower the risk.
12.	yes	"++"	There is a problem of declaration of the clinical signs by farmers and a lack of sensibility of the diagnostic test. These are risk factors of emergence.
13.	no	"++"	There are no increases in interactions between animal populations concerned by the disease. Since scrapie and other TSE, as well as CWD are transmissible, increases in interactions would represent a risk factor for emergence of the disease.
14.	no	"0"	There is no increase in interactions between ruminants and humans. Since the disease is not known to be zoonotic, increases in interactions should not have any influence on the risk for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. Since the disease is not zoonotic, a human demographic growth should not have any influence on the risk for emergence.
16.	yes	"+"	There is currently an increase in the goat population (sector in expansion) in Belgium. An increase constitutes a (weak) risk factor for emergence.
17.	yes	"0"	Human traveling is increasing, but this has no influence on the risk for emergence in the cattle population.
18.	yes	"0"	Human tourism is increasing, but this has no influence on the risk for emergence in the cattle population.
19.	yes	"++"	There is an increase in animal trade. This is a risk factor through the risk for importation of infected animals.
20.	yes	"+++"	There is an increase in animal transports. This increases the risk for transport of infected animals or infected animal products, and the risk for emergence.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"++"	There are intensive production systems for ruminants in Belgium. This constitutes a risk factor for emergence, due to the use of industrial feed (see origin of BSE) and to the transmission via contaminated soil.
23.	yes	"+"	There are extensive production systems for ruminants in Belgium. Extensive production, with grazing and contacts between

			animals, favour certain TSE, such as scrapie, for example. This is a weak risk factor for emergence.
24.	yes	"+++"	Ruminants infected by an atypical TSE do never develop the typical symptomatology. This increases the risk for non detection and the risk for emergence of the disease.
25.	yes	"++"	There could be an animal reservoir in small ruminants but data are lacking on pathogenesis and epidemiology to estimate a transmission risk from this reservoir. The distribution of PrPd in atypical TSE is rather limited (e.g. no lymphoid involvement) compared to classical TSE (scrapie). This is a risk factor for emergence of the disease as the sensitivity of the present tests is unknown and most cases are without clear clinical signs.
26.	yes	"+++"	The incubation period is long for the TSE, specially the atypical TSE. This increases the risk for transmission of the non detected disease and the risk for emergence of the disease.
27.	yes	"+"	There are contacts between small ruminants and wildlife. Since the disease is transmissible, this can favour the transmission and is a risk factor for emergence.
28.	no	"+"	The wild fauna does not play any epidemiological role. Since the disease is transmissible, an epidemiological role of wildlife would increase the risk of emergence of the disease.
29.	no	"+"	There is no increase in demography of the wildlife concerned by the disease. Since the disease is transmissible, an increase in demography of the wildlife would represent a risk factor of emergence of the disease.
30.	yes	"0"	There are climatic and meteorological changes. No influence on the risk of emergence.
31.	no	"0"	No influence of possible changes in ecosystems.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of urbanisation on the risk for emergence.
33.	no	"0"	Non vectorial disease.

Atypische myopathie bij paarden

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	Impossible to answer this question because up till now, the causative agent is unknown.
2.	yes	"++++"	There is lack of knowledge of the pathogenesis. The etiology of the disease is unknown. This is an important risk factor for emergence because this lack of knowledge makes the prevention and the etiological treatment difficult.
3.	yes	"+"	Changes in the pathogenesis are observed: these last years the disease affect populations of different age - old horses have been affected during the last clinical series; the recent cases we have seen showed clinical signs a little bit different as the cases we have seen before; the mortlity rate seems to decrease with time. A change in pathogenesis could always represent a risk factor of emergence of the disease.
4.	yes	"0"	There is no vaccine. Several horses that have survived from atypical myopathy have died from the condition after a second outbreak of the disease (several months later). These cases question about the efficacy of vaccination. It is, at the present time,

			impossible to answer the question as the pathogenesis of the disease and the etiology are unknown.
5.	no	"0"	Currently, there are no indications that the species barrier can be passed. The syndrome only affects horses. No influence on the risk for emergence.
6.	no	"0"	No possibility of transmission to humans. No influence on the risk for emergence.
7.	yes	"++++"	There is a geographical extension of the disease: the disease is present since 2000 in Belgium and is present in most of the European countries. This expansion may be due to a modification in the environment rather than to any effect of an "infectious" agent. This extension is a risk factor, particularly since the pathogenesis is unknown.
8.	yes	"++"	Since about ten years, an increase in incidence (emergence) is observed. This is a risk factor of emergence of the disease.
9.	no	"++++"	Pastures at risk have been identified, but this may be due to topographical specific environmental conditions rather than to the presence (persistence) of an "infectious" agent. The disease is especially observed in horses on pastures, in the spring or the fall. If the agent persisted in the environment, that would represent a risk factor for emergence of the disease.
10.	no	"0"	There is no legislation. This has no impact on the risk for emergence because the etiological agent is unknown.
11.	yes	"++"	Most of horses affected by atypical myopathy belong to persons poorly informed about how to manage a pasture. Lack of technological knowledge is more often the reason of the poor quality of the pasture. Poor quality of pastures appears to be a risk factor for the disease.
12.	no	"++"	The disease is clinically very easy to diagnose. Because alerting for the emergence of (seasonal) clinical series may enable to take temporarily preventive measures, the easy diagnosis prevents the emergence. Problems of detection of the disease would represent a risk factor for emergence of the disease.
13.	yes	"0"	There is in general an increase in interactions between horses (competitions, …), but it is unknown if this is a risk factor for emergence because it is unknown if the disease is transmissible. It is assumed that interactions have no influence on the risk for emergence. Horses affecetd by atypical myopathy are not in competition. Most of them are non working horses kept at pasture. The use for work is a protective factor for the condition.
14.	no	"+"	There are no increases in interactions between horses and humans. An increases would represent a risk factor because horses might be more often kept in badly managed pastures, which is a risk factor for developing the disease.
15.	no	"0"	There is no significant demographic growth in Belgium. Non-zoonotic diseases are not concerned by human demographic growth.
16.	no	"0"	There is no growth of the equine population. A growth in the population would have no effect on the risk for emergence.
17.	yes	"0"	Human traveling is increasing. Disease not concerned by an increase in human traveling.
18.	yes	"0"	Human tourism is increasing. Disease not concerned by an increase in tourism.
19.	yes	"0"	No influence of an increase in horses trade
20.	yes	"0"	No influence of an increase in number of horse transports
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"+++"	There are no intensive horse production systems in Belgium. Intensive production systems (overgrazing; more animals on small pastures) can increase the risk for emergence.
23.	yes	"+++"	There are extensive production systems for horses in Belgium (pasture). Because atypical myopathy is a pasture-associated disease (stabling decreases the risk), extensive production systems (animals on pasture) can increase the risk for emergence of

			the disease.
24.	no	"0"	Asymptomatic horses (i.e. subclinically affected horses) exist but they should not be considered as potential carriers but rather as horses temporarily affected. These horses are not susceptible to transmit the atypical myopathy, because the disease is rather associated to grazing than to an infectious agent. The subclinical infection has no influence on the risk for emergence.
25.	no	"0"	There are no known animal reservoirs susceptible to transmit the disease. No influence on the risk for emergence.
26.	no	"0"	The incubation period is not long (although one week of grazing is necessary before the appearence of the clinical signs). Since the disease is not contagious, a long period of incubation would have no influence on the risk for emergence of the disease.
27.	yes	"0"	There can be contacts between horses and wild fauna, but since the wild fauna is not concerned by the disease, this has no influence on the risk for emergence.
28.	no	"0"	The wild fauna is not concerned by the disease (not infected, no epidemiological role).
29.	no	"0"	The wild fauna is not concerned by the disease
30.	yes	"++++"	There are climatic and meteorological changes. The risk is linked to the environmental conditions on pastures (poor quality), and to the season (spring and fall). The climate and environmental changes are risk factors of emergence of the disease.
31.	no	"0"	There are no changes in ecosystems. Changes in the environmental characteristics of the pastures have no influence on the risk for emergence.
32.	yes	"0"	There is an ongoing urbanisation in Belgium, but which has no influence on the risk for emergence
33.	no	"0"	Non vectorial disease. No influence.

Mond- en klauwzeer (Aphtovirus)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"+++"	There is a genetic variability, but currently no genetic variability capable to contribute to the risk for emergence. A genetic variability capable to contribute to the risk for emergence (ex. change in host spectrum towards new animal species) should represent a risk factor for emergence of the disease.
2.	no	"+"	FMD was studied very completely and there is no lack of knowledge of the pathogenesis. A lack of knowledge represents always a risk factor for emergence.
3.	no	"++"	There is no change in the pathogenesis. A change in the pathogeny should be a risk factor for emergence (for ex. prolonged incubation period)
4.	yes	"++++"	A vaccine is available and is efficient in an epidemiological point of view, but preventive vaccination is not authorized in Belgium, which represent a difficulty to control the disease by vaccination. Moreover, differentiation between vacinated animals and infected ones is not perfect. These difficulties are a risk factor of emergence of the disease.

5.	no	"+++"	Currently, there are no indications of a possibility of passage of the species barrier, except the known susceptible species. Such a possibility would represent a risk factor for emergence of the disease in new animal species.
6.	no	"0"	Non zoonotic disease (or very very rarely and/or theoretically).
7.	no	"++++"	Currently, there is no extension of the geographical distribution of the agent (but could change rapidly). Since the virus is high contagious and can even cross the Channel under favourable climatic conditions (cf England in 2001 and 2007), a geographical extension would represent a very important risk factor for emergence.
8.	yes	"++++"	There have been recent cases in Bulgaria. Since the virus is highly contagious, an increase in incidence in a neighbouring country should represent an important risk factor for emergence in Belgium (dispersion by air, risk at importation).
9.	no	"+++"	Even if the virus can be relatively resistant in the outer environment, it is not considered that it can persist in the environment. According to the transmission pathways, the viral persistance in the environment should represent a risk factor for transmission and of emergence.
10.	yes	"- - - -"	There is a legislation concerning preventive (ex. control of importations) and control measures (ex. slaughtering). These are protection factors against emergence of the disease.
11.	no	"0"	The disease is not concerned by this factor
12.	yes	"+++"	There are difficulties of detection of the disease based on the passive surveillance (for ex. sheep express almost no clinical signs) and difficulties of notification. These are risk factors of emergence of this high contagious disease
13.	no	"+++"	There are currently no increases in interactions between the animal host populations. Such increases should increase the risk for viral diffusion and would represent a risk factor for emergence.
14.	no	"+++"	Currently, there are no increases in interactions between the concerned animal populations and humans. According to the possibility of indirect transmission of the virus between exploitations via human activities, such increases in interactions would represent a risk factor for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. Non zoonotic disease and no influence of a demographic growth.
16.	no	"++"	Currently, there are no growths of the susceptible animal populations. Because the animal density has an influence on the transmission rate, such a growth would be a risk factor for emergence.
17.	yes	"++"	Human traveling is increasing. This is a risk factor for emergence (risk for transport of materials infected by the resistant virus).
18.	yes	"++"	Human tourism is increasing. This is a risk factor for emergence (risk for transport of materials infected by the resistant virus).
19.	yes	"+++"	There is an increase in trade. Due to the high risk at importation (living animals and freezed meat), this is a risk factor for emergence of the disease.
20.	yes	"+++"	There is an increase in transport. Due to the high risk at importation (living animals and freezed meat), this is a risk factor for emergence of the disease.
21.	yes	"++"	There is an increase in terrorism worldwide. Currently, the disease not concerned by bioterrorism. If it was the case (cf second World war), this would be a risk factor for emergence.
22.	yes	"+++"	There are intensive production systems concerning the susceptible animal populations. This is a risk factor for emergence because a high animal density favours viral transmission.
23.	yes	"+++"	There are extensive production systems concerning the susceptible animal populations. This is a risk factor for emergence

			because it favours the aerogen transmission of the virus between herds.
24.	no	"+++"	There can be animals without clinical signs (during the 2001 FMD outbreak in the UK infected sheep did almost show no clinical symptoms). Asymptomatic carriage is a risk factor for spread of this highly contagious disease.
25.	no	"++++"	There is no animal reservoir (rather in Africa). An animal reservoir should be an important risk factor for emergence
26.	no	"++"	There is no specially long incubation period. A long incubation period would represent a risk factor for emergence, due to the speed of the transmission. The low incubation period is protective against emergence.
27.	yes	"+++"	There are possibilities of contacts between domestic ruminants and the wild fauna. It is an important risk factor for transmission and of emergence (in case the wild fauna is infected, cf in Africa).
28.	no	"+++"	The wild fauna has currently no epidemiological role. If the wild fauna (cervids and other ruminants) had an epidemiological role (cf in Africa), it should represent a risk factor for emergence (see transmission pathways).
29.	yes	"0"	There is an increase in the demography of wild cervids in Belgium. Since the Belgian wild fauna does not play currently an epidemiological role (see higher), an increase in its demography should have no influence on the risk for emergence.
30.	yes	"0"	There are climatic and meteorological changes, but which have no influence on the risk for emergence.
31.	no	"0"	No influence of this factor
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of this factor
33.	no	"0"	Non vectorial disease. No influence of this factor.

Afrikaanse varkenspest (Asfivirus)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"+++"	There is no genetic variability. A genetic variability should be a risk factor for emergence of new subtypes. The absence of genetic vriability is a protection factor against the emergence of new subtypes.
2.	yes	"+++"	There is lack of knowledge of the pathogenesis of this disease, for example concerning the immunopathogenesis of the infection. The lack of knowledge on pathogenesis is a risk factor for emergence.
3.	yes	"+++"	Changes in pathogenesis are sometimes reported in the Russian Federation, and EFSA recommends more research. A change in the pathogenesis (for example, longer incubation period, new host, etc.) would represent a risk factor for emergence.
4.	yes	"++++"	There are difficulties concerning the vaccination, due to the insufficient understanding of the immunity against the disease. The absence of vaccination is a risk factor for emergence of the disease.
5.	no	"0"	This disease concerns only domestic and wild suidae. A crossing of the species barrier is improbable.
6.	no	"0"	Non zoonotic disease and no influence on the risk for emergence
7.	yes	"++++"	The disease is present in Africa and in Sardinia. Since more recently, there is a worrying geographical extension of the disease

			and a threat for Europe from Russia and Caucasus. This is a risk factor for emergence in our countries.
8.	yes	"++++"	The disease is at risk for introduction in the Iberian peninsula where it has already previously been identified. It is also present in Africa, Sardinia and Russia. This is a risk factor for emergence in our countries.
9.	no	"+++"	The virus is not very resistant in the environment but could persist a few weeks (?). EFSA recommands more research about this. The persistance in the environment should represent a risk factor for emergence.
10.	yes	"- - - -"	The sanitary measures taken in case of an outbreak (for example, slaughtering) are protective factors against expansion of the disease.
11.	no	"0"	This disease is not concerned by changes in technological or industrial processes.
12.	yes	"++++"	Since the last outbreaks date from several years, there is a lack in practice experience of some farmers/veterinarians, leading to a risk for absence of early detection of this high contagious disease. Detection in wild boars is also difficult. These are risk factors of emergence of this high contagious disease. The performance of the tests is not a problem.
13.	yes	"++"	There are increasing contacts between domestic pigs (outdoor) and wild boars. This increases the risk for transmission of the disease to domestic pigs (from the wild fauna). This is a risk factor for emergence.
14.	no	"0"	There are no increasing interactions between humans and pigs/boars populations in Belgium. Since the disease is not zoonotic, such an increase should not have any influence on the risk for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. No influence of a human demographic growth.
16.	yes	"+++"	There is no increasing pigs population currently in Belgium but Flanders is a region with a high density pig population. An increase should represent a risk factor for emergence because a high density of the swine population should favor the spread of the disease.
17.	yes	"+++"	Human traveling is increasing. This is a risk factor for emergence, associated with the risk for importation of contaminated meat or meat products.
18.	yes	"++"	Human tourism is increasing. This is a risk factor for emergence, associated with the risk for importation of contaminated meat or meat products.
19.	yes	"++++"	There is an increase in trade. Importation of risk products (meat from infected animals and from prevalent countries), in which the virus can resist for a very long time, is an important risk factor for introduction and emergence of the disease.
20.	yes	"++++"	There is an increase in transports. Transport of risk products (meat or delicatessen from infected animals and from prevalent countries), in which the virus can resist for a very long time, is an important risk factor for introduction and emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"+++"	There are intensive production systems of pigs in Belgium. The high swine density increases the possibility of spread of the disease, which is a risk factor for emergence.
23.	yes	"++++"	There are extensive production systems of pigs in Belgium. This is a risk factor for emergence in the domestic pigs population through possibilities of contact with wild boars. Another reason is the possibility to introduce the virus by swillfeeding animals containing infected pork meat.
24.	yes	"+++"	There are no true asymptomatic carriers, but depending on the age of the animals, there can be animals without clinical signs.

			EFSA recommends more research. The presence of asymptomatic carriers represents a risk factor for spread of this high contagious disease.
25.	no	"++++"	Wild suidae are an animal reservoir, but mainly in Africa, and not in Belgium or in neighbouring countries. The presence of an animal reservoir in Belgium should represent a risk factor for emergence of the disease in the domestic pigs populations.
26.	no	"++++"	There is no long incubation period, which is a protection factor against the emergence. The presence of a long incubation period would represent a risk factor, due to the possibility of spread of the disease by asymptomatic undetected animals.
27.	yes	"++++"	There are contacts between domestic pigs and wild boars (for example, in extensive production systems). If the virus was present in the Belgian wild boar population, or in a neighbouring country, it should be a risk factor for emergence because of the possibility of transmission through direct contact. But currently, there is no presence of the virus in wild boars of Belgium or of neighbouring countries.
28.	no	"++++"	Since Belgian wild boars are not infected (are only infected in Africa), the Belgian wildlife does not currently play an epidemiological role. If there were infected wild boars in Belgium, this would represent an important risk factor for emergence in the domestic pigs population.
29.	yes	"+++"	Since a decade, we observe an increase in wild boars populations due to enhanced fertility and better natural feeding (abundance of natural feed as acorns, rodents, …). This represents a risk factor for emergence if this population was infected.
30.	yes	"0"	There are climatic and meteorological changes. Current virological, entomological and epidemiological data do not suggest that the disease, which is transmitted by suidae, can be influenced by the climatic changes. An EFSA working group is going to evaluate the possibility of influence of this factor on African swine fever.
31.	no	"+++"	There are no changes in the ecosystems in Belgium. If there were changes in the ecosystems which could modify the boars distribution and allow the presence of soft ticks, this would contribute to the risk for emergence.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of the urbanisation on the risk for emergence.
33.	no	"++++"	Soft ticks are not present in Belgium currently, which is a protection factor against emergence, although the disease can be also transmitted directly without the action of a tick. If these ticks were present in Belgium, this should represent an important risk factor for emergence of the disease. Here also EFSA suggest more research.

Klassieke varkenspest (Pestivirus)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"++"	Despite the existence of several CSF strains, the virus is stable. The presence of a genetic variability should represent a risk factor for emergence.
2.	yes	"++"	In agreement with the Discontools Gap analysis, there is a lack of knowledge: host factor determinating clinical outcome; viral factors that determine the virulence of the CSF isolate; immunopathogenisis. These lacks of pathogenesis are risk factors for emergence of the disease.

