DFID_ funded Collaborative research project for Asia and Africa

Risk Assessment Activity - Kenya

Phase 1

Under

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Contents:

Introduction

Kenya is one of the several African and Asian countries participating in a research project funded by the Department for International Development (DFID) of the United Kingdom to identify and promote pro-poor Highly Pathogenic Avian Influenza (HPAI) risk reduction strategies. The International Food Policy Research Institute (IFPRI), International Livestock Research Institute (ILRI), Food and Agricultural Organization (FAO), Royal Veterinary College (RVC), and University of California at Berkeley, are implementing the project with national partners in respective countries that, besides Kenya, include Ethiopia, Ghana and Nigeria in Africa; and Cambodia, Indonesia, Thailand and Vietnam in Asia.

This report is a record of proceedings and deliberations of a workshop held to review previous risk assessment work done by various stakeholders and partners in Kenya, draw pathways for introduction and transmission of HPAI H5NI virus into Kenya through various means. Stakeholders were also required to identify various gaps in risk analyses carried out, the outputs and design a methodology for a new activity while identifying data needs and possible data sources.

This workshop was attended by public and private stakeholders in the poultry industry in Kenya.

1. Minutes of the workshop

The minutes of the workshop are presented in **Annex 1 to 12**. They provide information about the participants of the workshop and the facilitators, the programme followed during the 2 day workshop and the presentations done. They also summarize the main points discussed during the workshop, other projects on AI or on the Kenyan poultry industry, other risk assessments and value chain analyses previously conducted and potential risk questions to address under this DfID funded project. In addition, the minutes present the main outputs of the workshop.

2. Next steps

Table1: Risk pathways activities time line

DATES	Risk Assessment Activity/responsible persons	Other DfID HPAI project Activity	Communication
2nd-3rd October 08	Risk Pathway workshop Kenya *(Stakeholders + RA Team)*		Involvement of stakeholders in definition of risk questions and pathways
9th Oct -10th Dec.08	Writing up of report *(RAF + support EC/AL):* Risk Question Risk Pathways Data needs and Data sources Glossary / Terminology used for Qualitative Risk Assessment		
8 – 12 Dec 08	Review of reports on risk pathways *(AL & External reviewer)*	Value Chain Analysis: Instruments for data collection	Circulate draft report to VCA team for data collection
15- 19 Dec 2008	Amendment of country reports *(RAF + support EC + follow-up AL)*		Circulation of workshop minutes to participants
20 Dec 08	Deadline for final risk pathways reports *(RAF / EC)*		Circulation of revised report to DVS Circulation of final revised report to

AL = Activity Leader, EC = Epi-Coordinator, RAF = Risk Assessment Facilitator

Table 2: Qualitative risk assessment activities time line

DATES	Risk Assessment Activity/ responsible persons	Other DfID HPAI project Activity	Communication
Jan-09	Data Collection *(RAF)*	Value Chain Analysis: Qualitative Data Collection and Analysis End February 2009	Contact of key informants among stakeholders and others / Communication with VCA team for data collection
Feb-09	Risk Estimation & Risk Mitigation *(RAF with technical support AL/EC)*		
Mar-09	Writing-up report *(RAF with support EC)*		Circulation of draft report to DVS
	Deadline for country reports on Qualitative. RA *(RAF/EC)*		
Apr-09	Review of reports on qualitative RA *(AL, External Reviewer)*		
	Amendment of reports on Qualitative Risk Assessment *(RAF with support EC)*		Circulation of revised report to DVS
May-09	Deadline for final country report *(RAF / EC)*		Circulation of final revised report to stakeholders

AL = Activity Leader, EC = Epi-Coordinator, RAF = Risk Assessment Facilitato

3. Risk questions

In order to build up on the qualitative risk assessment done by FAO, it was decided to only consider the biological pathways necessary towards;

- The transmission of HPAI from sector 4 to other sector 4 farms once the hazard has been introduced into the country;

- Transmission from sector 4 to sector 3;

- Transmission from sector 3 to sector 4 via sale of live birds.

The risk assessment conducted by FAO estimated qualitatively the risk of introduction of HPAI in Kenya (release assessment) and attempted to rank the different exposure pathways. (**Annex 8**). It was therefore decided that this study should focus on estimating the risk of what was considered to be the most important exposure pathways.

The following risk questions were therefore defined by participants:

Risk Q 1. What is the risk of Transmission of HPAI H5N1 from sector 4 to sector 4?

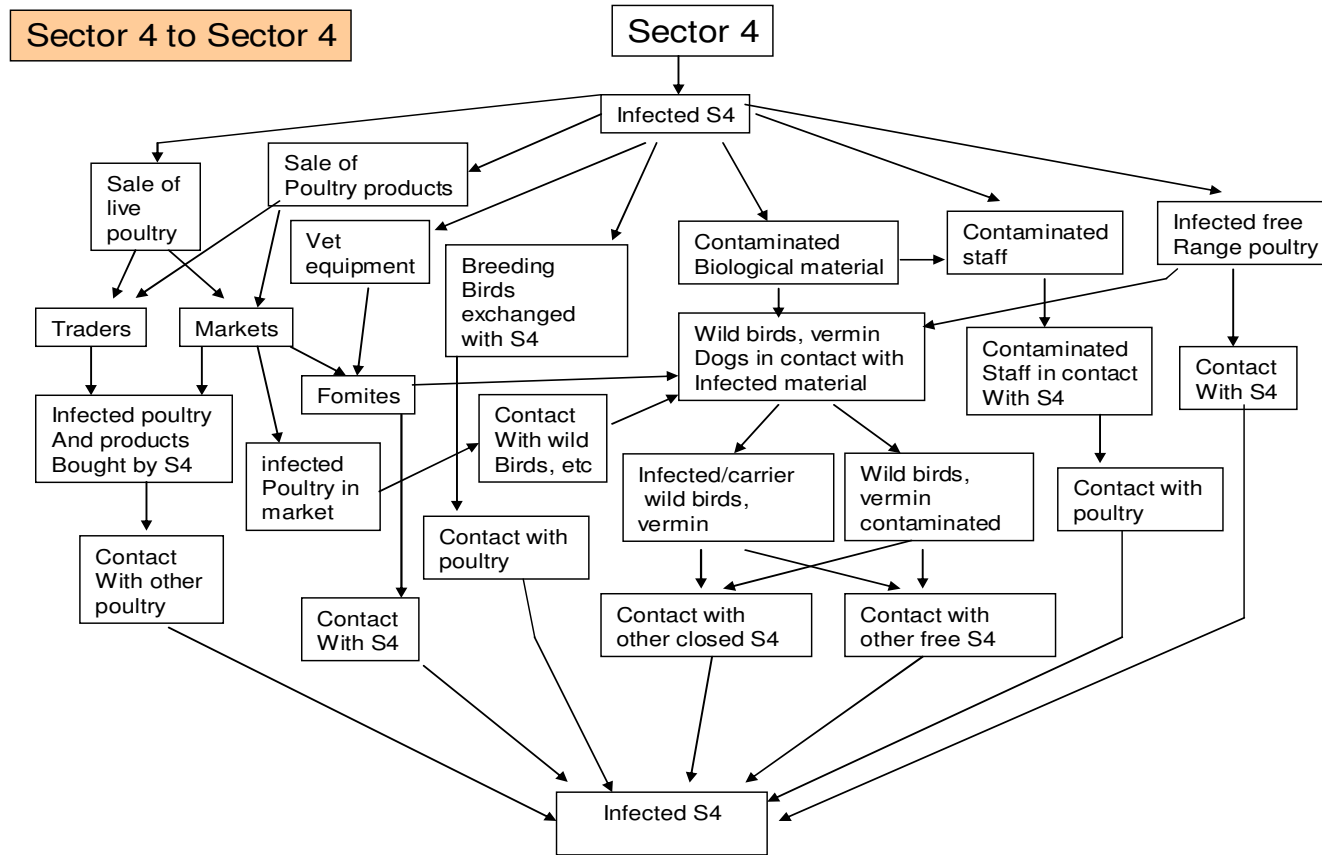**Risk Q 2**. What is the risk of Transmission of HPAI H5N1 from sector 4 to sector 3?