3.	no	"++"	There are viral factors which determine the virulence of the CSF viruses. This is a risk factor for emergence of more virulent strains.
4.	yes	"++"	A good vaccine exists, but preventive vaccination of domestic pigs is not authorized in Belgium, which represent a difficulty to control the disease by vaccination. Vaccination of wild boars is effective (EFSA), despite some difficulties due to the oral route of vaccination. Vaccination is protective against emergence. Difficulties concerning the vaccination are a risk factor for emergence of the disease.
5.	no	"0"	This disease concerns only domestic and wild suidae. A crossing of the species barrier is improbable.
6.	no	"0"	Non zoonotic disease and no influence on the risk for emergence
7.	yes	"+++"	There is currently no real geographical extension of the disease towards Belgium. However, the disease is present in wild boar in Germany, but seems to be under control through the vaccination; the situation in Romania and Bulgaria is unclear; the situation in the Russian Federation is also unclear. If there was a geographical extension towards Belgium, this should represent a risk factor for emergence.
8.	yes	"+++"	There are increases in incidence of the disease in other countries (for example, in Germany). Considering the intracommunity transports of pigs, the increase in incidence in one country represents a risk for introduction of the disease in Belgium.
9.	no	"+++"	The virus is not very resistant in the environment (maybe a few weeks after secretion/excretion). The reemergence in earlier vaccinated boar populations is sometimes difficult to understand, and the possibility of persistence in the environment will be searched for in a research project on classical swine fever. If the virus was capable to persist in the environment, it should represent an important risk factor for emergence. (Here, meat and frozen meat are not considered as "environment").
10.	yes	"- - -"	The sanitary measures taken in case of an outbreak (for example, slaughtering) are protective factors against expansion of the disease if the sanitary measures are well applied. Feeding with kitchen waste is now absolutely prohibited. These measures are protection factors against emergence.
11.	no	"0"	This disease is not concerned by changes in technological or industrial processes.
12.	yes	"+++"	Since the last outbreaks date from several years, there is a lack in practice experience of some farmers/veterinarians, leading to a risk for absence of early detection of the clinical signs of this high contagious disease. There are pigs with subclinical infection, leading to difficulties of detection. Detection in wild boars is also difficult. Contraints induced by the sanitary measures constitute un important risk factor of under-notification These are risk factors of emergence. The performance of the tests is not a problem.
13.	yes	"++"	There are increasing contacts between domestic pigs (outdoor) and wild boars. This increases the risk for transmission of the disease to domestic pigs (from the wild fauna). This is a risk factor for emergence.
14.	no	"0"	There are no increasing interactions between humans and pigs/boars populations in Belgium. Since the disease is not zoonotic, such an increase should not have any influence on the risk for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. No influence of a human demographic growth.
16.	yes	"+++"	There is no increasing pigs population currently in Belgium but Flanders is a region with a high density pig population. An increase should represent a risk factor for emergence because a high density of the swine population should favor the spread of the disease.
17.	yes	"++++"	Human traveling is increasing. This is a risk factor for emergence, associated with the risk for importation of contaminated meat or

			meat products.
18.	yes	"++++"	Human tourism is increasing. This is a risk factor for emergence, associated with the risk for importation of contaminated meat or meat products.
19.	yes	"++++"	There is an increase in trade. Importation of risk products (meat or delicatessen from infected animals and from prevalent countries), in which the virus can resist for a very long time, is an important risk factor for introduction and emergence of the disease.
20.	yes	"++++"	There is an increase in transports. Transport of risk products (meat or delicatessen from infected animals and from prevalent countries), in which the virus can resist for a very long time, is an important risk factor for introduction and emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"+++"	There are intensive production systems of pigs in Belgium. The high swine density increases the possibility of spread of the disease and is a risk factor for emergence.
23.	yes	"++"	There are extensive production systems of pigs in Belgium. This is a risk factor for emergence in the domestic pigs population through possibilities of contact with wild boars. Another reason is the possibility to introduce the virus by feeding animals with scraps of meat (cuisine waste) containing infected pork meat.
24.	yes	"+++"	There are no true asymptomatic carriers, but depending on the age of the animals, there can be animals without clinical signs. Wild boars can be asymptomatic carriers. Asymptomatic carriage is a risk factor for spread of this highly contagious disease.
25.	yes	"+++"	Wild boars are animal reservoirs. There is no infected wild boar in Belgium, but wel in Germany, a neighbouring country. The presence of an animal reservoir in Germany represents a risk factor for introduction of the disease in Belgium.
26.	yes	"+++"	Depending of the age of the animals, there can be a longer incubation period of the disease. A long incubation period is a risk factor, due to the possibility of spread of the disease by asymptomatic undetected animals.
27.	yes	"++++"	There are contacts between domestic pigs and wild boars (for example, in extensive production systems). Because of the possibility of transmission of the disease through direct contact, this is a risk factor for emergence. There are no infected wild boars in Belgium, but the presence of the disease in wild boars in Germany could have an influence.
28.	yes	"+++"	Since wild boars are an animal reservoir of the disease, the wild fauna plays an epidemiological role. Because wild life is difficult to control, the presence of infected wild boars in a neighbouring country (Germany) is a risk factor for emergence in Belgium.
29.	yes	"+++"	Since a decade, we observe an increase in wild boars populations due to enhanced fertility and better natural feeding (abundance of natural feed as acorns, rodents, …). This represents a risk factor for emergence if this population was infected.
30.	yes	"0"	There are climatic and meteorological changes. But current virological, entomological and epidemiological data do not suggest that the disease, which is transmitted by suidae, can be influenced by the climatic changes.
31.	yes	"+"	Development of crow culture changes the ecosystem and gives more chance to increase wild boars populations. This is a risk factor for emergence of the disease.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of the urbanisation on the risk for emergence.
33.	no	"0"	No vectorial disease, no influence of this factor.

West-Nijlkoorts (Flavivirus) (Bengis *et al*., 2004 ; Chevalier *et al*., 2004 ; Glaser, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"++"	There exist more virulent strains. For example the severity of the expansion in the USA was due to (1) the immunologically naive status of the US population and (2) a particularly virulent strain. The same happened recently in Europe. Genetic variability is a risk factor if the strain is more virulent.
2.	yes	"++"	There is lack of knowledge of the pathogenesis which could explain some emergences: for example, the poorly known role of vectors in the cycle maintenance-dissemination of the virus, the molecular determinism of the virulence variations, the possible bird to bird transmission. The lack of knowledge is a risk factor
3.	yes	"+++"	There are changes in pathogenesis depending on the genetic variability. For example, the American strain is more virulent than the European one. The change of pathogenesis is a risk factor for emergence.
4.	yes	"++"	There is an available and authorized vaccine for horses in Belgium, but vaccination of the horses will not control emergence since horses are dead-end hosts. Vaccination of (wild) birds is impossible. Difficulty to vaccinate birds is a risk factor for emergence
5.	yes	"+++"	The virus can infect numerous receptive bird species which are capable to transmit the virus effectively. This is a risk factor for emergence. The virus can also infect other mammals, but these are dead-end hosts which do not contribute to the propagation of the disease and consequently have no influence on the risk for emergence/expansion.
6.	yes	"0"	The disease is transmissible to humans, and this is a risk factor for emergence of the disease in the human population. But since humans are dead-end hosts, this has no influence on the risk for emergence and propagation in the animal population.
7.	yes	"++++"	There are more and more cases in the South of France, Italy, Hungary, Romania and recently in Austria. The emergence in the North of Europe is a risk factor for emergence in Belgium.
8.	yes	"++++"	There is an increase in incidence in the South of France, Italy, Hungary, Romania, Austria. This is a risk factor for emergence in Belgium.
9.	no	"0"	The virus can not persist in the environment outside the vector. Even if it was able to persist in the environment, this should have no influence of the risk for emergence since transmission involves the action of a vector.
10.	yes	"- -"	The current legislation and sanitary policies are protection factors against emergence: mandatory notification of disease, Ministerial decree of 29th september 1992, recent Royal decree, contingency plan, efficient diagnostic tests.
11.	no	"0"	There are no changes in technological or industrial processes concerning domestic birds or horses. No influence on the risk for emergence.
12.	yes	"++++"	There are many asymptomatic infections by humans and horses, detection of high mortality rates by birds is difficult. Detection of emergence can only be late. Problems of detection of emergence are risk factors of emergence since the disease can disseminate without being detected.
13.	no	"++"	There is no increase in interactions between the concerned animal populations (horses, wild birds, domestic birds). If infected

			migratory birds transport the virus to Belgium, this should be a risk factor of introduction and dissemination of the disease in horses and birds in Belgium. This risk for introduction is possible because the viruses can persist several days in birds, allowing a viral transport from South of France or from Austria. The risk for dissemination of the disease also exists since the vectors are present in Belgium.
14.	no	"0"	There is no increase in (vectorial) interactions between humans and horses/birds. Since humans are dead-end hosts, an increase in interactions between human and bird/horse populations could increase the risk for emergence in humans (immunologically naive human population), but not in the animal populations capable to spread the infection. No influence on the risk for emergence in the animal populations.
15.	no	"0"	There is no significant demographic growth in Belgium. A human demographic change should have no influence on the risk for emergence of the disease in Belgium because humans are dead-end hosts.
16.	no	"+++"	There is no growth in the equine and bird populations in Belgium. If there was such a growth, it could increase the risk for emergence (birds are capable to transmit infection).
17.	yes	"0"	Human traveling is increasing, but this has no influence on the risk of introduction of the disease in Belgium because humans will not introduce the virus (dead-end hosts).
18.	yes	"0"	Human tourism is increasing but this has no influence on the risk of introduction of the disease in Belgium because humans will not introduce the virus (dead-end hosts).
19.	yes	"+++"	There is an increase in trade. Trade of birds or of goods (which can contain infected mosquitoes) is a risk factor (cf outbreak in the USA). Importation of horses (for example, from Romania) increases the risk for introduction but not the risk for propagation of the disease in Belgium, because horses are dead-end hosts.
20.	yes	"+++"	There is an increase in transport. International transport is a risk factor for introduction of the disease because it allows movements of infected mosquitoes, (illegal) importation of infected birds and importation of goods which can contain infected mosquitoes (cf outbreak in the USA). Transport of horses is not a risk factor for emergence since horses are dead-end hosts.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	Wild birds, which are responsible for the propagation and dissemination of the disease, are not production species, and are not concerned by production systems. No influence of production systems on the emergence of West Nile disease.
23.	no	"0"	Wild birds, which are responsible for the propagation and dissemination of the disease, are not production species, and are not concerned by production systems. No influence of production systems on the emergence of West Nile disease.
24.	yes	"++++"	Migratory birds can transport the viruses asymptomatically over long distances. This is an important risk factor for emergence.
25.	yes	"++++"	The animal reservoirs of the disease are the (wild) birds which are difficult to control. This is an important risk factor for emergence.
26.	no	"0"	The incubation period of West Nile disease is not particularly long. The length of the incubation period has no influence on the risk for emergence because the vectors do not need the presence of clinical signs to bite animals and transmit the viruses.
27.	yes	"+++"	Via the vectors, there are possibilities of contact between on one hand horses/domestic birds and on the other hand wild birds. This is a risk factor for emergence in the (immunologically naive) horse and domestic bird populations (infection from wild birds). Domestic birds will be capable to spread the disease.

28.	yes	"++++"	Wild birds play an epidemiological role: they transmit the disease, amplify the viruses and transport it on long distances. It is an important risk factor for emergence because of the difficulties to control wild fauna.
29.	no	"+++"	There is no increase in demography and/or distribution of wild birds in belgium. Such changes would represent risk factors for emergence (introduction) of the disease in Belgium.
30.	yes	"++++"	There are climatic and meteorological changes. These changes can possibly generate changes in the migratory routes and increases in the length of life of migratory birds, or settling of exotic vectors. For example, larvae of mosquitoes develop better in organic matters in stagnant waters which are concentrated by warm and dry climatic conditions. These are important risk factors for emergence of the disease in Belgium. However, this is speculation: WNV has always been in Europe and there is no evidence that changing climate may affect it in either way.
31.	yes	"+++"	There are changes in the ecosystems produced by man. The ecological effects on the wild bird populations have yet to be studied. Ecosystems favouring installation of mosquito populations (for example, swimming pools) and wild birds populations are risk factors of emergence. Changes in ecosystems which can change the classical migratory routes of wild birds (question of availability in nidification areas) are also risk factors for emergence. However, this is speculation: WNV has always been in Europe and there is no evidence that changing climate may affect it in either way.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Since the vectorial mosquitoes are present in urbanized areas such as in humid natural areas and in countryside, urbanisation has no influence on the risk for emergence.
33.	yes	"++++"	Culex (mosquito), the vector of the disease, is present in large number in Belgium. This is an important risk factor of viral dispersion in case of introduction of the virus in Belgium, of infection of humans and horses, and also a risk factor for the amplification cycle between birds and mosquitoes.

Riftdalkoorts (Bunyaviridae, Phlebovirus) (Bengis *et al*., 2004 ; Chevalier *et al*., 2004 ; Gerdes, 2004 ; Martin *et al*., 2008)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	There is no genetic variability. A genetic variability of this virus should have no influence on the risk for emergence.
2.	yes	"+++"	There is lack of knowledge of the pathogenesis. (potential vectors, geographical distribution). This lack of knowledge represents a risk factor for emergence.
3.	no	"++"	There is no change in pathogenesis concerning this disease. A change in pathogenesis (for example, increase in virulence) should represent a risk factor for emergence.
4.	yes	"+++"	Live and inactivated vaccines exist but are not commercially available in Belgium. In case of introduction of the disease in Belgium, this should constitute a risk factor for dispersion and emergence.
5.	yes	"++"	Numerous animal species have been identified as receptive to the virus. This represents a risk factor for emergence.

6.	yes	"+++"	The disease is zoonotic. In case of sufficient viraemia, humans are able to retransmit the virus to the vector, which then can retransmit the virus to animals or humans (the humans are not dead-end hosts). This is a risk factor for expansion (and emergence) of the disease in case of introduction.
7.	no	"+++"	The disease, confined to Africa until 2000, invaded the arabic peninsula but has never been reported in Europe. If the disease emerged in Europe, this should represent a risk factor for emergence in Belgium. The ability of RVF to extend in free areas is due to the high variety of vectors able to transmit the infection, and to a sufficient vireamia in ruminants and humans to infect the mosquitoes. There also exists a possibility for the wind to transport infected vectors from neighbouring areas (Egypt).
8.	yes	"++"	There is an increased incidence in Africa, but not in Europe. If there would be an increased incidence in Europe, this would represent a risk factor for Belgium, because of the possibility of transboundary expansion on large distances, via for example animal transport.
9.	no	"0"	The virus can not persist in the environment outside the vector. Even if it was able to persist in the environment, this would have no influence of the risk for emergence since transmission involves the action of a vector.
10.	yes	"- - -"	There is a legislation (mandatory notification disease) and precautionary measures (for example, trade and transport controls, differential diagnose in case of abortion). These are protections factors against the emergence of the disease. Recommendations to (1) establish a warning system to detect any abnormal increase in abortion/neo- and perinatal mortality associated to necrotic hepatitis in ruminants, during the season of mosquitoes (spring, summer, autumn) and (2) define an emergency contingency plan.
11.	no	"0"	RVF is not concerned by changes in technological or industrial processes.
12.	yes	"+++"	In case of introduction of the disease, there may be detection problems of the emergence, due to the lack of specificity of the symptomatology, the neccessity of a sufficient number of contemporary cases to detect the emergence, the lack of experience despite the availability of diagnostic tests in Belgium. These are risk factors of emergence.
13.	yes	"++"	There are increasing interactions between animal compartments, for example through trade and transport. There are few transmissions by direct contact between ruminants despite the presence of the virus in the saliva and in nasal excretions, but the proximity between animals increases the risk because it favours the action of the vector. The increase in interactions between animal compartments is a risk factor for viral transmission and emergence.
14.	no	"+++"	There is no increase in interactions between ruminant and human populations.in the urban cycle, humans are infected by mosquitoes pricks. The disease is also transmissible via direct contact with infected animal tissues (sylvatic cycle, vets, farmers). An increase in interactions (vectorial proximity, direct contact) between ruminant and human populations should represent a risk factor for emergence of the disease because humans are capable to reinfect the vectors and retransmit the disease (are not dead-end hosts).
15.	no	"0"	There is no significant demographic growth in Belgium. RVF is not concerned by an eventual human demographic growth.
16.	no	"++"	There is currently no increase in the Belgian ruminant population. High densities of sensitive animals could maintain durably the infection cycles, if the vectors are present. A growth of the ruminant population should be a risk factor for emergence.
17.	yes	"++"	Human traveling is increasing. This is a risk factor because of the possibility of introduction of the disease via infected persons who have travelled in an endemic area, and because the human viraemia is sufficient to reinfect indigenous mosquitoes. However, this risk factor is relative because of the necessity, for the establishment of an outbreak, of ecological conditions favourable to the

			emergence of a lot of mosquitoes.
18.	yes	"++"	Human tourism is increasing. This is a risk factor because of the possibility of introduction of the disease via infected persons who have travelled in an endemic area, and because the human viraemia is sufficient to reinfect native mosquitoes. However, this risk factor is of relative importance because of the necessity, for the establishment of an outbreak, of ecological conditions favourable to the emergence of a lot of mosquitoes.
19.	yes	"+++"	Animal trade is increasing. This is an important risk factor for emergence because of the risk for importation of infected viraemic animals capable to transmit the infection.
20.	yes	"+++"	Animal transport is increasing. This is an important risk factor because movements of infected animals can be responsible for the dissemination of the disease in new areas (cf outbreak in Egypt).
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"++"	There are intensive production systems for ruminants in Belgium. The high density of the animal population increases the risk for infection (higher transmission rates) and of emergence.
23.	yes	"++"	There are extensive production systems for ruminants in Belgium. The presence of animals on the pasture increases the risk for contact with the vectors and the risk for emergence.
24.	no	"++"	There are no asymptomatic infected animals (but the infection can sometimes pass inapparently). Asymptomatic animals can disseminate the infection without being detected, confined or treated. This is a risk factor for emergence.
25.	no	"+++"	There is no animal reservoir for RVF (? à valider). If an animal reservoir existed, it would represent a risk factor for emergence.
26.	no	"0"	The incubation period of RVF is not especially long. The length of the incubation period has no influence on the risk for emergence because the vectors do not need the presence of clinical signs to prick animal and transmit the viruses.
27.	yes	"++"	There are possibilities of (proximity) contacts between domestic and wild ruminants. Proximity between the two animal populations favours the viral transmission through the vectors. This is a risk factor for dispersion of the disease.
28.	no	"+"	The epidemiological role of the wild ruminant population has yet to be studied. If the wild fauna played an epidemiological role, this would represent a risk factor.
29.	yes	"0"	There is an increase in the demography of wild cervids. Since wildlife does not play any epidemiological role, this has no influence on the risk for emergence.
30.	yes	"++++"	There are climatic and meteorological changes (longer periods of heat and more intensive rainfall). This is a risk factor for emergence because heat and rain have an influence on the geographical distribution of mosquitoes populations (reproduction sites depends on the presence of water: rains, floods, etc.). Localized rains have no influence, but strong persistent rain periods occuring after a drought, accompanied by durable floods, allow hatching of eggs and the establishment of large populations of mosquitoes. The virus could persist during months in the mosquitoe's eggs and could replicate again during the development to the larvae stadium during the strong rains.
31.	no	"+++"	Currently, there are no ecological changes in Belgium which could favour the emergence of the disease (for example, dams and irrigation zones favouring the development of mosquito populations). Belgium is a densely populated region with intensive use of the soils, decreasing the available water surfaces. Changes in the ecosystems such as for example the construction of dams and

			large irrigation zones should represent a risk factor for emergence, through favouring the development of the mosquitoes population.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Since the vectorial mosquitoes are present in urbanized areas such as in humid natural areas and in countryside, urbanisation has no influence on the risk for emergence.
33.	yes	"++++"	The vector of the disease (mosquitoes Aedes and Culex) is present in Belgium. This represents an important risk factor for dissemination of the disease if it is introduced in Belgium via for example trade of infected animals. There is a possibility of viral overwintering (vertical transovarian transmission of the virus) in some vector species (Aedes), and of simultaneous hatching of one generation of infected mosquitoes, which can favour the primary installation of the disease, followed by the action of secondary vectors leading to the installation of an endemicity (cf Egypt). The ability of RVF to extend in free areas is due to the high variety of vectors capable to transmit the infection and to a viraemia level in ruminants and humans sufficient to infect mosquitoes. There is also a possibility of mechanical transmission via culicoides and ticks.