Risk Q 3. What is the risk of Transmission of HPAI H5N1 virus from sector 3 to sector 4 via sale of live birds in markets?
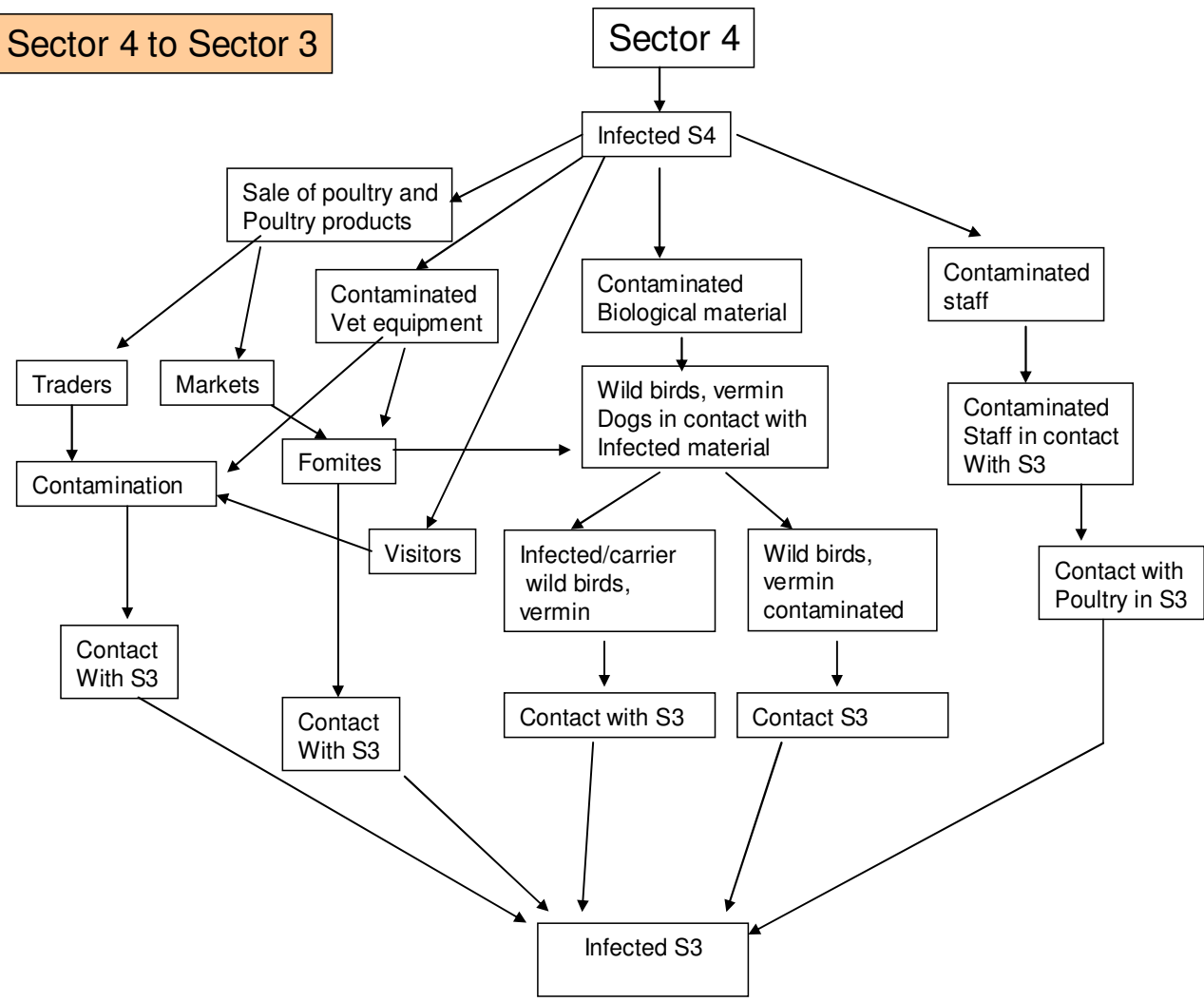
4. Risk Assessment Framework