Epidemische hemorragische ziekte (Orbivirus) (EFSA, 2009)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"++"	There is no genetic variability. A genetic avriability would represent a risk factor for emergence.
2.	yes	"+++"	There is lack of knowledge of the pathogenesis. This infection is few studied in cervids and not known in cattle. This lack of knowledge in pathogenesis is a risk factor for emergence of the disease.
3.	no	"++"	There is no observed change in the pathogenesis. A change in the pathogeneisis should be a risk factor for emergence.
4.	yes	"++++"	No vaccine available on the market. Important risk factor for emergence.
5.	no	"+++"	There is no observed passage of the species barrier. A passage of the species barrier would represent a risk factor for emergence.
6.	no	"0"	The disease is not zoonotic. This has no influence on the risk for emergence
7.	yes	"++++"	There have been 4 epidemics in the Mediterranean countries. This is an important risk factor for emergence in Belgium, via vectorial dispersion if the disease is present in a neighbouring region, or via the importations.
8.	yes	"++++"	There have been 4 epidemics in the Mediterranean countries. This is an important risk factor for emergence in Belgium, via vectorial dispersion if the disease is present in a neighbouring region, or via the importations.
9.	no	"0"	The virus can not persist in the environment. Persistence of the virus in the environment should have no influence on the risk for emergence because the vectorial transmission pathway.
10.	yes	"- - -"	There are quarantine and detection systems; the notification of the disease is mandatory. These are protection factors of emergence of the disease.
11.	no	"0"	This disease is not concerned by this factor

12.	yes	"++++"	There are several problems of detection of the disease: concerning the passive surveillance, the clinical signs are similar to these of the Bluetongue; there is no active surveillance programme; the wild fauna is difficult to survey; lack of serological diagnostic methods on the market. These difficulties represent a risk factor for emergence of the disease (dissemination before being detected).
13.	no	"++"	Currently, there are no increases in interactions between domestic and wild cattle in Belgium. An increase in such interactions could be a risk factor for emergence (through a favoured vectorial transmission).
14.	no	"0"	No increase in interactions between animal and human populations. Non zoonotic disease, no influence of an interaction with humans.
15.	no	"0"	There is no significant demographic growth in Belgium. Non zoonotic disease and no influence of a demographic growth.
16.	no	"++"	There is no growth of the domestic ruminant population. If there was an increase, it would represent a risk factor for emergence (vectorial transmission favoured).
17.	yes	"0"	Human traveling is increasing. No influence of an increase in human travels
18.	yes	"0"	Human tourism is increasing. No influence of an increase in human tourism
19.	yes	"+++"	There is an increase in trade of cattle. Because of the risk at importation, this is a risk factor for emergence.
20.	yes	"+++"	There is an increase in transport of cattle. Because of the risk at importation, this is a risk factor for emergence.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"- -"	There are intensive production systems in Belgium for cattle. Stabling is a protection factor against infection (and emergence) in the domestic cattle population because the risk for contact with the culicoides is reduced (except that culicoides can enter the stabels). Wild cervids are not concerned by production systems.
23.	yes	"+++"	There are extensive production systems in Belgium for cattle. This leads to an increased risk for contact with the culicoides and is a risk factor for emergence in the domestic cattle population. Wild cervids are not concerned by production systems
24.	no	"0"	There is no asymptomatic carriage. An asymptomatic carriage would have no influence on the risk for emergence because the vectorial transmission (culicoides) does not depend on the presence of clinical signs.
25.	no	"++++"	The host animals are the wild cervids, but there is no animal reservoir (the lenght of the viraemia is variable). An animal reservoir should represent a risk factor for emergence of the disease.
26.	no	"0"	There is no specially long incubation period for the disease. A long incubation period would have no influence on the risk for emergence because tick bites do not depend on the presence of clinical signs.
27.	yes	"++"	There are contacts between wild and domestic (in extensive systems) ruminants, which could, via the proximity, favour the action of the vectors and the transmission of the disease to the domestic cattle population. This is a risk factor for emergence in the domestic cattle population.
28.	yes	"+++"	There is an epidemiological role of the wildlife because wils ruminants can be infected and retransmit the infection. This is a risk factor for emergence because of the difficulties to control the wildlife.
29.	yes	"++"	There is an increase in the wild cervids population in Belgium. This represents a risk factor for emergence, because this facilitates the vectorial transmission of the virus.
30.	yes	"++++"	There are climatic and meteorological changes, which modify the repartition of the vectors in the North hemisphere. This is a risk

			factor for emergence (presence of culicoides)
31.	no	"+"	Currently, there are no changes in ecosystems in Belgium. Changes in ecosystems could contribute to an interaction between domestic cattle and wild cervids which should favour the transmission by the culicoides. This would represent a risk factor for emergence of the disease in the domestic cattle population.
32.	yes	"0"	There is an ongoing urbanisation in Belgium, but the disease is not concerned by the urbanisation.
33.	yes	"++++"	The transmission is vectorial (culicoïdes (C. imicola, obsoletus, pulicaris)). This is an important risk factor for emergence through the possibility of dispersion from a neighbouring country.

Chronic wasting disease bij hertachtigen (TSE) (prionen)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"+"	There is no evidence of genetic variability. A genetic variability should represent a risk factor for emergence.
2.	yes	"++"	There is lack of knowledge of the pathogenesis. There are few studies on the subject of chronic wasting disease. The lack of knowledge of pathogenesis is a risk factor for emergence.
3.	yes	"++"	There are changes in pathogenesis (for example: some polymorphisms like the G96S polymorphism in white tail deer and S225F in mule deer seem to provide a reduced susceptibility; the potential for genetic influences on susceptibility relating to the CWD strains identified in North America, as well as to other TSE, remains under investigation). Theses changes in pathogenesis are risk factors of emergence.
4.	yes	"+"	There is no immunization against the TSEs. Consequently, there is no vaccination possible. If no vaccination, no protection and higher risk for emergence.
5.	no	"++"	Currently, there is no evidence for passage of the species barrier. But the possibility of passage of the barrier species exists, and represents a potential risk factor for emergence in other ruminant species.
6.	no	"0"	In principle, the disease is not transmissible to humans. However, in vitro conversion experiments indicate that CWD prions can convert human as well as bovine and sheep prion proteins into its abnormal conformer (PrPres), albeit at a very low rate. A transmission to humans should not represent a risk for emergence in the animal populations because humans do not retransmit infection.
7.	no	"+++"	Currently, there is no geographical extension of the disease, which is restricted to North America. However, considering the knowledge collected in North America with regard to the epidemiology of CWD (spreading of the disease from geographical clusters) and the demographical and geographical bias in the Belgian and EU CWD survey, the presence of CWD in EU cervids cannot be excluded. Since the assumption of a random sampling in the Belgian and EU CWD survey is not fulfilled, a quantitative estimate of the true prevalence with confidence intervals is not possible, since it might underestimate the true prevalence if the epidemiological situation with regards to CWD in cervids was different in blank areas. Since the disease is transmissible, a geographical extension would represent a risk for emergence of the disease in Belgium.

8.	yes	"++"	There is an increase in incidence in other countries (which countries?). This represents a risk factor for emergence of the disease in Belgium (mechanism?)
9.	yes	"+++"	The prion can persist in the environment, what is responsible for the horizontal transmission. The persistence in the environment is a risk factor for emergence of the disease.
10.	no	"- -"	The disease is poorly covered by the legislation, because of the absence of cases in Belgium and in Europe. A legislation should be a protection factor against the emergence of the disease.
11.	yes	"+"	There are changes in the technological and industrial processes. By analogy with the mechanism partly responsible of the emergence of BSE, changes in processes are risk factors of emergence of the chronic wasting disease. Technological changes could also lower the risk.
12.	yes	"+++"	The detection of the disease is difficult in wild cervids, and also in domestic cervids, due to the lenght of the incubation period. These problems of detection of emergence are risk factors of emergence.
13.	yes	"++"	There are increases in interactions between the cervidae populations. Since CWD is transmissible, the interactions between these animal populations favour the transmission of the prions responsible for the disease. These are risk factors of emergence.
14.	no	"0"	There are no increases in interactions between the cervid and human populations. Since the disease is not transmissible to humans by contact, there is no influence of an eventual increase in interactions between the animal and human populations on the risk for emergence.
15.	no	"0"	There is no significant demographic growth in Belgium. The disease is not concerned by a human demographic growth.
16.	yes	"++"	The cervid population is increasing in Belgium. This growth represents a risk factor for emergence because the disease is transmissible.
17.	yes	"+++"	Human traveling is increasing. This is a risk factor of emergence of the disease (import via international hunters).
18.	yes	"+++"	Human tourism is increasing. This is a risk factor of emergence of the disease (import via international hunters).
19.	yes	"++"	There is an increase in trade of cervids (?). This is a risk factor for emergence, through the risk for importation of infected animals.
20.	yes	"++"	There is an increase in transport of cervids (?). This is a risk factor for emergence, through the risk for transport of infected animals in our country
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"++"	There are intensive production systems of cervids in Belgium (?). This favours the transmission of the disease amongst cervids. Industrial feeding of the animals plays also a role. These are risk factors of emergence.
23.	yes	"++"	There are extensive production systems of cervids in Belgium. These are risk factors of emergence because this favours the transmission between cervids, such as evidenced in USA in parks for cervids.
24.	yes	"++"	The cervids can sometimes be asymptomatic during all their lifespan. This is a risk factor for transmission and of emergence, due to the non detection and to the absence of sanitary meausres
25.	yes	"+++"	There is an animal reservoir. Since the disease is transmissible, and that the animal reservoir plays an epidemiological role, this is a risk factor for emergence.
26.	yes	"+++"	The incubation period is long. Preclinical carriers can excrete the PrPd before the disease occurs (birth, milk, …). This increases the risk for transmission of the non detected disease and the risk for emergence of the disease.

27.	yes	"+"	There are contacts between domestic and wild cervids. Since the disease is transmissible, this can favour the transmission and is a risk factor for emergence.
28.	yes	"+++"	Since it is a cervid disease, the wildlife has an epidemiological role. This is a risk factor for emergence, due to the difficulty of controlling wild fauna.
29.	yes	"+++"	There is an increase in the demography of wild cervids, which can increase the risk for emergence.
30.	yes	"0"	There are climatic and meteorological changes. No influence on the risk of emergence.
31.	no	"0"	No influence of possible changes in ecosystems.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of urbanisation on the risk for emergence.
33.	no	"+"	Non vectorial disease. However, CWD can apparently be transmitted by fomites.

Boviene besmettelijke pleuropneumonie (*Mycoplasma mycoides* subsp. *mycoides* variant Small Colony)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"++"	Several mycoplasms, of which Mycoplasma mycoides subsp mycoides variant Small Colony, show modifications of the surface antigens (antigenic variation, variation in diverse surface proteins) due to genetic modifications. This genetic variability is a risk factor for emergence of new types.
2.	yes	"++"	The pathogenesis of the mycoplasms has been intensively studied the last 20 years but there are still numerous remaining knowledge gaps. This is a risk factor for emergence of the disease.
3.	no	"++"	Currently, there are no changes in the pathogenesis of the disease. If there were changes in the pathogenesis, these would represent a risk factor for emergence of the disease.
4.	yes	"+++"	There are problems associated with the vaccination: there is an attenuated live vaccine in Africa available, but the efficiency of these vaccines against the European strains is doubtful; the vaccination protects only a few months and has to be repeated; the vaccination is forbidden in Europe. These difficulties constitute a risk factor for emergence.
5.	no	"+"	The bacteria is highly host specific and the probability to change the host spectrum is very low. If there was a possibility to pass the species barrier, this would represent a risk factor for emergence of the disease in a new animal species.
6.	no	"0"	The disease is not zoonotic and this possibility would have no influence on the risk for emergence because humans should not retransmit the disease.
7.	no	"++"	The disease is widespread in Africa, Asia and some European countries, but there is no geographical extension of concern to Belgium. A further geographical extension would represent a risk factor. For example, the regular episodes in the Southern of Europe (namely in France) represent a risk factor for emergence in Belgium.
8.	yes	"++++"	There have been re-emergences in Europe since the eradication in the XIXth century: in Portugal in 1951, in Spain in 1957, in France in 1984, in Italy in 1990-1993, in Portugal in 1999. These re-emergences represent an important risk factor for emergence

			in Belgium via the trade (risk for importation of infected animals)
9.	no	"+"	Mycoplasms are not considered to be resistant in the environment, which is a protection factor against emergence. The persistance in the environment would represent a risk factor of emergence.
10.	yes	"- - - -"	There are legislations and sanitary policy measures: disease of the list of OIE, existence of recommended norms for the surveillance, slaughtering of the herd in case of outbreak, control of the trade of the bovines, control of the meet at the slaughterhouses, etc. These measures are protection factors against the emergence of the disease.
11.	no	"0"	The disease is not concerned by changes in technological or industrial processes. No influence on the risk for emergence of the disease.
12.	yes	"++++"	There are several problems of detection of emergence, which represent risk factors for emergence of the disease: (1) there are chronic infected asymptomatic animals, difficult to diagnose, and which are responsible for the silently persistence and propagation of the disease; (2) the veterinarians and the breeders will have difficulties to recognize the first cases in case of outbreak; (3) there are less pathogenic strains causing untypical problems.
13.	no	"++"	There are no increases in interactions between the bovine populations at national level. Increases in interactions should represent a risk factor for emergence because interactions increase the possibilities of transmission of the disease.
14.	no	"0"	The disease is not concerned by the human population.
15.	no	"0"	There is no significant demographic growth in Belgium. The disease is not concerned by the human demography.
16.	no	"++"	There is no growth of the bovine population in Belgium. An increase in this population would represent a risk factor because it would increase the risk for transmission of this contagious disease.
17.	yes	"0"	Human traveling is increasing, but which has no influence of the risk for emergence of the disease.
18.	yes	"0"	Human tourism is increasing, but which has no influence of the risk for emergence of the disease.
19.	yes	"++"	There is an increase in trade of animals, which create opportunities of contacts between infected and non infected animals via movements and via importations. Movements of animals play an important role in the propagation of the disease. The increase in trade is a risk factor for emergence of the disease.
20.	yes	"++"	There is an increase in transport of animals, which create opportunities of contacts between infected and non infected animals. Movements of animals play an important role in the propagation of the disease. The increase in transport a risk factor for emergence of the disease.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"0"	There are intensive production systems for bovines. The intensification does not play any role in the emergence of the disease.
23.	yes	"0"	There are extensive production systems for bovines. These extensive production systems do not play any role in the risk for emergence of the disease.
24.	no	"++++"	There are currently no asymptomatic infected animals in Belgium. Undetected asymptomatic animals or animals which recover rapidly and remain carrier during a long period (until 2 years) are capable to retransmit the infection. These animals represent a major source of infection. In Europe, the clinically unapparent chronic form of the disease is most frequent. If the disease was introduced in Belgium, these asymptomatic carriers would be a very important risk factor for dissemination of the disease between herds and of emergence.

25.	no	"++++"	There are currently no animal reservoirs in Belgium. In the world endemic zones, the chronic carriers are responsible for the insidious maintenance of the disease in the populations, and these reservoir animals represent an important risk factor for emergence of the disease.
26.	yes	"++++"	The incubation period, during which the animal is already infectious, can be very long (between 1and 3 months, sometimes more, until 7 months). Because these animals are not detected, this is a risk factor for emergence of the disease.
27.	yes	"0"	There are contacts between the domestic bovines and the wild fauna but, because the wildlife does not play any epidemiological role (host specificity of the mycoplasm, which does not infect other animal species), this has no influence on the risk for emergence of the disease.
28.	no	"0"	The wild fauna is not sensitive to the mycoplasm and has no influence of the risk for emergence.
29.	no	"0"	There is no increase in the demography of the wildlife in Belgium. Because the wildlife does not play any epidemiological role, this has no influence on the risk for emergence of the disease.
30.	yes	"0"	There are climatic and meteorological changes, but these have no influence on the risk for emergence of the disease.
31.	no	"0"	The disease is not concerned by changes in the ecosystems produced by man.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. The disease is not concerned by the urbanisation.
33.	no	"0"	Non vectorial disease.

Hoogpathogene aviaire influenza (influenzavirus A subtype H5N1) (Webster and Hulse, 2004 ; Bengis *et al*., 2004 ; Gilbert *et al*., 2008)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+++"	There is a high genetic variability in RNA viruses. A reassortment provoked the emergence of this highly pathogenic strain H5N1. The genetic variability of the influenza viruses is a risk factor for emergence of new strains.
2.	yes	"+"	There is lack of knowledge of the pathogenesis. For example, the study of the molecular markers of virulence is yet necessary. A lack of knowledge represents always a risk factor for emergence.
3.	yes	"+++"	There have been changes in pathogenesis. Namely, the passage to the "highly virulent" status of this avian influenza virus is an essential element. This viral ability to change its pathogenesis pattern is a risk factor for emergence.
4.	yes	"++"	Vaccination is forbidden in Belgium (except in zoos). Vaccination can prevent clinical signs but does not fully prevents the viral excretion, making the viral transmission yet possible. Vaccination can hide a residual infection. Vaccination affects the trade. These difficulties represent a risk factor for emergence of the disease in case of introduction.
5.	yes	"++"	The virus can be transmitted from poultry to pigs and to other mammals (for example, carnivores), and also between different bird species. This represent a risk factor for emergence of new subtypes in case of concomitant infection of a pig (for example) by a

			porcine and a human strain.
6.	yes	"+++"	The virus is zoonotic. This is a risk factor for emergence of the disease in humans and also in the animal population because humans are capable of retransmitting the disease (humans are not dead-end hosts).
7.	yes	"+++"	A geographical expansion of the disease has been observed the last years (not in 2011 anymore) observed. This increases the risk for emergence in Belgium.
8.	yes	"+++"	New cases are regularly reported in foreign countries. This increases the risk for emergence in Belgium.
9.	yes	"++"	The virus can persist in the environment under specific conditions (water). The possibility of viral persistence in the environment increases the risk for transmission and of emergence.
10.	yes	"- - -"	There are currently legislation and sanitary policy measures (mandatory notifiable disease, biosecurity, confinement of poultry, etc.). These measures are protection factors against emergence.
11.	no	"0"	This disease is not concerned by changes in technological or industrial processes.
12.	yes	"++"	If the disease is introduced in Belgium, it will probably occur via the wild avifauna. The surveillance of this wild avifauna is a passive surveillance. Since the wild fauna, present in a natural environment, is difficult to monitor, there will be a problem of early detection of the presence of the disease on the territory. This is a risk factor for emergence because an absence or a delay in detection will allow the virus to expand without control measures.
13.	no	"++"	There is no increase in interactions between the animal populations concerned by the disease. If the disease is introduced in Belgium, it will probably happen via the wild avifauna. An increase in interactions between the animal populations concerned by the disease should be a risk factor for emergence, (1) through the increase in risk for viral transmission to domestic poultry and (2) in case of increase in interactions between poultry and pigs (for example, farms associating poultry and pork production), through the increase in risk for viral transmission to pigs, which can be a center of viral recombination leading to the emergence of new subtypes.
14.	no	"+++"	There is no increase in interactions between the avian/porcine and the human popuation in Belgium. If there was such an increase, this should be a risk factor for transmission to humans and emergence in the human population (the human cases of H5N1 followed a narrow contact between poultry and humans). However, despite the theoretical risk for human adaptation with subsequent inter-human transmission, there will probably be no subsequent inter-human transmission.
15.	no	"0"	There is no significant demographic growth in Belgium. Human demographic growth would have no influence on the risk for emergence.
16.	no	"++"	There is currently no growth of the domestic/wild avian and porcine populations in Belgium. A growth of these animal populations should represent a risk factor for emergence of the disease, because an increase in animal density favours the transmission rate of the disease.
17.	yes	"++"	Human traveling is increasing. This is a risk factor for viral introduction in Belgium, namely through the authorized or illicit transport of birds.
18.	yes	"++"	Human tourism is increasing. This is a risk factor for viral introduction in Belgium, namely through the authorized or illicit transport of birds.
19.	yes	"+++"	Birds/animal trade is increasing. This is a risk factor for introduction and emergence of the disease in the country, through the risk

			for (illegal) importation of infected animals.
20.	yes	"++"	Bird/animal transport is increasing. This is a risk factor for introduction and emergence of the disease in the country, through the risk for (illegal) transport of infected animals
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"++"	There are intensive poultry production systems in Belgium. If the disease was introduced in Belgium, this would be a risk factor for emergence, through the high contagiousness and transmission rate of the infection in high density populations. The high density of the pork production systems would also be a risk factor for recombination and emergence of new sybtypes, in case of introduction of the disease in Belgium.
23.	yes	"+++"	There are extensive poultry/pork production systems in Belgium. This is a risk factor for emergence through the possibility of contact with infected wild avifauna.
24.	yes	"+++"	There are (wild) avian species which show no clinical signs if infected. These species can move and disseminate the disease. This is a risk factor for introduction of the disease in our country.
25.	yes	"+++"	Wild birds (mainly water birds) are the animal reservoir for the domestic poultry. Their presence is a risk factor for emergence of the disease in domestic poultry.
26.	no	"++"	The incubation period is not specially long in animals. But a long incubation period could favour the viral disperion on long distances via migrations of undiseased infected birds, and should represent a risk factor for introduction of the disease in our country.
27.	yes	"+++"	There are possibilities of contact between domestic poultry and wild avifauna. This is a risk factor for emergence of the disease.
28.	yes	"+++"	If infected, the wild avifauna can be a viral reservoir and play an epidemiological role by transmitting the infection to domestic poultry. This is a risk factor for emergence because wild faune is difficult to control.
29.	no	"++"	There is no increase in demography and/or distribution of wild birds in belgium. Such changes would represent risk factors for introduction and expansion of the disease in Belgium because of the important epidemiological role of this animal population.
30.	yes	"0"	There are climatic and meteorological changes, but they atr not capable of influencing the risk for emergence of the disease (no influence on the migratory routes). It is to be noted that higher humidity and temperatures favour the persistence of the virus in water.
31.	no	"+++"	There are currently no changes in the ecosystems in Belgium. But changes in ecosystems (for example, establishment of water features favourable to the wild waterbirds) would represent risk factors for introduction of the disease via the wild fauna.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Urbanisation has no influence on the risk for emergence of the disease.
33.	no	"0"	The transmission is not vectorial. No influence of the insects on the risk for emergence of the disease.

Cysticercose bij varkens (*Cysticercus cellulosae*, *Taenia solium*)

Factor	Presence (yes) / absence	Impact (risk / protection	Scientific justification

	(no)	/ no effect)	
1.	no	"0"	There is no genetic variability. A genetic variability would have no influence on the risk for emergence of this disease.
2.	no	"+"	There is no lack of knowledge on the pathogenesis of this disease. A lack of knowledge represents always a risk factor for emergence.
3.	no	"+"	There is no change in the pathogenesis of the disease. A change in pathogenesis could always represent a risk factor of emergence of the disease.
4.	yes	"++"	There exist an efficient vaccine but which is not commercially available. The lack of available vaccine is a risk factor for emergence of the disease.
5.	no	"0"	There is no possibility of passage of the species barrier and this has no influence on the risk for emergence of the disease
6.	yes	"+"	The disease is zoonotic (humans are host for the adult stages of taenia saginata). Because humans can occasionnally retransmit the infection, this is a risk factor for emergence of the disease.
7.	no	"0"	There is no current geographical extension of the disease (stays in central America, Africa, Asia). If there was a geographical extention, this would have no influence on the risk for emergence because the transmission of the parasite by ingestion stays geographically localized. The risk is rather linked to importation of infected pigs.
8.	no	"++"	Even in developing coutries (Peru, mexico) the incidence decreases (Flisser *et al*, 2010. Plos NTD 4 (12)e831). An increase in incidence represents a risk factor for emergence of the disease in Belgium because of the increased risk of importation of infected pigs. De decreased incidence is a protection factor against emergence.
9.	yes	"+++"	The parasite can persist in the environment (pastures, surface waters: 2 months during the summer and 5 months during the winter). This can increase the risk for infection of the igs via ingestion of eggs in the environment and represent a risk factor for emergence of the disease.
10.	yes	"- -"	There are controls at importation, which represent a protection factor against the introduction of the disease in the country. These repersent protection factors against the emergence of the disease.
11.	no	"0"	Raw pork minced meat consumption is frequent in Belgium. Use frozen meat fo that use could reduce the risk but only for humans. There are no changes in the technological or industrial processes concerning the pork industry which could have an influence on the risk of emergence of the disease.
12.	yes	"+++"	There are problems of detection of the disease (live animals are asymptomatic; weak sensitivity of the visual inspection at the slaughterhouse) and this can impede the detection of a possible increase in incidence. This represents a risk factor for emergence of the disease.
13.	no	"0"	There is no increase in interactions between the concerned animal populations (swine populations). An increase in such interactions would have no influence on the risk for emergence of the disease because the transmission cycle of the parasite involves an indirect relation between humans and swine and no direct relation between swine.
14.	no	"+++"	There is currently no increase in interactions between pork and human populations in Belgium. Increases in interactions would represent a risk factor of transmission of the parasite in swine (increase in exposition to human feces)
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic growth.

16.	no	"0"	There is no growth of the porcine population in Belgium. Such an increase would have no influence on the risk for emergence of the disease.
17.	yes	"++"	Human traveling is increasing. This increases the risk of human infection abroad and the risk of introduction of the parasite in the Belgian swine population (emergence).
18.	yes	"++"	Human tourism is increasing. This increases the risk of human infection abroad and the risk of introduction of the parasite in the Belgian swine population (emergence).
19.	yes	"++"	There is an increase in trade of pork. This represents a risk factor of importation of infected swine in Belgium (introduction and emergence)
20.	yes	"+"	There is an increase in transport of pork. This represents a risk factor of introduction of infected swine in Belgium (emergence)
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	Yes	"- - -"	There are intensive swine production systems in Belgium. This is a protection factor against infection of porks because their receive industrial feed and have no access to an environment contaminated by human dejections.
23.	Yes	"++"	There are extensive swine production systems in Belgium (ex kept outside, BIO porks). This represents a risk factor of infection of swine via ingestion of matters infected by human excrements present in the environment.
24.	yes	"+++"	Live pigs are asymptomatic and this represents a risk factor for emergence (lack of detection).
25.	yes	"+++"	There exists an animal reservoir (pork) and this represents a risk factor for emergence of the disease.
26.	no	"0"	There is no long incubation period in swine but the incubation period has no influence on the risk for emergence because only dead animals (meat) are capable to transmit the disease to humans. The live animal is not infectious.
27.	yes	"0"	There are contacts between domestic pigs and wildlife but this has no influence on the risk for emergence because the transmission of the parasite (ingestion of infected matters from humans) does not involves a direct contact between animals, and because wildlife does not play an epidemiological role.
28.	no	"0"	The wild fauna does not play an epidemiological role. If the wildlife did play an epidemiological role, this would have no influence on the risk for emergence because infection of swine comes from humans.
29.	yes	"0"	There is a demographic growth of the wild boars population in Belgium. Because the wild fauna does not play an epidemiological role in the transmission of the disease to domestic cattle, such an increase would have no influence on the risk for emergence of the disease.
30.	yes	"0"	There are climatic and meteorological changes but this has no influence on the risk for emergence of the disease
31.	yes	"0"	There are changes in the ecosystems produced by man but these have no influence on the risk of emergence of the disease.
32.	yes	"0"	There is an ongoing urbanization in Belgium but which has no influence on the risk for emergence of the disease.
33.	no	"0"	Non vectorial disease

Klassieke rabiës (carnivoren) (Lyssavirus génotype 1) (Bengis *et al*., 2004 ; Cliquet and Picard-Meyer, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	Lyssaviruses are RNA viruses which typically have a high mutation rate. But currently, we do not observe a genetic variability in this Lyssavirus genotype 1. If there was a genetic variability this should not increase the risk for emergence because classical rabies is already asssociated with an agressive behaviour (contrary to the bat rabies).
2.	no	"+"	There is no lack of knowledge of the pathogenesis of rabies in carnivores. A lack of knowledge represents always a risk factor for emergence.
3.	no	"+"	Currently, there is no change in the pathogenesis of the disease. A change in the pathogenesis represents always a risk factor for emergence. In this case, the influence is weak because the virus is already associated with an agressive behaviour of the animals, allowing the transmission of the disease.
4.	no	"++++"	There are no difficulties to control the disease by vaccination, which is a high protection factor against the emergence of the disease. Difficulties to control the disease by vaccination should represent a high risk factor for emergence of the disease.
5.	no	"+"	The virus can already infect naturally all the mammal species. The host spectrum is already very large. There are no relevant possibilities to increase the host spectrum compared to the current situation. The faculty of the virus to infect additional species should even so represent a little risk factor for emergence.
6.	yes	"0"	Animals can transmit the infection to humans. But since humans do not retransmit the virus, they are dead-end hosts. The zoonotic character of the disease is not a risk factor for emergence (no influence).
7.	yes	"+++"	The disease is present in Europe (not in Belgium), for example in Northern Italy (other neighbouring countries?). The geographical extension of the disease is a risk factor for emergence of sylvatic rabies in Belgium.
8.	yes	"+++"	There is an increase in incidence in other european countries (neighbouring countries, for example?). This is a risk factor for emergence of the disease in Belgium, through the risk for illegal transport of infected animals.
9.	no	"0"	The virus is not able to persist in the environment. The possibility of viral persistance in the environment should have no influence on the risk for emergence because transmission requires a contact between animals.
10.	yes	"- - -"	The presence of a legislation/sanitory policy measures (vaccination dogs/foxes), forbidden movements of unvaccinated dogs) is a protection factor against the emergence of the disease.
11.	no	"0"	No influence of changes in technological or industrial processes for the risk for emergence of this disease.
12.	yes	"+++"	Illegal importation of susceptible animals poses a continuous risk for reintroduction. Some travellers and animal rescue organisations adopt sick and abandonned animals in southern countries and circumvent deliberately or out of ignorance the existing legislation. Veterinarians not always declare these illegal imports if they are presented, because of the conflict of interest (client binding!). Veterinarians who do declare illegal imports, resulting in euthanasia of the animal, are bashed on internet fora.This is an important risk factor for emergence of the disease.
13.	yes	"++"	There are increases in interactions between animal compartments. This can favour interspecies transmissions, and is a risk factor for emergence.

14.	yes	"0"	There are increases in intercations between humans and dogs/foxes. This increases the risk for infection of humans, but since humans are dead-end hosts, this has no influence on the risk for emergence of the disease.
15.	no	"0"	There is no significant demographic growth in Belgium.The emergence of the disease is not concerned by a demographic growth, because humans are dead-end hosts.
16.	no	"++"	There is no increase in the dog population in belgium. An increase would represent a risk factor for emergence.
17.	yes	"+++"	Human traveling is increasing. Some travellers and animal rescue organisations adopt sick and abandonned animals in southern countries and circumvent deliberately or out of ignorance the existing legislation. This is a risk factor for re-emergence of the disease in Belgium.
18.	yes	"+++"	Human tourism is increasing. Some travellers and animal rescue organisations adopt sick and abandonned animals in southern countries and circumvent deliberately or out of ignorance the existing legislation. This is a risk factor for re-emergence of the disease in Belgium.
19.	yes	"++"	There is an increase in trade of dogs, for example: importation of puppies from endemic regions with false vaccination certificates. There are also illegal importations. These are risk factors of re-introduction of the disease in Belgium.
20.	yes	"++"	There is an increase in transport of dogs, for example: transport of puppies from endemic regions with false vaccination certificates. These are risk factors of re-introduction of the disease in Belgium (linked with the increase in trade).
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	yes	"-"	Dogs, cats, foxes are not concerned by production systems. Intensive production systems of cattle, however, decrease the risk for contact of cattle with infected (wild) animals and constitute a protection factor against infection of cattle.
23.	yes	"++"	Dogs, cats, foxes are not concerned by production systems. Extensive production systems of cattle, however, increase the risk for contact of cattle with infected (wild) animals and constitute a risk factor for infection of cattle.
24.	no	"+++"	There are no asymptomatic carriers. The presence of asymptomatic carriers (related to the length of the incubation period) should represent a risk factor for emergence of the disease, because these animals in incubation are capable to transmit the disease via direct contact, without showing any clinical sign.
25.	no	"+++"	Since rabies is currently eradicated in Belgium, there are no animal reservoirs. The animal reservoir should be dogs and foxes. If infected foxes or dogs were present in Belgium, thus if there was an animal reservoir, it should represent a risk factor for emergence of the disease.
26.	yes	"++++"	There is a long incubation period in animals. Since animals in incubation are capable to transmit the virus by direct contact without showing clinical signs, the long incubation period is a risk factor for emergence of the disease.
27.	yes	"++"	There are contacts between wild foxes or wild animal species, and domestic cattle or dogs. This is a risk factor for emergence of the disease in the domestic animal population.
28.	yes	"++"	The wild fauna (foxes and raccoons with uncertain origin) plays an epidemiological role (reservoir) concerning rabies. This is a risk factor for emergence.
29.	yes	"+++"	There is an increase in the foxes population in Belgium. Foxes and raccoon dogs in Eastern Europe are still reservoirs of the virus. Illegal import of these species (especially raccoon dogs) may pose a risk for reintroduction. Raccoon dogs have been spotted in Belgian fauna, but their origin is uncertain. They are almost never submitted for rabies surveillance. This is a risk factor for

			emergence of the disease.
30.	yes	"0"	There are climatic and meteorological changes. No influence of climatic changes on the risk for emergence of classical rabies of carnivores.
31.	no	"0"	No influence of changes in ecosystems on the risk for emergence of classical rabies of carnivores.
32.	yes	"-"	There is an ongoing urbanisation in Belgium. Urbanisation is a protection factor against emergence since dogs kept in an urban environment are less likely to come into contact with wildlife (in contrast to farm dogs or hunting dogs).
33.	no	"0"	Non vectorial disease. No influence on the risk for emergence.

Pest (*Yersinia pestis*) (Bengis *et al*., 2004 ; Higgins, 2004)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	yes	"+"	There is enormous genetic variability - including virulence plasmid content - between strains belonging to different biovars and geographical origin. This is a risk factor for emergence of new "strains".
2.	no	"++"	Yersinia are well known bacteria. This knowledge allows a good prophylaxis and is a protection factor against emergence. Lacks of knowledge are always risk factors for emergence.
3.	no	"+"	There are no changes in pathogenesis. Some strains are more virulent than others, some tend to cause a disease often evolving towards the pneumonic form which can be transmitted to other individuals by air (vector no longer required), others do not. But globally, the disease is the same. Changes in pathogenesis would represent a risk factor for emergence.
4.	yes	"++"	There is a human vaccine, which is not commercially available however for the public (only for some exposed persons such as the military or for research workers); the protection is short-term (6 months); it is impossible to vaccine the rats. The absence of vaccination is a risk factor for emergence of the disease.
5.	no	"+"	The bacteria can already infect rats, cats, dogs, rabbits, etc. Because the bacteria are genetically stable, there is no possibility to change this host spectrum. The possibility to change the host spectrum is always a risk factor for emergence of the disease in this new host.
6.	yes	"+"	The disease is zoonotic. Because humans are capable to retransmit the infection to animals or to other humans, this factor represents a risk factor for emergence of the disease.
7.	yes	"++++"	There is an extension of the geographical distribution of the agent: the disease is currently endemic in several parts of the world in the XXth century (Africa, Asia, North and South of America) but not in Europe. This is an important risk factor for emergence in Europe and in our country.
8.	yes	"+++"	Recently, there has been an outbreak in North Africa and reappearance in several countries worldwide (currently not in Europe). The disease is considered by the WHO as a re-emergent disease on world scale. Because fleas and rats do not recognize the

			political borders, this increase in incidence represent a risk factor for emergence in Europe and in our country.
9.	yes	"+"	The bacteria can stay virulent for several days in putrefying organisms. The persistence in the environment would represent a risk factor for emergence of the disease, but the mechanism is unknown. Re-emergence is conditionned by many environmental factors, including the presence of suitable vectors and (intermediate) hosts.
10.	yes	"- - -"	There are some sanitary policies: biosecurity (fight against rodents and vermin), control programs against fleas in endemic regions, tests at importation, etc.). These elements are important protection factors against emergence.
11.	yes	"0"	The disease is not concerned by the changes in technological or industrial processes.
12.	yes	"+"	There could be problems of recognition of the warning symptoms of the disease in human patients by first line doctors in case of re-emergence. The non detection of the disease would be a risk factor for emergence of the disease.
13.	yes	"+"	There can be increases in interactions between the different concerned animal compartments (between wild and domestic rodents via flea bites, between cats and rodents via ingestion of rats, etc.). This could represent a risk factor for emergence of the disease if infected animals would be present in the region.
14.	yes	"+"	There are increases in interactions between humans and animal populations concerned by the disease, due to the proximity between the reservoir rodent populations and the human activities (extension of the peri-urban zones) or due to contacts with cats. Because humans are capable to retransmit the disease to animals or other humans, this could be a risk factor for emergence if the disease was prevalent in Europe.
15.	no	"++"	There is no significant demographic growth in Belgium. A human demographic growth could create conditions for an increase in the transmission of the disease (from animals to humans and between humans), if such a growth was accompanied by a decrease in general hygiene (for example, waste discharges in big cities).
16.	yes	"+++"	There is a growth of the rodent population in Belgium. This represents a risk factor for emergence of the disease.
17.	yes	"+"	Human traveling is increasing. The bacteria can spread via rodents/vectors accompanying international human movements. International air traveling represent a risk factor for emergence of the disease.
18.	yes	"+"	Human tourism is increasing. The bacteria can spread via rodents/vectors accompanying international human movements. The eco-tourists are a risk population if they travel in endemic regions. International air traveling represents a risk factor for emergence of the disease.
19.	yes	"+"	The rodents are not directly concerned by the trade but, such as for traveling and tourism, international trade from endemic regions can represent a risk factor of accidental importation of infected rodents/vectors in a free region (historical example: rats in the commercial ships). So, the global increase in trade is a risk factor for emergence of the disease.
20.	yes	"+"	The rodents are not directly concerned by the transports but, such as for traveling, tourism and trade, international transport from endemic regions can represent a risk factor of accidental importation of infected rodents/vectors in a free region (historical example: rats in the commercial ships). So, the global increase in trade is a risk factor for emergence of the disease.
21.	yes	"+"	There is an increase in terrorism. Yersinia pestis could be used as bacteriological weapon. This is a risk factor for emergence of the disease.
22.	no	"0"	The disease is not concerned by the production systems of domestic animals.
23.	no	"0"	The disease is not concerned by the production systems of domestic animals.