For the qualitative risk assessment, the method followed is the framework recommended by world organization for animal health (OIE) as described in the hand book for the import risk analysis. The definition of terms (glossary) to be used, as adapted from the OIE handbook, in relation to the risk assessment are Annexed to this report (**Annex 7**).
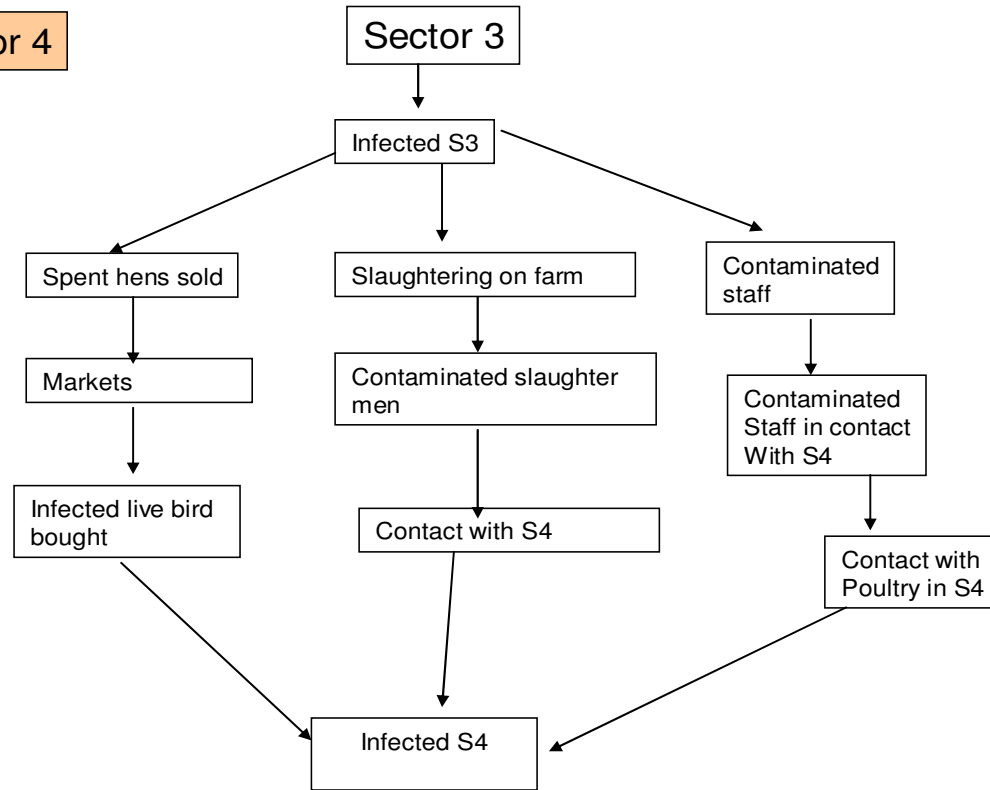
5. Risk pathways

Presented below are the overall transmission pathways between sector 3 and sector 4 based on the risk questions defined above. Detailed transmission pathways are shown in Annex 10.

Sector 4 to Sector 3

Sector 4

Infected S4

Sale of poultry and
Poultry products

Contaminated
Vet equipment

Contaminated
Biological material

Contaminated
staff

Traders

Markets

Fomites

Wild birds, vermin
Dogs in contact with
Infected material

Contaminated
Staff in contact
With S3

Contamination

Visitors

Infected/carrier
wild birds,
vermin

Wild birds,
vermin
contaminated

Contact with
Poultry in S3

Contact
With S3

Contact
With S3

Contact with S3

Contact S3

Infected S3

Sector 3 to Sector 4

Sector 3

Infected S3

Spent hens sold

Markets

Infected live bird bought

Slaughtering on farm

Contaminated slaughter men

Contact with S4

Contaminated staff

Contaminated Staff in contact With S4

Contact with Poultry in S4

Infected S4

6. Data needs / data sources

Each of the pathways presented in **Annex 10** are characterised by a number of parameters and will be analysed on the basis of all information available.

Data needs required for the estimation of the probabilities of virus transmission in the different pathways, as well as corresponding sources of information, was identified by the Kenyan risk assessment facilitator. These are presented below:

Table 1:Data needs for Transmission via staff (S4-S4)

Steps	Data needed	Data sources
Sector 4 infected		
Probability that staff gets contaminated provided the farm is infected	Practices on Sector 4 farms: Do owners/Staff get in contact with poultry or potentially contaminated material (faeces, feathers, etc.), level of bio security Do the owners/staff clean/change clothes/shoes before leaving an infected farm?	Representative from Sector 4 farms, FAO, CDC data
Probability that staff gets in contact with another S4 farm	Proportion of staff/owner of S4 farm working/owning another S4 farm Proportion of staff/owner of S4 farm visiting other S4 farms, and estimate of frequency of these visits	Representative from Sector 4 farms, FAO, CDC data
Probability that contact with contaminated staff results in infection of other S4 farm	Practices on Sector 4 farms (see above) Level of contact of visitors on S4 farms with poultry Infectiousness of these types of contact	Representative from Sector 4 farms FAO, CDC, Literature

The pathways of transmission via farm bridge species (wild birds, vermin, etc.) are similar in several steps and hence have common data needs and sources of information. This has therefore necessitated grouping of the pathways and therefore developed one table for data needed and data sources identified. as shown in table 4 below.

Table 2 Data Needs for Transmission via Farm-bridge species (S4-S4/S4-S3)

Steps	Data nedeed	Data sources
Sector 4 Infected		
Probability that there is contaminated material on the farm given that farm is infected	1. Levels of hygiene/sanitation - Disposal of fecal material - Drainage systems - Crates and cleaning	Farms representatives, FAO, CDC
Probability that wild birds, vermin, dogs, scavenger, vultures or resident wild birds will be in contact with contaminated material	1. Observation of wild birds, vermin, dogs /cats by people living / working on farm +/ frequency 2. Observation of wild birds, vermin, dogs /cats by people living / working on markets+/ frequency 3. Do farms treat against vermin?	Farm representatives NMK,KWS PAHSP Literature MLD/DVS
Probability that wild birds, vermin, dogs, scavenger, vultures or rresident wild birds will be in contact with closed/Free range sector 4 poultry and lead to infection	1. Contact level with S4 or FR poultry or at markets 2. Type of housing 3. Accessibility to feeds / storage of feeds 4. Infectiousness of contact	Farms representatives NMK,KWS PAHSP

Table 4 Data needs for transmission via Live Birds (S4-S4)

Steps	Data nedeed	Data sources
Sector 4 Infected		
Probability that a rapid test will confirm infection Probability that clinical cases will be reported promptly and accurately (Infected free range poultry)	1. Duration: 1d – 3d after first case 2. Response time (reporting to sampling, sampling to cvl, cvl to results, results to communication 3. Proportion of farms reporting die offs to DVS, PAHSP	VIL/VETLABS KABETE VILS/VETLABS KABETE; past reports of clinical disease,PAHSP
Probability that infected spent hens and cockerels are sold or exchanged (Breeding) from sector 4 to another sector 4 farm	1. Number, volume and frequency of sales 2. Cockerel exchanges 3. Number of markets	Sector 3 Farms representative Traders, brokers, staff/owners FAO, CDC data, VCA team
Probability that introduced birds will cause new infections	1. Farm practice; are new birds mixed with others while on farms? 2. Infectiousness of this contact	Sector 4 representative CDC data FAO data

Table 5 Data Needs for transmission via Markets and sale of Live Birds (S3-S4)

Steps	Data nedeed	Data sources
Sector 3 Infected		
Probability that a rapid test will confirm infection given infection of S3 **Probability that clinical cases will be promptly reported** (Infected free range poultry)	1. Duration: 1d – 3d 2. Response time (reporting to sampling, sampling to cvl, cvl to results, results to communication 3. Proportion of farms reporting die offs to DVS, PAHSP	VIL/VETLABS KABETE VILS/VETLABS KABETE; past reports of clinical disease,PAHSP
Probability that infected spent hens and cockerels are sold or exchanged (Breeding) from sector 4 to another sector 4 farm	1. Number, volume and frequency of sales 2. Cockerel exchanges 3. Number of markets involved in sale of S3 poultry	Sector 3 Farms representative Traders, brokers, staff/owners FAO, CDC, VCA team
Probability that infected birds are Slaughtered on the farm and contaminates slaughter men from sector 3 farms Probability of S3 contamination with dead birds and waste Probability of infected livebird getting into contact with S4 poultry	Biosecurity level (S3) Implementation and monitoring of biosecurity procedure, frequency of movement of slaughter men between Sector 3 and sector 4 farms and number 1. Proper disposal pits of (Infected material) 2. Duration 3. How 4. Where 5. Number 6. Duration, surface water flows, wild birds visiting open air disposal sites,	Farms, AHSP, VILS, private vet clinic DVS (Licensing Inspection reports)