24.	yes	"+++"	Some rodent species are resistant, do not die when infected, and transmit the disease. These resistant host species infect the fleas which in their turn infect sensitive animals, which can create an outbreak. In case of presence of such rodents in our regions, this asymptomatic carriage would represent a risk factor for emergence of the disease.
25.	yes	"++"	The wild rodents are the natural reservoir of the disease. The fleas are also considered as natural reservoir because they can stay infected during 396 days. In the natural outbreaks, the forest plague survive by a continuous cycle of the etiological agent, transmitted between rodents via the fleas (arthropod-vertebrate complex). cats and dogs could also represent an animal reservoir if the incidence of the infection increases in these species. The animal reservoirs represent a risk factor for emergence of the disease.
26.	no	"+"	In sensitive animals, the incubation period is short and the animals die rapidly, which is a protection factor. A long incubation period should represent a risk factor for emergence because it favors the transmission by infected and non diseased animals.
27.	yes	"++"	There are contacts between domestic and wild rodents. For example, wild rats (forest plague) can infect ubiquitous rats via a flea bite, which in their turn can infect domestic rats, which in their turn can infect humans (urban plague). These contacts are risk factors of emergence of the disease.
28.	yes	"+++"	The wild rodents (rats) play an important epidemiological role because they are the natural reservoir of the bacteria. Because the wild fauna is difficult to control, this represent a risk factor for emergence of the disease.
29.	no	"+++"	There is an increase in the rodent/rat population in our country. If the disease was present in the region, an increase in the rat population would represent a risk factor for emergence of the disease.
30.	yes	"++"	There are climatic and meteorological changes. If sensitive animal are sufficiently numerous and if the climatic conditions are favorable (warm and dry weather), a plague outbreak can occur in rodents. The fleas would also better survive and would be more abundant in case of soft winter. Floods favor the moving of the rodents (rats) can also favor an emergence. These are risk factors of emergence. However hard winters (if the gulf stream disappeared) should be protective factors against emergence.
31.	yes	"+"	There are changes in ecosystems produced by man, and this represents a risk factor for emergence of the disease.
32.	yes	"+"	There is an ongoing urbanisation in Belgium. The urbanisation creates opportunities of contacts between wild and domestic rats (infected wild rodents can infect rodents living at proximity of the habitations which in their turn can infect humans). If there are problems concerning the waste and dumping management, the increase in urbanisation could, in case of presence of the bacteria, be a risk factor for emergence.
33.	yes	"+++"	Fleas (mostly the rat fleas) and body lice (EID 16 n°5 p.892-893, 2010) are responsible for the transmission of the disease between all the host species. The presence of this vector in Belgium constitutes an important risk factor for emergence of the disease.

Door teken veroorzaakte encefalitis (Virus van de TBE-groep (Flaviviridae))

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification

1.	no	"0"	There is no genetic variability. A genetic variability should have no influence on the risk for emergence.
2.	yes	"++"	There is lack of knowledge of the pathogenesis. The lack of knowledge in pathogenesis is a risk factor for emergence.
3.	no	"+"	The infection profile remains stable. A change of pathogenesis could represent a risk factor for emergence of the disease.
4.	yes	"++"	The vaccination is efficient for the prevention of the disease in humans, but has no epidemiological significance on the risk for emergence of the disease because the transmission is vectorial. This is a risk factor for emergence of the disease.
5.	no	"0"	There are no known possibilities to pass the species barrier, except the known susceptible species (wild small mammals, cattle). The passage of the species barrier would have no influence on the risk for emergence.
6.	yes	"0"	The disease can be transmitted to humans, but this has no influence on the risk for emergence.
7.	yes	"+++"	The disease is present in Europe and goes up to the North of Europe following the increase in ticks populations. This is a risk factor for emergence in Belgium.
8.	yes	"+++"	The last years, the number of (human) cases increases in most countries (France, Germany, Austria, etc.). This is a risk factor for emergence.
9.	no	"0"	The virus does not persist in the environment. Since the transmission needs a vectorial action, a persistence in the environments would have no influence on the risk for emergence.
10.	no	"- -"	There are no measures capable to limit the extension of the disease, because of the impossibility to take measures against ticks and wild small mammals. The pasteurization of the milk of infected cows is a protection factor of the human population.
11.	no	"0"	This disease is not concerned by this factor
12.	yes	"++"	There are difficulties to detect the disease in ticks and wild small mammals, and also probably difficulties of field detection of this etiology in diseased cattle. Problems of detection are risk factors of emergence of the disease.
13.	no	"0"	There is no increase in interactions between animals compartments concerned by the disease (small mammals, cattle) (for ticks, see last point). Such an increase would have no influence on the risk for emergence, because the transmission needs the action of a tick.
14.	no	"0"	There is no increase in interactions between animals concerned by the disease (small mammals, cattle) and humans (for ticks, see last point). Such an increase would have no influence on the risk for emergence, because the transmission needs the action of a tick.
15.	no	"0"	There is no significant demographic growth in Belgium. The disease is not concerned by a human demographic growth.
16.	no	"0"	There is no growth of the domestic animal populations concerned by the disease. Such an increase would have no influence on the risk for emergence of the disease.
17.	yes	"++++"	Human traveling is increasing. This is a risk factor for infection of humans and of emergence in the human population. This implies also a risk for importation of infected ticks via planes;
18.	yes	"++++"	Human tourism is increasing (forest tourism, campers, picking, hunting, naturalists). This is a risk factor for emergence in humans, but not in animal populations.
19.	no	"0"	The increase in trade does not concern ticks nor wild small mammals.
20.	no	"0"	The increase in transports does not concern ticks nor wild small mammals.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.

22.	yes	"-"	There are intensive production systems concerning cattle, decreasing the risk for being infected by ticks. This is a protection factor against emergence in the cattle population.
23.	yes	"+"	There are extensive production systems concerning cattle, increasing the risk for being infected by ticks. This is a risk factor for emergence in the cattle population.
24.	no	"0"	There is no asymptomatic carriage. An asymptomatic carriage would have no influence on the risk for emergence because tick bites do not depend on the presence of clinical signs.
25.	yes	"+++"	The animal reservoirs are forest rodents and small mammals. Because this reservoir is wildlife, the animal reservoir is a risk factor for emergence of the disease.
26.	no	"0"	There is no especially long incubation period for the disease. A long incubation period would have no influence on the risk for emergence because tick bites do not depend on the presence of clinical signs.
27.	yes	"++"	There are possibilities of contacts between cattle and wildlife (small mammals of the wild fauna). This is a risk factor for transmission of the disease and of emergence
28.	yes	"+++"	Wildlife (ticks and wild small ruminants) has an important epidemiological role because they are the animal reservoir. This is a risk factor for emergence because control of wildlife is difficult.
29.	yes	"++++"	The abundance of forest big vertebrates (roe deer) and of the small mammals reservoir (xild rodents) favours the ticks pullulation. This is a risk factor for emergence of the disease.
30.	yes	"++"	There are climatic and meteorological changes. Climatic changes (warming) increase the tick populations and their geographical repartition. This is a risk factor for emergence.
31.	no	"++"	Changes in the eco-landscaped structure of the forests (ex. North of America) favours the ticks pullulation. This would represent a risk factor for emergence, but such changes in ecosystems do not exist in Belgium.
32.	yes	"++"	There is an ongoing urbanisation in Belgium. Urbanisation is a risk factor because it increases the interactions between humans and ticks/wild fauna. This is a risk factor for emergence on the disease.
33.	yes	"++++"	Ticks (Ixodes ricinus et ixodes persulcatus) are present in Europe and in Belgium. This is an important factor of emergence of the disease in Belgium.

Atypische BSE (prionen (type H en type L))

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"+"	A certain diversity exists concerning the prions, but we can not speak about a true variability. A genetic variability should represent a risk factor for emergence.
2.	yes	"++"	There is lack of knowledge of the pathogenesis. The origin of atypical BSE is unknown (spontaneous and sporadic arrival? Meat and bone meal?). Little is known on the pathogenicity of atypical BSE. There are no data on the distribution of the infectivity in peripheral tissues, what impede any evaluation of risk reduction by the different prevention measures in force, such as SRM. The

			lack of knowledge of pathogenesis is a risk factor for emergence.
3.	yes	"++"	The L-type seems more virulent for humans than the classical type. In case of L-type, the majority of the PrPd is not situated in the brainstem, and the brain should not be the optimal target for the detection of prion particles, which can lead to a lack of detection of cases. A non detection of cases can lead to the emergence of the disease.
4.	yes	"+"	There is no vaccine. If no vaccination, no protection and higher risk of emergence.
5.	yes	"++"	There is a possibility of transmission to other species, but this is only proven under experimental conditions for the L-type (humanized mice, monkeys). There is a possibility, after interspecific passage, to generate classical BSE --> possibility of re-emergence of classical BSE. The possibility to change the host spectrum is a risk factor for emergence.
6.	yes	"+"	There are indications that the L-type could be potentially transmissible to humans and be more virulent that the classical type. Humans do not transmit infection (dead end host), but there is the theory about recycling of human cadavers from the Ganges into MBM as possible vector, and recently theoretical airborn transmission is shown to be very efficacious. So the possibility of passage to humans is a risk factor for emergence in animals.
7.	no	"0"	There are cases in different European countries, but we can not speak about a real geographical expansion. Since the transmission of the disease is food-borne, it has no influence on the risk for emergence. The risk concerns the importations (see below).
8.	yes	"+"	There are cases in several European countries, and also in non-European countries (Japan, USA). This is only a risk factor in case of importation of infected animals or infected animal products (meat and bone meal).
9.	yes	"++"	The persistence in the environment is not proven for Atypical BSE, but by analogy with other prions (scrapie and classical BSE), it has to be considered that there is a survival in the environment. This is a risk factor for emergence.
10.	yes	"- - -"	There is a legislation (EC Regulation 999/2001). This is an important protection factor against emergence. However, the reduction of the surveillance can be a risk factor for underestimation of the prevalence or of undetection of a potential emergence.
11.	yes	"+"	There are changes in the technological or industrial processes. The origin of atypical BSE is sporadic or spontaneous (i.e. not due to changes in industrial processes), but the recycling of infectious materials could be at the origin of the transmission of the disease, such as for classical BSE. Consequently, the changes in the industrial processes are risk factors of emergence.
12.	yes	"+++"	Different current tests (see validation of current tests by EFSA) available offer sufficient sensitivity. However, due to the fact that in atypical cases the majority of the PrPd is not present in the brainstem (brainstem is used in all these tests), the current testing methods do not allow reliable detection of the Atypical cases, so no reliable data on the occurence and possible other transmission mechanisms than for classical BSE are available. This represents a risk factor of non detection of a re-emergence of the disease, and a risk factor for emergence in case of recycling of products from infected incubating animals.
13.	no	"+"	There are no increases in interactions between cattle populations. Pathogenesis and transmission of Atypical BSE is largely unknown. If lymphoreticular system would be more involved like in Classical scrapie or CWD, then direct and indirect contact could be a risk factor.
14.	no	"0"	There are no increases in interactions between human and cattle populations. Since the transmission is foodborne and that humans are dead end hosts, interactions have no influence on the risk for emergence of atypical BSE.
15.	no	"0"	There is no significant demographic growth in Belgium. There is no influence of a demographic growth on the risk for emergence,

			for the same reasons mentioned above.
16.	no	"0"	There is no growth of the cattle population in Belgium. A growth of the cattle population should have no influence on the risk for emergence since the transmission route of the disease is food-borne.
17.	yes	"0"	Human traveling is increasing, but this has no influence on the risk for emergence in the cattle population.
18.	yes	"0"	Human tourism is increasing, but this has no influence on the risk for emergence in the cattle population.
19.	yes	"++"	There is an increase in trade of cattle. This is a risk factor, through the risk for importation of infected animals or meat and bone meal.
20.	yes	"+"	There is an increase in transport of cattle and animal products. There is no influence of the transport of animals on the risk for emergence, but the transport, deriving from less controlled countries, of meat and bone meal (illegal ?!) could be a risk.
21.	yes	"+"	As BSE is considered as a potential bioterrostic agent for animals (economic) as for humans (nv CJD link), atypical BSE can also considered as such (one cannot exclude it)
22.	yes	"+"	Intensive production systems exist for cattle in Belgium. These are a risk factor only if recycled material is used (which is forbidden).
23.	yes	"+"	Extensive production systems exist for cattle in Belgium. These can be a risk factor only if the mean age of the population increases.
24.	yes	"++"	The animals are asymptomatic during a very long period (no H-BSE and L-BSE were observed in the passive epidemio-surveillance network although, during retrospective interviews, the farmers and veterinarians for six of these animals reported clinical signs with TSE in three fallen stock), rendering the early detection of the disease impossible. This can be a risk factor for emergence in case of recycling of products from infected incubating animals.
25.	no	"0"	There is no animal reservoir. The existence of an animal reservoir should not represent a risk factor because the transmission of the disease is most probably food-borne (but other transmission ways cannot be excluded as pathogenesis studies are lacking at present).
26.	yes	"++"	The incubation period is very long (> 8 years), rendering the early detection of the disease impossible. This can be a risk factor for emergence in case of recycling of products from infected incubating animals.
27.	yes	"+"	There are possibilities of contacts between domestic cattle and wildlife. Pathogenesis and transmission of Atypical BSE is largely unknown. If lymphoreticular system would be more involved like in Classical scrapie or CWD, then direct and indirect contact could be a risk factor and also the (carnivorous !) feeding of contaminated MBM.
28.	no	"0"	The wildlife has no known epidemiological role in the risk for emergence.
29.	no	"0"	No influence of a possibly increase in demography or distribution of the wildlife.
30.	yes	"0"	There are climatic and meteorological changes. No influence on the risk of emergence.
31.	no	"0"	No influence of possible changes in ecosystems.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. No influence of urbanisation on the risk for emergence.
33.	no	"0"	Non vectorial disease.

Dirofilariose (*Dirofilaria*) (Mas-Coma *et al*., 2008)

Factor	Presence (yes) / absence (no)	Impact (risk / protection / no effect)	Scientific justification
1.	no	"0"	There is no genetic variability. A genetic variability would have no influence on the risk for emergence of this disease.
2.	no	"+"	There is no lack of knowledge of pathogenesis. A lack of knowledge represents always a risk factor for emergence.
3.	no	"++"	There is no change in the pathogenesis. A change in pathogenesis can increase the risk for emergence.
4.	yes	"++"	There exist difficulties to control the disease by vaccination. This represents a risk factor for emergence.
5.	yes	"+"	There exist possibilities of changing the host spectrum. Such possibilities represent a risk factor for emergence.
6.	yes	"+"	The possibility to change the host spectrum from animals to humans exists, but only in highly endemic regions. The number of human infections is increasing in Europe. The contribution of humans in transmission is negligible.
7.	yes	"+++"	There is a progressive recovery of the disease in France (first in the Mediterranean Basin, then towards the center till the Paris Basin) (maybe false expansion due to an increased detection). 'This represents a risk factor of emergence in Belgium.
8.	yes	"++"	Increase in prevalence in the South (Spain, Italia, Sardinia) and in the East of Europe (Serbia, Croatia, Turkey, Romania) + increase in the number of cases in the North of Europe (Switzerland, Austria, Netherland, Germany, United-Kingdom, Sweden, Hungaria) in imported dogs or in dogs which stayed in the South of France, but also in dogs which have not left their home (cases in Switzerland). This represent a risk factor of emergence of the disease in Belgium.
9.	no	"0"	There is no persistance of the parasite in the environment. Because the transmission is vectorial, a persistence in the environment should have no influence on the risk for emergence.
10.	no	"- -"	There is no legislation nor sanitary polici. Some measures, such as compulsory prophylactic treatment of dogs travelling to endemic areas, could protect against the emergence of the disease.
11.	no	"0"	The disease is not concerned by this factor
12.	yes	"++"	There exists a problem of detection of the disease. This represent a risk factor of emergence.
13.	no	"0"	There is no increase in interactions between the animal compartments concerned by the disease. An increase would have no influence on the risk of emergence because the transmission pathway involves mosquitos and does not need some interactions between animals.
14.	no	"0"	There is no increase in interactions between the animal and the human populations. An increase would have no influence on the risk of emergence because the transmission pathway involves mosquitos and does not need some interactions between animals and humans.
15.	no	"0"	There is no significant demographic growth in Belgium. The emergence of the disease is not influenced by a human demographic growth.
16.	no	"++"	There is no increase in the dog population in Belgium. Such an increase would represent a risk for an increased transmission of the disease and for an increased incidence of the disease.

17.	yes	"+++"	Human traveling is increasing. Movements of infected dogs via travels, tourism, transport and trade increase the risk of introduction of the disease in the country.
18.	yes	"+++"	Human tourism is increasing. Movements of infected dogs via travels, tourism, transport and trade increase the risk of introduction of the disease in the country.
19.	yes	"++"	There is an increase in trade of dogs. Movements of infected dogs via travels, tourism, transport and trade increase the risk of introduction of the disease in the country.
20.	yes	"++"	There is an increase in transport of dogs. Movements of infected dogs via travels, tourism, transport and trade increase the risk of introduction of the disease in the country.
21.	yes	"0"	There is an increase in terrorism worldwide, but which does not concern this disease.
22.	no	"0"	Carnivores are not concerned by the production systems for food animals.
23.	no	"0"	Carnivores are not concerned by the production systems for food animals.
24.	yes	"+++"	The infection can be asypmtomatic. If not detected and not treated, the risk of retransmission of the disease is increased. This represents a risk factor for emergence.
25.	yes	"++"	domestic and wild canids, (cats)
26.	yes	"+"	There is a long incubation period, during which the animals can be infected without being detected; this is a risk factor for emergence
27.	yes	"0"	There can be contacts between the domestic animals and the wild fauna, but this has no influence on the risk of emergence because the (vectorial) transmission does not need contacts
28.	yes	"+"	Because wild canids are reservoir of the disease and that they can transmit the infection, the wild fauna has an epidemiological role. This represent a risk factor for emergence because it is difficult to control the wild fauna.
29.	yes	"+"	There is an increase of the foxes demograpgy/distribution in Belgium. An increase in the wild carnivore population represent a risk factor for emergence.
30.	yes	"+++"	There are climatic and meteorological changes. A warm and humid climate, favourable for the reproduction of the vector populations, can favour the expansion of the disease. This represent a risk factor.
31.	no	"++"	There are no true changes in the ecosystems in Belgium. Changes in ecosystems, if they favour the multiplication of the moquitoes, can be risk factors for emergence.
32.	yes	"0"	There is an ongoing urbanisation in Belgium. Since the vectorial mosquitoes are present in urbanized areas such as in humid natural areas and in countryside, urbanisation has no influence on the risk for emergence.
33.	yes	"++++"	The vectorial moquitoes (anophèles, culex, aedes) are present in belgium. This represent a risk factor for emergence.

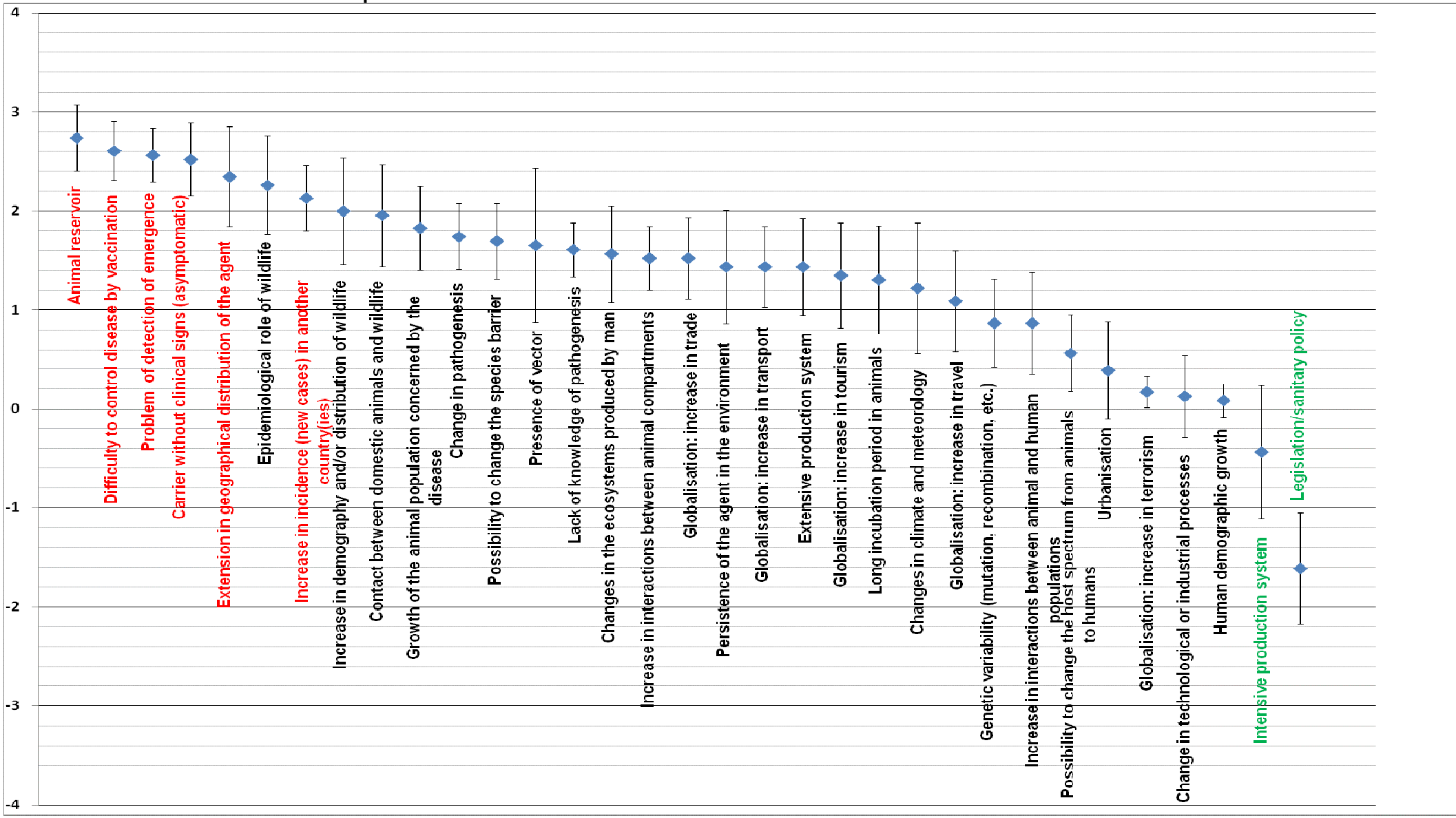
Bijlage 9. Rangschikkingscenario's voor de verschillende groepen van ziekten

De 95% betrouwbaarheidsintervallen zijn berekend op basis van een normale distributie. De x-as geeft de sterkte van de invloed van de factoren op het risico van opkomen van de dierenziekten weer, volgens de scores van de experten (zie verklaring in bijlage 4). De positieve waarden representeren risicofactoren. De « 0 » waarde betekent dat de factor geen invloed heeft. De negatieve waarden representeren beschermingsfactoren. De zes in het rood angeduide risicofactoren vertegenwoordigen de meest voorkomende risicofactoren in alle scenari, volgens bijlage 11. De in het groen aangeduide risicofactoren worden als beschermingsfactoren beschouwd.

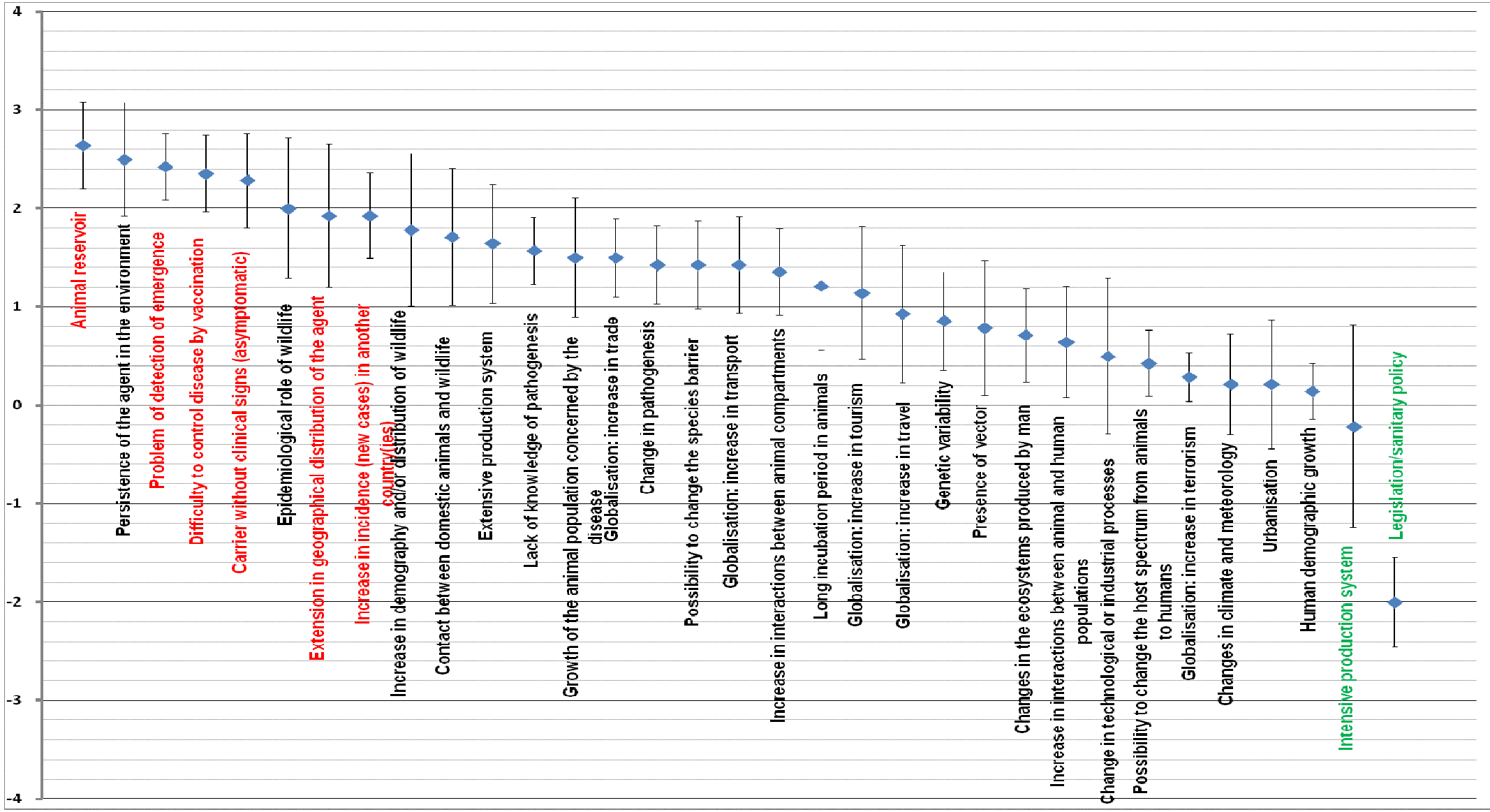
Scénario 1. Risicofactoren voor opkomen van ziekten waarbij de dierengezondheid als geheel wordt beschouwd

Dit scenario wordt in de tekst van het advies onder het deel « resultaten » weergegeven (punt 2.3.2).

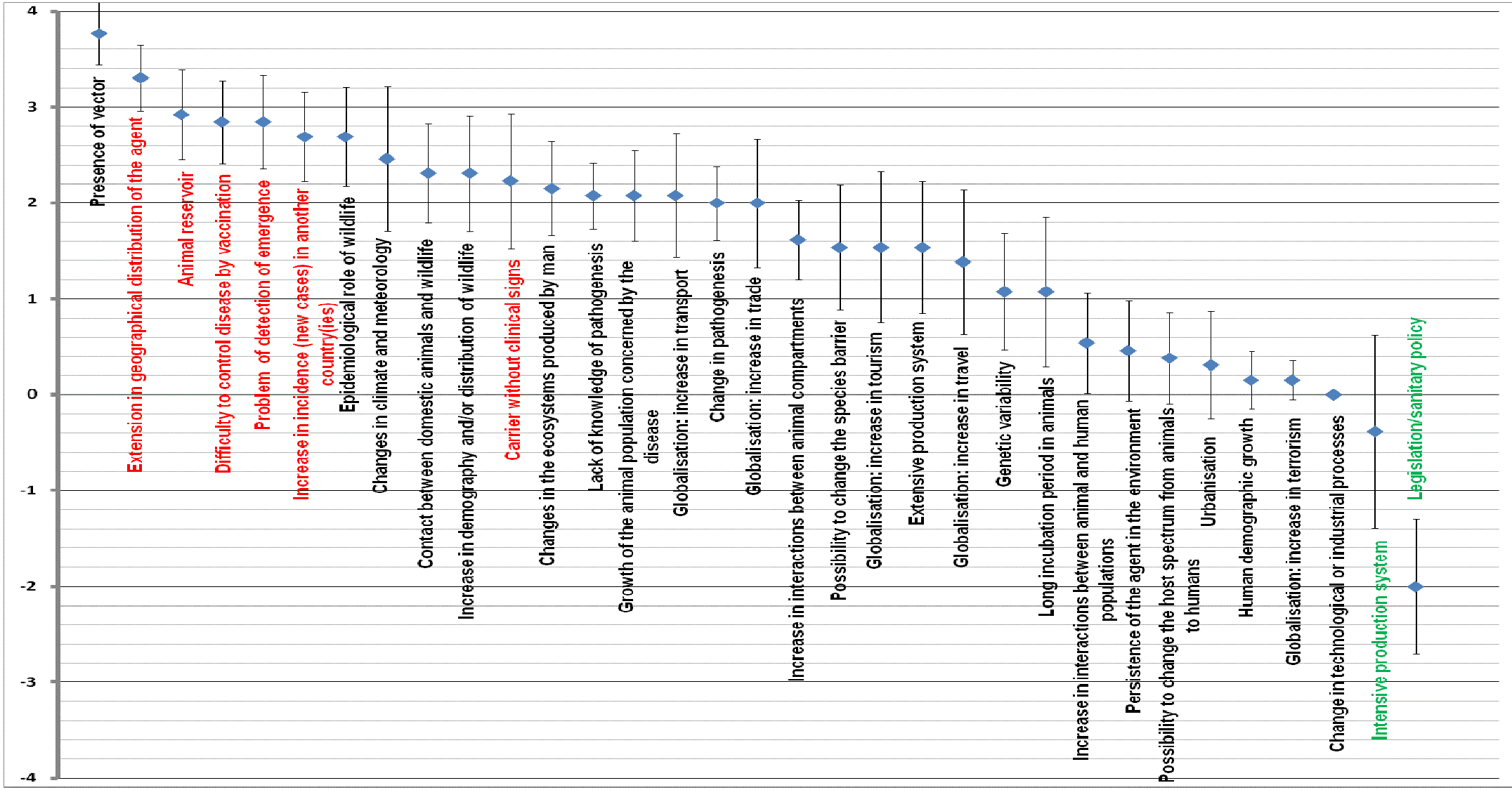
Scenario 2. Risicofactoren voor opkomen van zoönotische infectieuze dierenziekten



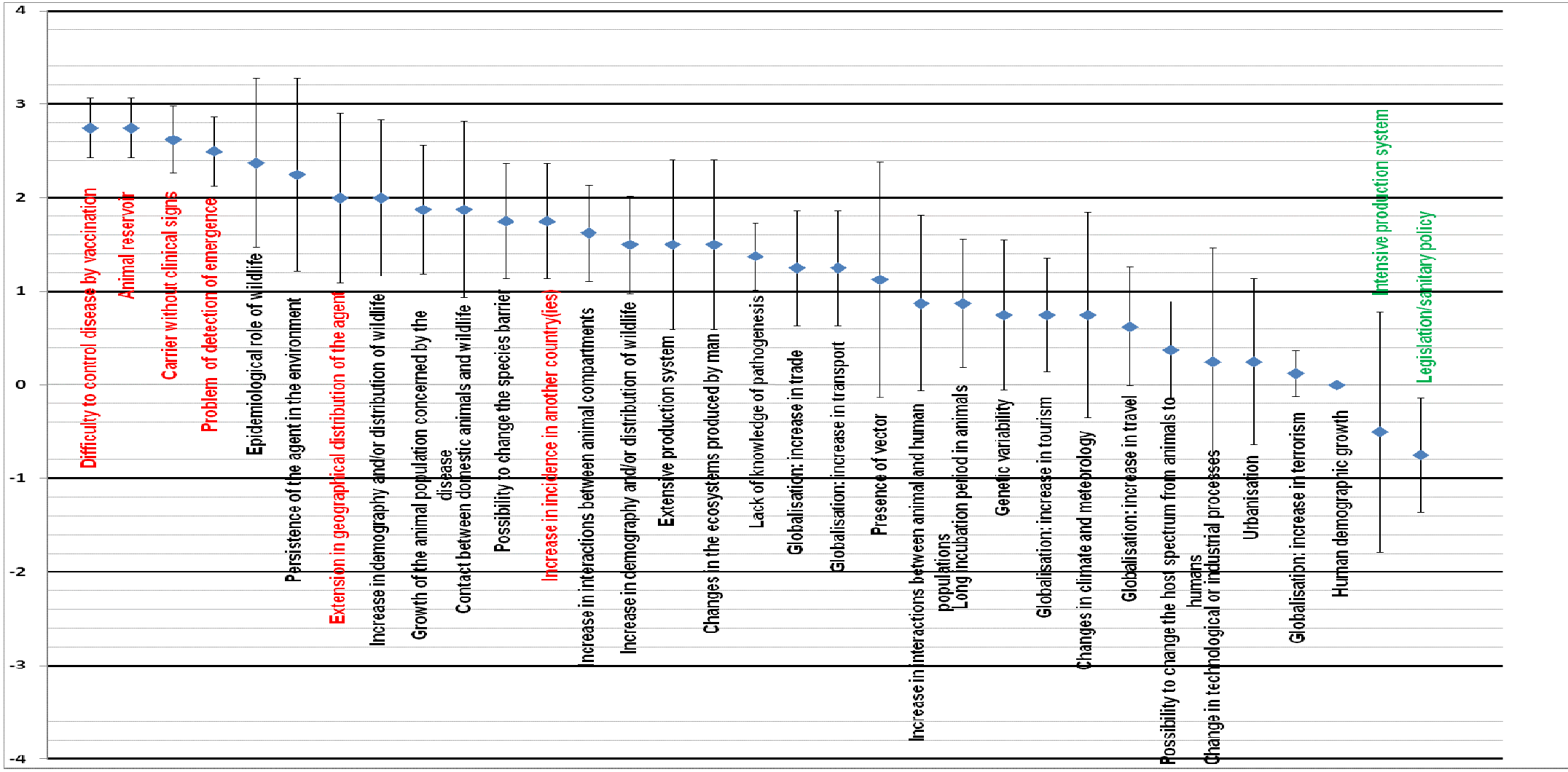
Scenario 3. Risicofactoren voor opkomen van door voeding overgedragen infectieuze dierenziekten