Table 6 Data Needs for transmission via staff (S3-S4/S4-S3)

Steps	Data nedeed	Data sources
Sector 3 Infected		
Probability that Staff is infected provided that the S3 or S4 farm is infected	1. Practices on Sector 3/4 farms: Do owners/Staff get in contact with poultry or potentially contaminated material (faeces, feathers, etc.), level of bio security such as foot bath, cleaning, equipment , housing and disinfections 2. Implementation and monitoring of biosecurity procedure in sector 3 farms	Farms MLD (DVS) FAO PAHSP
Probability that Contaminated staff gets in contact with S/3 or S/4 poultry	1. Proportion of staff/owner of S3/S4 farm working/owning another S3/S4 farm 2. Proportion of staff/owner of S3/S4 farm visiting other S3/S4 farms, and estimate of frequency of these visits	S3/4 farms` representative FAO CDC data Sector 3 farms1 representative
Probability that contact with Contaminated staff results in infection of S/3 or S/4 poultry	Practices on Sector 3/4 farms (see above) Level of contact of visitors on S3/S4 farms with poultry Infectiousness of these types of contact	S3/4 farms` representative FAO CDC data Sector 3 farms1 representative

7. Definition of terms

7.1. Risk categories:

Once all information available for each of the parameter described above is reviewed, its probability of occurrence is assessed for classification by means of the descriptive scale shown in Table 9.

Table 9: Risk categories (EFSA, 2006)

Probability category	Interpretation
Negligible	Event is so rare that it does not merit to be considered
Very low	Event is very rare but cannot be excluded
Low	Event is rare but does occur
Medium	Event occurs regularly
High	Event occurs very often
Very high	Even occurs almost at certainly

Adapted from: The EFSA journal. 2006. Migratory birds and their possible role in the spread of highly pathogenic avian influenza. 155p.

7.2. Combination Matrix:

In order to assess the likelihood of occurrence of each of the pathways, the risk estimates of the parameters characterizing these pathways will then be combined.

In order to assess each of the probability of release, exposure and consequence, risk estimates of parameters will be combined. For each biological pathway, a risk estimate will be obtained by combining parameters' risk categories according to the combination matrix presented in Table 10. As different biological pathways can lead to each of the release, exposure and consequence, the probability of these events will be. For combination of release risk estimate and exposure risk estimate, the combination matrix shown in Table 10 will be applied.

Table 10: Risk categories combination matrix

		Parameter 2 /Exposure ris k category					
		Negligible	Very Low	Low	Medium	High	Very High
Parameter 1 / Release risk category	Very High	N	VL	L	M	H	VH
	High	N	VL	L	M	H	H
	Medium	N	VL	VL	L	M	M
	Low	N	N	VL	VL	L	L
	Very Low	N	N	VL	VL	VL	VL
	Negligible	N	N	N	N	N	N

Adapted from: Cristobal Zepeda (Centers for Epidemiology and Animal Health USDA-APHIS /Animal Population Health Institute, Colorado State University), with slight modifications.

For combination of the combined release and exposure risk estimate with the consequence risk estimate, we will be using the combination matrix shown in Table 11.

Table 11: Risk categories combination matrix

		Consequence risk category					
		Negligible	Very Low	Low	Medium	High	Very High
Combined release and exposure risk category	Very High	N	VL	L	M	H	VH
	High	N	VL	L	M	H	VH
	Medium	N	VL	L	M	H	VH
	Low	N	VL	VL	L	M	H
	Very Low	N	N	VL	VL	L	M
	Negligible	N	N	N	N	N	N

Adapted from: Cristobal Zepeda (Centers for Epidemiology and Animal Health USDA-APHIS /Animal Population Health Institute, Colorado State University), with slight modifications.

7.3. Uncertainty:

The level of uncertainty associated with each parameter of the risk pathways will be specified and considered for interpretation of data and results. The uncertainty associated to data will be categorised as presented in Table 12.