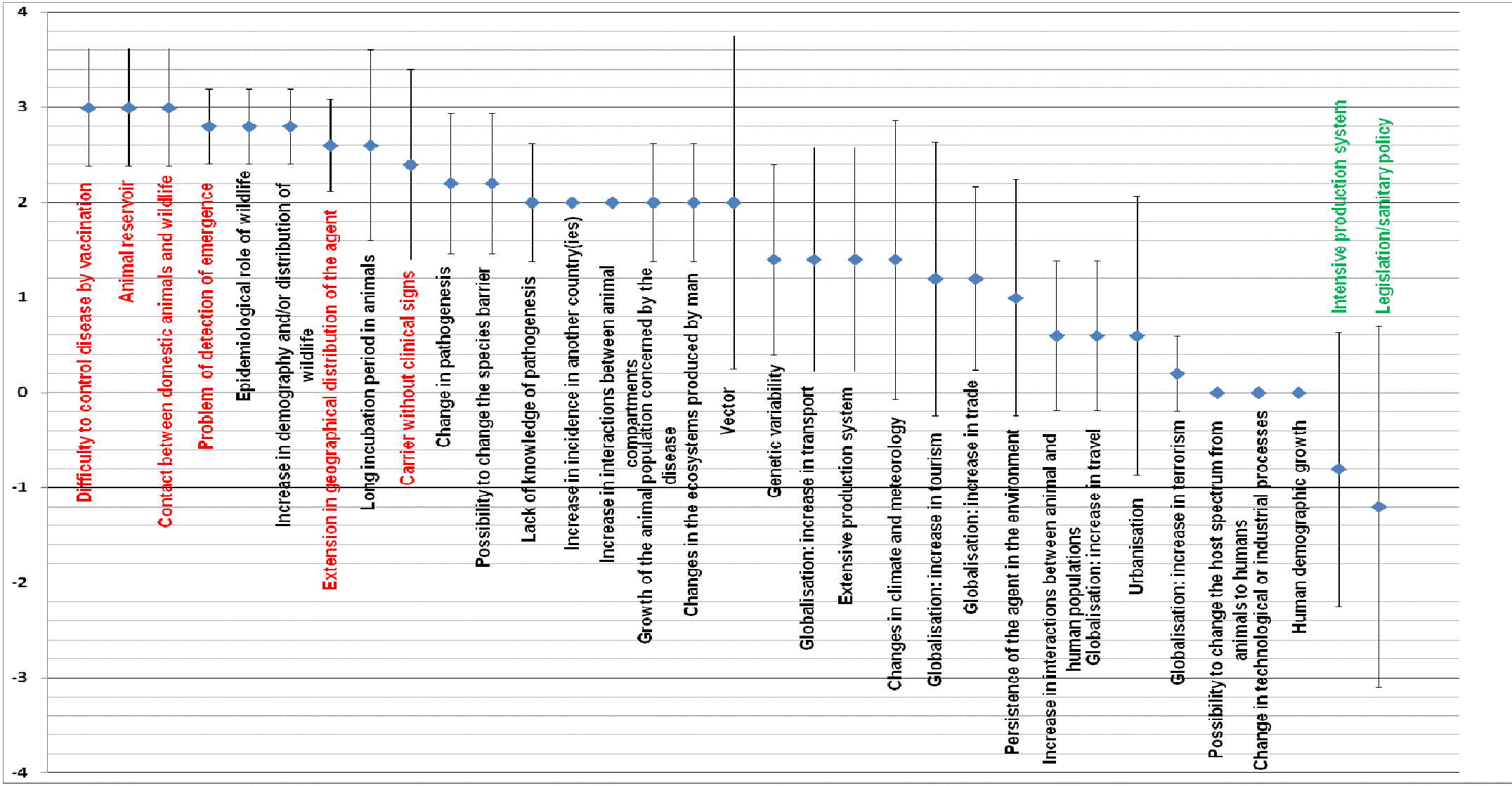
Scenario 4. Risicofactoren voor opkomen van infectieuze vectorziekten



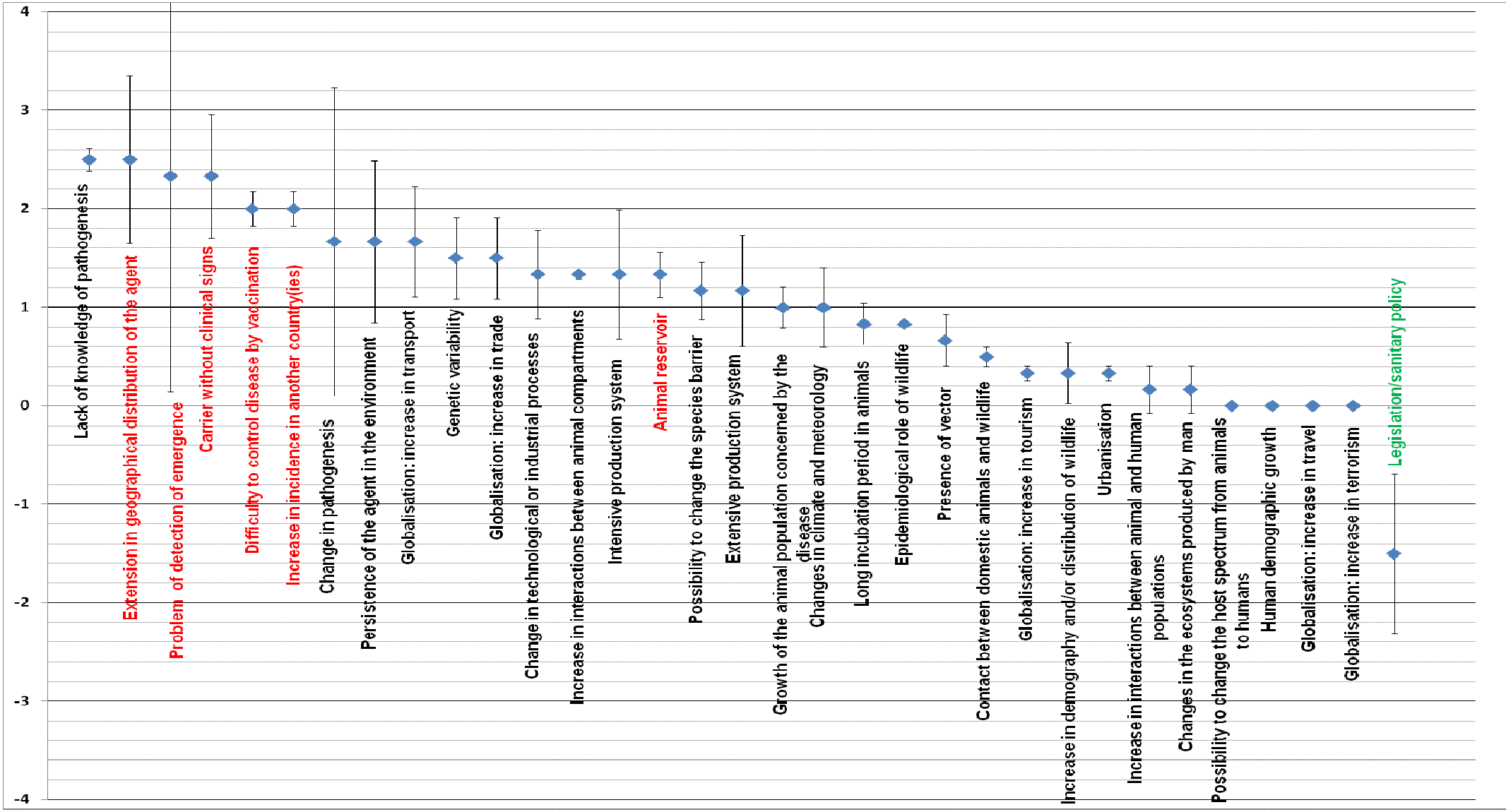
Scenario 5. Risicofactoren voor opkomen van endemische infectieuze dierenziekten



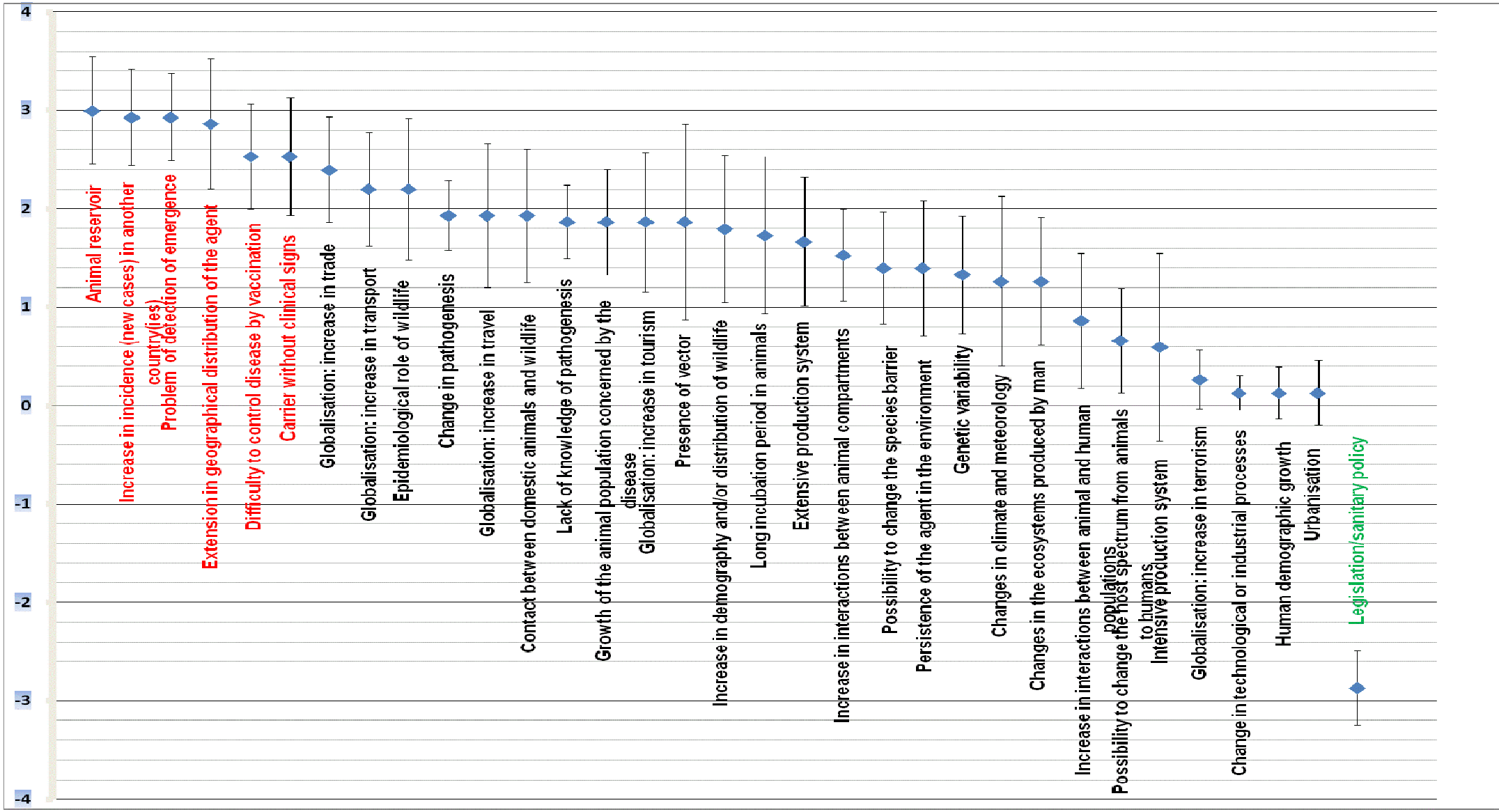
Scenario 6. Risicofactoren voor opkomen van sporadische infectieuze dierenziekten



Scenario 7. Risicofactoren voor opkomen van infectieuze dierenziekten waarvan het opkomen wordt vastgesteld



Scenario 8. Risicofactoren voor opkomen van exotische dierenziekten en met risico op opkomen

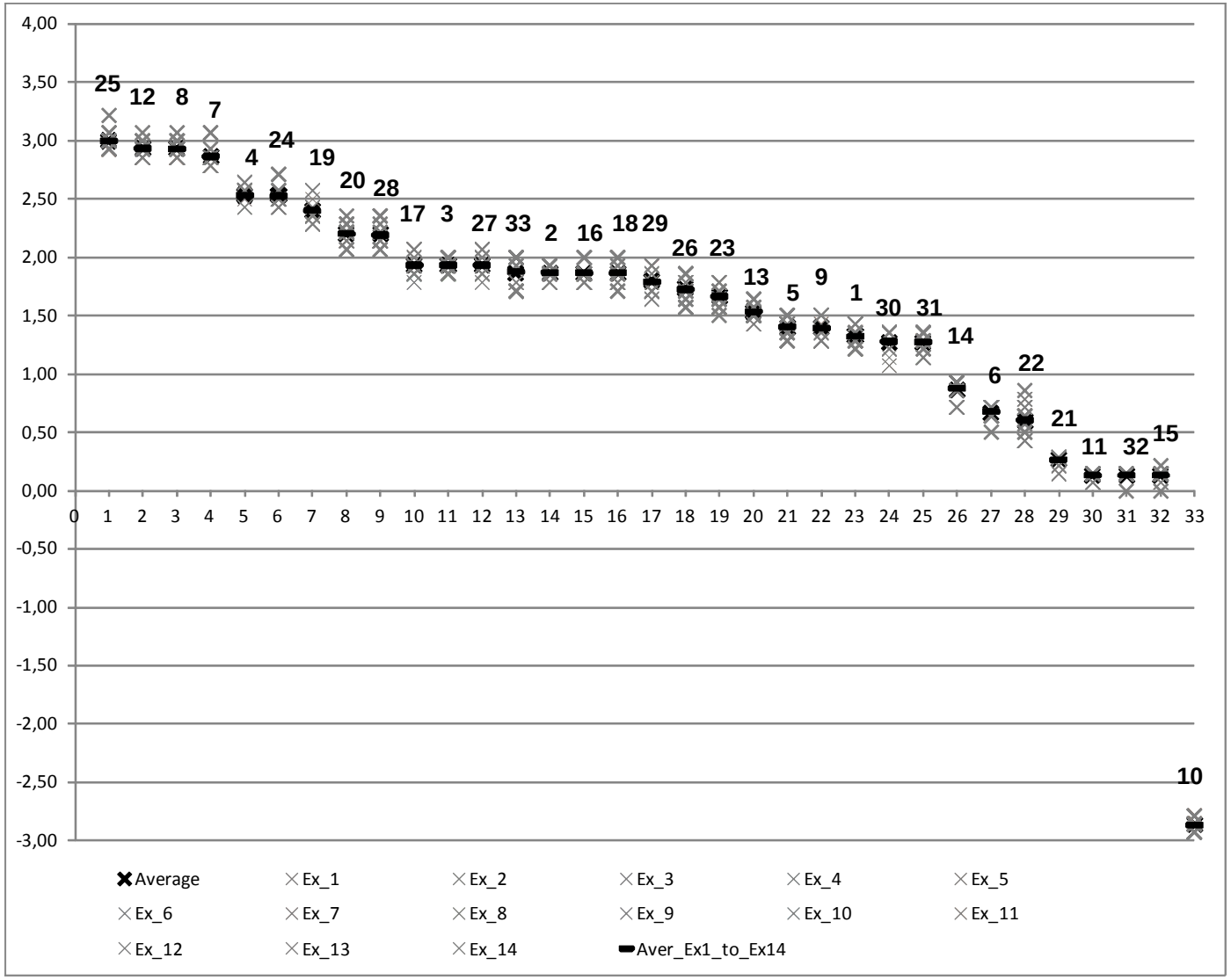


Bijlage 10. Invloed van de heterogeniteit van de groepen op de resultaten van de rangschikkings

De aan de groepen inherente heterogeniteit en het aantal in de groepen opgenomen ziekten beïnvloeden de resultaten van de rangschikking. De hierna weergegeven grafieken tonen de invloed op de rangschikkingresultaten wanneer telkens één ziekte wordt weggelaten.

Scenario 1. Risicofactoren die het opkomen van exotische ziekten beïnvloeden (groep met 15 ziekten)

Het zwarte kruisje in het midden staat voor de gemiddelde score per risicofactor wanneer de 15 ziekten van de groep in aanmerking worden genomen. De grijze kruisjes geven de gemiddelde score weer wanneer telkens één ziekte uit de groep wordt weggelaten. Het nummer boven de kruisjes staat voor het nummer van de risicofactor zoals weergegeven in de tekst (punt 2.2, stap 2).
In dit scenario is de invloed van het weglaten van een ziekte op de rangschikkingresultaten klein (de orde van de rangschikking verandert niet veel) omdat er veel ziekten zijn. De resultaten betreffende de grote groepen zijn meer stabiel.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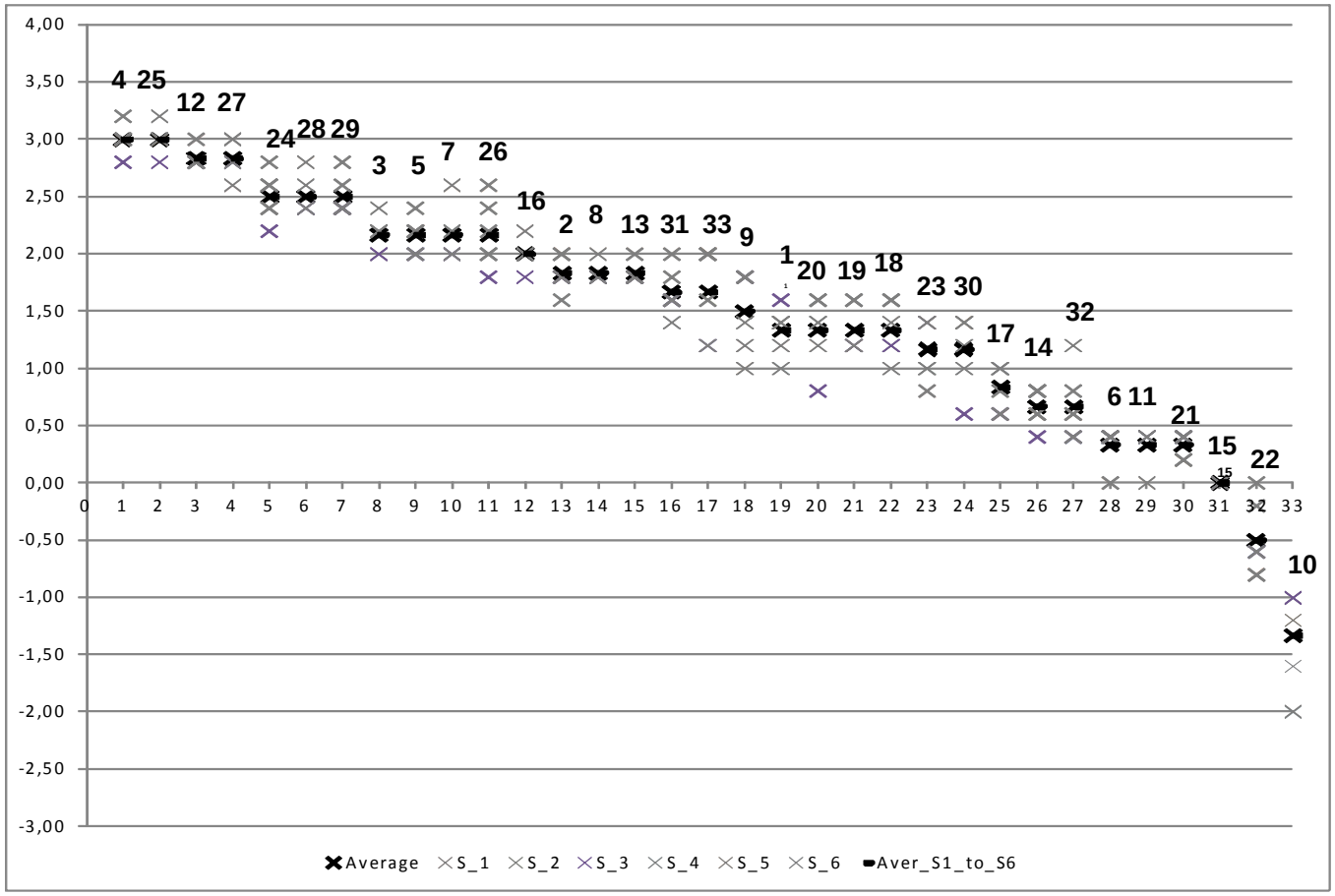
Ex_12
Ex_13
Ex_14
Aver_Ex1_to_Ex14

Scenario 2. Risicofactoren die de opkomst van sporadische ziekten beïnvloeden (groep met 6 ziekten)

Bij dit scenario is de invloed van het weglaten van een ziekte op de rangschikkingresultaten veel groter (de orde van de rangschikking verandert) omdat er minder ziekten zijn. De resultaten betreffende de kleine groepen zijn dus minder stabiel.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S_1
S_2
S_3
S_4
S_5
S_6
Aver_S1_to_S6

Bijlage 11. Samenvatting van de top drie risicofactoren voor de verschillende scenario's

Voor elk rangschikkingscenario worden de drie belangrijkste factoren vermeld. Het voorkomen van deze risicofactoren werd voor alle scenario's geteld en de meest voorkomende risicofactoren werden geïdentificeerd (zie punt 3. Conclusies).

Scope	**Groep van ziekten**	**Belangrijkste risicofactoren (top 3 van elk van de verschillende scenario's)**		
Dierengezondheid als geheel	**Alle ziekten**	Problem of detection of emergence	Animal reservoir	Difficulty to control disease by vaccination
Epidemiologische situatie van de ziekten	**endemisch**	Difficulty to control disease by vaccination	Animal reservoir	Carrier without clinical signs (asymptomatic)
	sporadisch	Difficulty to control disease by vaccination	Animal reservoir	Contact between domestic animals and wildlife
	opkomen vastgesteld	Lack of knowledge of pathogenesis	Extension in geographical distribution of the agent	Problem of detection of emergence
	exotisch	Animal reservoir	Increase in incidence (new cases) in another country(ies)	Problem of detection of emergence
Pathogene agentia	**bacteriën**	Difficulty to control disease by vaccination	Animal reservoir	Problem of detection of emergence
	virussen	Extension in geographical distribution of the agent	Increase in incidence (new cases) in another country(ies)	Problem of detection of emergence
	parasieten	Difficulty to control disease by	Carrier without clinical signs	Animal reservoir

		vaccination	(asymptomatic)	
	prionen	Persistence of the agent in the environment	Problem of detection of emergence	Long incubation period in animals
Wijze van overdracht	**via vectoren**	Presence of vector	Extension in geographical distribution of the agent	Animal reservoir
	via voeding	Animal reservoir	Persistence of the agent in the environment	Problem of detection of emergence
	direct	Animal reservoir	Difficulty to control disease by vaccination	Carrier without clinical signs (asymptomatic)
	indirect	Contact between domestic animals and wildlife	Animal reservoir	Epidemiological role of wildlife
	inhalatie	Extension in geographical distribution of the agent	Increase in incidence (new cases) in another country(ies)	Carrier without clinical signs (asymptomatic)
	milieu	Persistence of the agent in the environment	Long incubation period in animals	Lack of knowledge of pathogenesis
Zoönose?	**ja**	Animal reservoir	Difficulty to control disease by vaccination	Problem of detection of emergence
	neen	Extension in geographical distribution of the agent	Problem of detection of emergence	Increase in incidence (new cases) in another country(ies)

Bijlage 12. Specifieke aanbevelingen

Hieronder worden de specifieke aanbevelingen vermeld voor de verschillende risicofactoren. Deze aanbevelingen zijn ruwe data en worden niet geprioritiseerd. Een prioritisatie alsook een haalbaarheidsstudie kunnen later uitvevoerd worden in overleg met de risicobeheerders.

Problemen van opsporing van opkomende ziekten:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Problemen van klinische (passieve) detectie op het terrein, die bijv. te wijten zijn aan een gebrek aan waakzaamheid en kennis, aan een variatie van het klinische beeld, aan het bestaan van verschillende serotypes of aan asymptomatische dragers.	o opleidingen o regelmatige sensibilisering en stimulatie van de waakzaamheid van de terrein actoren (veehouders en dierenartsen) o oprichting van een systeem van peilpraktijkdierenartsen (zie humane geneeskunde)	o actieve bewaking o syndromische bewaking
Nieuwe en niet geïdentificeerde ziekte	o herhaalde opleidingen van de terrein actoren voor het opsporen van abnormale situaties	Ontwikkeling van screeningtests om onbekende dierenziekten op te sporen (bijvoorbeeld, aspecifieke testen zoals bio-chips, metagenomics)
Gebrekkige aangifte aan het FAVV (wantrouwen, motivatie)	o dialoog en communicatie o financiële compensaties o beloning voor de opsporing van de « index case (eerste geval van een opkomende dierenziekte) o in geval van verdenking, de tijdelijke controlemaatregelen na de aangifte beperken tot het laboratoriumresultaat bevestigd is, om op die manier de drempel tot aangifte te verlagen (zie advies 12-2010 van het wetenschappelijk Comité voor meer uitleg)	Een sociologische analyse uitvoeren naar de relaties tussen de terreinactoren (veehouders en dierenartsen) en het Agentschap om oplossingen te identificeren voor het probleem van onderaangifte van ziekten. Op die manier zal het Agentschap concrete acties kunnen ontwikkelen om het vertrouwen met de operatoren te verbeteren.
Gebrek aan coördinatie tussen de verschillende schakels van de keten, slechte overdracht van	o praktijkgids type brochure o informatie o lijst van contactpersonen	Een sociologische analyse uitvoeren naar de relaties tussen de terreinactoren (veehouders en dierenartsen) en het Agentschap om oplossingen te identificeren voor het probleem van onderaangifte van ziekten. Op die manier zal het Agentschap concrete acties kunnen ontwikkelen

gegevens		om het vertrouwen met de operatoren te verbeteren.
Stalen van slechte kwaliteit, onvoldoende afkoeling tijdens het transport naar het laboratorium	o opleidingen o eenvoudige procedures/methodes van monstername	
Diagnostische tests : termijnen voor het verkrijgen van de resultaten, aspecifieke reacties, lage prestatie (gevoeligheid)	o communicatie tussen het FAVV en de terreinactoren o laboratoriummanagement	Wetenschappelijk onderzoek op diagnostische technieken

Dierlijk reservoir :

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
In het wild levende dieren (bijv. knaagdieren)	/	Bemonsteringen bij doeldiersoorten en bewaring van stalen op lange termijn (bijv. serotheek)
Gedomesticeerde dieren	/	Bemonsteringen bij nuts- en gezelschapsdieren en bewaring van stalen op lange termijn (bijv. serotheek)
Teken, insekten	/	Ontwikkeling van een systeem van systematisch vangen en identificeren van insekten en teken die vectoren kunnen zijn
Gezonde dragers	/	Identificatie van gezonde dragers via bewakingsactiviteiten

Beperkte efficiëntie van de vaccinatie:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete managementmaatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Problemen van beschikbaarheid:		
- onbestaand of moeilijk te produceren vaccin, omdat de antilichamen moeilijk zijn te produceren of omdat de pathogene agentia moeilijk zijn te isoleren en *in vitro* te ontwikkelen	overeenkomsten met privé-firma's	- Wetenschappelijk onderzoek - ontwikkeling van vaccins
- niet beschikbare vaccin	- behoud van voorraden van vaccins - overeenkomsten met privé-firma's	
- niet toegelaten vaccin	- vergunningsaanvraag indien relevant	

	- analyse door het FAGG - eventueel tijdelijke gebruiksvergunning	
Problemen van efficaciteit:		
- lage doeltreffenheid (bijv. parasiet, genetische variabiliteit)	/	Wetenschappelijk onderzoek
- vaccin niet meer aangepast aan de ziektekiemen die op het terrein circuleren	/	
- geen DIVA	/	
Moelijk toedienen van het vaccin, gebrek aan medewerking van de stakeholders		Farmaceutische firma's: de formulering van het vaccin verbeteren en de toedieningsvorm aanpassen

Uitbreiding van de geografische spreiding van de ziektekiem :

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Uitbreiding veroorzaakt door bekende en beheersbare factoren	Deze factoren vermijden	bewaking
Uitbreiding veroorzaakt door niet bekende en niet beheersbare factoren	o Verhoogde waakzaamheid met betrekking tot de internationale situatie door de bevoegde autoriteit o Monitoring van niet officiële bronnen (google, …) o Raadpleging van de waarschuwingen, van de literatuur	bewaking
Uitbreiding in eigen land	Controlemaatregelen	bewaking
Uitbreiding in een buurland	Controle van de intracommunautaire handel en vervoer	bewaking
Uitbreiding in Europa	Controle van de intracommunautaire handel en vervoer	bewaking
Uitbreiding in een andere regio van de wereld	Controle van de invoer	bewaking

Asymptomatische dragers (zonder klinische tekenen):

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Introductie of invoer van besmette dieren	o quarantaine o serologische tests bij aankoop, bij invoer	
Permanente uitscheiding	Dieren met uitscheiding opsporen	Snelle tests ontwikkelen
Intermitterende uitscheiding	Opsporen met indirecte diagnostische methoden (serologie)	

Toename van de incidentie (nieuwe gevallen) in een of meer andere landen:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
	o Verhoogde waakzaamheid met betrekking tot de internationale situatie door de bevoegde autoriteit o Monitoring van niet-officiële bronnen (Google,…) o Waarschuwingen, literatuur raadplegen	
Buurland	Op het vlak van epidemiologische bewaking gestructureerd samenwerken met de buurlanden	bewaking aan de grenzen (bijvoorbeeld in het wild levende fauna)
EU-land	Controle op intracommunautair handelsverkeer en vervoer	bewaking
Derde land	Controle op de invoer	bewaking

Epidemiologische rol van de wilde fauna:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
	bioveiligheid	bewaking van de wilde fauna, toespitsen op diersoorten die van belang zijn

Gebrekkige kennis van de pathogenese:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Volledig nieuwe pathogene agentia	o Geen beheersmaatre	o Bewaking (als er methoden bestaan) o Wetenschappelijk onderzoek

waarvan de pathogenese onbekend is	gel mogelijk o Quarantainemogelijkheid	
Een gelijkaardige ziektekiem is bekend en de pathogenese kan op grond daarvan worden afgeleid	o Quarantaine o Op grond van veronderstelde elementen getroffen maatregelen	o Bewaking (als er methoden bestaan) o Wetenschappelijk onderzoek
Lacunes in de kennis van de pathogenese van een bekend agens	o Op bekende elementen gesteunde maatregelen	o Bewaking o Wetenschappelijk onderzoek
Ziekte is bekend maar de kennis van de terreinactoren, deskundigen is onvoldoende	Permanente opleiding	

Wijziging in de pathogenese:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Toename van de virulentie	Omstandigheden die een verhoging van de pathogenese in de hand werken proberen te vermijden	o Bewaking o Wetenschappelijk onderzoek
Verlenging van de incubatieperiode		
Variatie in de interactie tussen gastheer en pathogeen agens		
Verandering van het gastheerspectrum	Soorten compartimenteren op bedrijfsniveau om overdracht tussen verschillende soorten te vermijden	

Contacten tussen gedomesticeerde dieren en wilde fauna:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
	bioveiligheid	Bewaking van de in het wild levende fauna

Globalisering : meer handelsverkeer:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
intracommunautair		Lijst van risicolanden
extracommunautair	Controle aan grenzen, in GIP, havens, luchthavens	herevaluatie van de Europese wetgeving uitgaande van risicoevaluatie bij import

Globalisering : meer vervoer:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
intracommunautair		
Extracommunautair	o controle aan de grenzen, in GIP, havens, luchthavens o certificaten	

Toename van de bij de ziekte betrokken dierenpopulatie:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
In het wild levende fauna	Populatiemanagement	
Gedomesticeerde dieren	bioveiligheid	De ziekten van die populaties bewaken

Demografische toename en/of spreiding van de wilde fauna:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Demografie	Populatiemanagement	
spreiding		

Persistentie van de ziektekiem in het milieu:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Stof, grond	Afvalbeheer	bemonstering met het oog op bewaking
Lucht		bemonstering met het oog op bewaking
Fecale stoffen	Hygiëne	bemonstering met het oog op bewaking
Water	Contact met besmette matrices vermijden	Bemonstering met het oog op bewaking

Toename van de interacties tussen compartimenten (populaties) van dieren:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
		Wetenschappelijke studie uitvoeren van de

		contactnetwerken tussen dieren en de risicogebaseerde bewaking opdrijven in de hot spots van die contactnetwerken
Gedomesticeerde dieren – gedomesticeerde dieren	bioveiligheid	
Gedomesticeerde dieren – wilde dieren	bioveiligheid	
Wilde dieren – wilde dieren		Epidemiologische bewaking van de belangrijkste ziekten van verschillende diersoorten
Gedomesticeerde dieren - ongedierte	Ongediertebestrijding	
Outdoor veehouderij	Bioveiligheid (afsluitingen)	
Geen quarantaine voor nieuwe dieren	Opleiding van veehouders en dierenartsen	
Introductie van dieren uit onveilige gebieden	Opleiding van veehouders en dierenartsen	
Onaangepaste huisvesting van de dieren	Opleiding van veehouders en dierenartsen	
Vermenging van dieren van verschillende leeftijden	Opleiding van veehouders en dierenartsen	

Mogelijkheid van verandering van het gastheerspectrum van een diersoort naar een andere diersoort (overschrijding van de soortgebonden barrière):

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
	o contacten met gevoelige diersoorten vermijden o bioveiligheid	bewaking wetenschappelijk onderzoek

Extensieve productiesystemen:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Contacten met brondieren	bioveiligheid	

Lange incubatieperiode bij het dier:

Deelcategorieën van	**Aanbevelingen**	
	Concrete	**Bewaking/waakzaamheid/wetenschappelijk**

risicofactoren	management maatregelen	onderzoek
	quarantaine	

Vector :

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
In het algemeen (muggen, teken, Culicoides, enz.)		o Bewaking van de vectorpopulaties om eventuele toenames van de populaties op te sporen o bewaking van het verschijnen van een nieuwe soort o Studie van de populatiedynamiek (bijvoorbeeld overwintering, enz.) o Bewaking van de besmetting van vectoren door pathogene agentia
Toename van de incidentie van een vectorsoort		Bewaking van de door die vector overgedragen ziekten

Genetische variabiliteit (mutatie, recombinatie, enz.):

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Aangeboren variabiliteit (drift, shift)	o directe actie onmogelijk o overdracht beperken door middel van hygiëne en bioveiligheid	o Moleculaire epidemiologische bewaking van geïsoleerde ziektekiemen
Door externe factoren geïnduceerde variabiliteit	Omstandigheden die mutagenese induceren vermijden	

Globalisering : meer toerisme:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Binnen EG	o controles aan de grenzen, in de havens en luchthavens o informatie over bioveiligheid voor reizigers	
Buiten EG		
Vectorverspreiding	Biociden in vervoermiddelen (vliegtuig,	

	schip)	

Veranderingen in ecosystemen door de mens:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
ontbossing / herbebossing		bewaking van de bij die veranderingen betrokken ziekten (zie **bijlage 8)**
dammen / dijken		
kanalen		

Klimaat- en weersveranderingen:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
opwarming	Factoren vermijden die bijdragen aan de opwarming	Bewaking van de vectorpopulaties en van de vectoriële ziekten
Vochtigheid/neerslag	Plaatsen met stilstaand water verminderen	Bewaking van de vectorpopulaties en van de ziekten waarvan de verspreiding wordt bevorderd door vochtige omstandigheden (zie **bijlage 8**)

Globalisisering : meer reizen:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Binnen EG	o controles aan de grenzen, in de havens en luchthavens o informatie over bioveiligheid voor reizigers	
Buiten EG		
Vectorverspreiding	Biociden in vervoermiddelen (vliegtuig, schip)	

Toename van de interacties tussen dierenpopulaties en mensenpopulaties:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Interacties met het personeel van het landbouwbedrijf	Opleiding personeel	Mogelijk door die interacties overgedragen (zoönose)verwekkers bestuderen
Interacties met vreemden (bijvoorbeeld kinderboerderijen)	Hygiëne, opleiding	

Mogelijkheid van verandering van het gastheerspectrum van dieren naar de mens:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
	Direct contact met de dieren vermijden	
Voor een betere opsporing bij dieren	Betere interface tussen volksgezondheids- en diergezondheidsautoriteiten	bewaking
Voor een betere opsporing bij mensen	o Opleiding van artsen o Uitbreiding van het spectrum van tests in de humane geneeskunde	

Veranderingen in de technologische en industriële processen:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Nieuwe technologische processen		Risicobeoordeling van de veranderingen
Veranderingen van de bestaande processen		
(Veeteelttechnische) processen voor huisvesting van dieren : bezettingsgraad,voeding, afvalverwijdering, all in – all out, enz.	o Geregeld reinigen o « safe » voeding o Afvalbeheer	
Tijdens het slachten	o Good Slaughterhouse Management	
Tijdens de verwerking van melk, vlees en eieren	HACCP	

Intensieve productiesystemen:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Hoge bezettingsgraad	o Bioveiligheid o opleiding	

Verstedelijking :

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**

Uitbreiding naar het platteland	Identificatie en inventarisatie van niet beroepsmatig gehouden gedomesticeerde dieren	Bewaking van door teken overgedragen ziekten
Toename van de verstedelijking	Informatie verstrekken aan het publiek om het risico van opkomst en verspreiding van ziekteverwekkers te verminderen (bijvoorbeeld beheer van watervlakken dat aan privépersonen toebehoort)	

Globalisering : meer terrorisme:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
bioterrorisme Agroterrorisme (doelbewuste verspreiding van verwekkers van dieren-/plantenziekten om de economie van een land te destabiliseren)	Gestructureerde samenwerking tussen het FAVV en de federale veiligheidsdiensten om alarmdrempels te bepalen	waarschuwingssysteemen

Demografische toename van de menselijke bevolking:

Deelcategorieën van risicofactoren	**Aanbevelingen**	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
In België	Opleiding van het publiek in hygiëne en preventie van dierenziekten op Belgisch niveau	
In Europa	Opleiding van het publiek in hygiëne en preventie van dierenziekten op Europees niveau	
Op wereldniveau: toename van de consumenten betekent meer voedsel en bijgevolg invoer vanuit een steeds groter aantal (onbekende) gebieden van oorsprong	Informatieverstrekking aan de voedingsindustrie en voedingsdistributie over gevaren en risico's van opkomen om hen toe te laten ermee rekening te houden in hun HACCP plan met het oog op het vermijden dat deze pathogenen voorkomen in voeding.	
Toename van het aantal hobbyhouders en houders van neerhofdieren	Informatieverstrekking aan hobbyhouders	

Wetgeving / gezondheidsvoorschriften:

Deelcategorieën van risicofactoren	Aanbevelingen	
	Concrete management maatregelen	**Bewaking/waakzaamheid/wetenschappelijk onderzoek**
Gebrek aan wetgeving over aangifte	Lijst van aangifteplichtige ziekten aanpassen	
Gebrek aan grenscontrole	Grenscontrole opdrijven	
Gebrek aan controle op de bioveiligheid	Meer belang hechten aan bioveiligheid	
Gebrek aan verplichte controlemaatregelen	Wetgeving opstellen	
Beperkingen op het toepassen van behandelingen (bijvoorbeeld antibiotica)	Evaluatie van alternatieve behandelingen door adviescomités van deskundigen	
Beperkingen op het toepassen van vaccinatie		
Wetgeving stelt autoriteit niet in staat om acties te ondernemen	Wetgeving aanpassen	