Table 12: Uncertainty categories

Uncertainty category	Interpretation
Low	There are solid and complete data available; strong evidence is provided in multiple references; authors report similar conclusions
Medium	There are some but no complete data available; evidence is provided in small number of references; authors report conclusions that vary from one another
High	There are scare or no data available; evidence is not provided in references but rather in unpublished reports or based observations, or personal communication; authors report conclusions that vary considerably between them

Adapted from: The EFSA Journal. 2006. Migratory birds and their possible role in the spread of highly pathogenic avian influenza. 155p.

8. Reporting format of risk assessment and risk estimation

In a first step, release, exposure and consequence assessments will be conducted separately.

Supporting evidence for assessing the likelihood of occurrence of each parameter of the pathways will be discussed in the text and will include references. At the end of the each of the risk assessment section, a table summarizing the following information will be included (Table 13).

Then, the consequence risk estimate will be derived from the combination matrix. It will be presented together with its associated level of uncertainty.

The risk estimation will then be done using the first matrix for combining release and exposure risk estimates, and the second matrix for combining this risk estimate with the consequence risk estimate. The final level of uncertainty will also be specified.

A list of references will be added at the end of the report.

Table 13: summary table

Parameter of pathway	Data Need	Source of information	Risk Category	Uncertainty

9. List of Annexes:

Annex 1: List of participants

Annex 2: Overview of DFID HPAI project

Annex 3: Presentation of objectives of the workshop

Annex 4: Presentation of the Risk Assessment Activity

Annex 5: Introduction to Risk Assessment

Annex 6: Background information on HPAI and poultry industry in Kenya

Annex 7: Poultry production system in Kenya-sector 3

Annex 8: Qualitative Risk Assessment by FAO, Kenya

Annex 9: HPAI Wildlife surveillance, KWS and NMK

Annex 10: Pathways of transmission between sector 4 farm and sector 3 farms, and within sector 4 farms

Annex 11: Presentation of the spatial modelling activity

Annex 12: Minutes of the Workshop

ANNEX 13: GLOSSARY

ANNEX 13: GLOSSARY

Consequence assessment: The process of describing the relationship between specified exposures to a biological agent and the consequences of these exposures. A causal process must exist by which exposures produce adverse health or environmental consequences which may in turn lead to socio-economic consequences. The consequence assessment describes the consequences of a given exposure and estimates the probability of them occurring.

Commodity: Animals, products of animal origin intended for human consumption, for animal feeding, for pharmaceutical or surgical use or for agricultural or industrial use, semen, embryo/ova, biological products and pathological material.

Exposure assessment: The process of describing the biological pathway(s) necessary for exposure of animals and humans in the importing country to the hazard (in this case the pathogenic agent) released from a given risk source, and estimating the probability of the exposure(s) occurring, either qualitatively or quantitatively.

Hazard: Any pathogenic agent that could produce adverse consequences.

Hazard identification: The process of identifying the pathogenic agents. Qualitative risk assessment : An assessment where the outputs on the likelihood of the outcome or the magnitude of the consequences are expressed in qualitative terms such as high, medium, low or negligible.

Quantitative risk assessment: An assessment where the outputs of the risk assessments are expressed numerically.

Release assessment: The process of describing the biological pathway(s) necessary for an importation activity to "release" (that is, introduce) pathogenic agents into a particular environment, and estimating the probability either qualitatively or quantitatively, of that complete process occurring.

Risk: The likelihood of the occurrence and the likely magnitude of the consequences of an adverse event to animal or human health in the importing country during a specified time period.

Risk estimation: The process of integrating the results from the release assessment, exposure assessment, and consequence assessment to produce overall measures of risks associated with the hazards identified at the outset.

Risk assessment: The evaluation of the likelihood and the biological and economic consequences of entry, establishment, or spread of a pathogenic agent within the territory of an importing country.

Transparency: Comprehensive documentation of all data, information, assumptions, methods, results, discussion and conclusion used in the risk analysis. Conclusions should be supported by an objective and logical discussion and the documents should be fully referenced.

Uncertainty : The lack of precise knowledge of the input values which is due to measurement error or to lack of knowledge of the steps required, and the pathways from hazard to risk, when building the scenario being assessed.