Annex to:

EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare), More S, Bøtner A, Butterworth A, Calistri P, Depner K, Edwards S, Garin-Bastuji B, Good M, Gortázar Schmidt C, Michel V, Miranda MA, Nielsen SS, Raj M, Sihvonen L, Spoolder H, Stegeman JA, Thulke H-H, Velarde A, Willeberg P, Winckler P, Baldinelli F, Broglia A, Verdonck F, Beltrán Beck B, Kohnle L, Morgado J and Bicout D, 2017. Scientific opinion on the assessment of listing and categorisation of animal diseases within the framework of the Animal Health Law (Regulation (EU) No 2016/429): Low Pathogenic Avian Influenza. EFSA Journal 2017;15(7):4891. doi:10.2903/j.efsa.2017.4891

Annex A – Mapped fact-sheet used in the individual judgement on Low Pathogenic Avian Influenza

Article 5

Question A(i)

Question A(i) scientific evidence indicate that the disease is transmissible
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(vi) the routes and speed of transmission of the disease between animals and, when relevant, between animals and humans	(a)(vi) 1 types of routes of transmission from animal to animal (horizontal, vertical)	See Table 2 (Pantin-Jackwood et al., 2012; Claes et al., 2013, 2014). **Table 2:** Routes of LPAI transmission from animal to animal

MODE	CHICKEN	TURKEY	DUCK
HORIZONTAL INTRASPECIES	+++	+++	+++
VERTICAL	_	_	_
FOMITE	++	++	++
WILD BIRD ORIGIN	+	++	+++
HORIZONTAL INTERSPECIES	+	++	++

+++ Highly efficient
++ Effective
+ Can occur but low efficiency
_ Not reported

	(a)(vi) 2 types of routes of transmission from animal to humans (direct, indirect)	Direct exposure to aerosolised droplet materials in poultry environment through the conjunctiva or the upper respiratory tract

Question A(ii)

Question A(ii) animal species are either susceptible to the disease or vectors and reservoirs thereof exist in the Union
Interpretation: indicate if animal species susceptible to the disease or vector or reservoir are present in the Union
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(i) animal species concerned by the disease	(a)(i) 1 naturally susceptible wildlife species	Aquatic birds, Anseriformes (Daoust et al., 2011; Kuiken, 2013) charadriiformes; over a hundred species of birds from at least 13 different orders (EFSA, 2006)
	(a)(i) 2 naturally susceptible domestic species	All species of domestic poultry to include the family phasianidae (chickens, turkeys and related poultry such as quail, guinea fowl and pheasant). Other birds native and introduced; farmed anseriformes, particularly to include ducks and geese; ratites. In general viruses from birds rarely infect mammals (reviewed in Swayne (2016))
	(a)(i) 3 experimentally susceptible wildlife species	No additional information
	(a)(i) 4 experimentally susceptible domestic species	Pigs, mustelid, horses, companion animals (cats and dogs), seals and other sea mammals, rats, rabbits, guinea pigs, mice, non-human primates (Short et al., 2015)
	(a)(i) 5 wild reservoir species	Bird of the orders anseriformes (Verhagen et al., 2014) and charadriiformes

	(a)(i) 6 domestic reservoir species	No natural reservoirs but spill over from wild bird reservoir species (Swayne, 2016). In some eco-systems domestic ducks may maintain virus for long periods

Question A(iii)

Question A(iii) disease causes negative effects on animal health OR poses a risk to public health due to its zoonotic character **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(ii) morbidity and mortality rates of the disease in animal populations	(a)(ii) 1 Prevalence/ incidence	See Table 1; see at the end of the document.
	(a)(ii) 2 Case-morbidity rate (% clinically diseased animals out of infected ones)	Morbidity can be variable and will depend on the virus strain and poultry species. In ducks morbidity will be very low with subclinical infection normal due to localised enteric infection; whereas in chicken layers it may be high often but will be influenced by flock size (Gonzales et al., 2012) whole flocks have been affected within several days (Parker et al., 2012) but more persistent circulation reported for up to six months, but this is exception.
	(a)(ii) 3 Case-fatality rate	Mortality rates in all avian species are usually less than 5% unless exacerbated by secondary pathogens. Localised infection normal (Swayne et al., 2013).
(a)(iii) zoonotic character of the disease	(a)(iii) 1 report of zoonotic human cases	Yes; rare mild cases principally with conjunctivitis and mild respiratory infection in those occupationally exposed. Number of cases worldwide less than 30 (Kim et al., 2016) H7N9 798 cases/c230 deaths see section (b)(ii)2.
(a)(iv) resistance to treatments, including antimicrobial resistance	(a)(iv) 1 resistant strain to any treatment even at laboratory level	Not applicable but resistant strains could theoretically emerge if anti-viral drugs were applied; prohibited for use in veterinary sector.
(b)(ii) Impact of the disease on human health	(b)(ii) 1 types of routes of transmission between animals and humans - *see (a)(vi)2*	Avian influenza viruses do not readily infect people, but can do so when people have close contact with infected birds. Exposure to high viral load in untreated products. The illness caused by avian influenza viruses can present as a flu-like respiratory illness or conjunctivitis (Kim et al., 2016).
	(b)(ii) 2 Incidence of zoonotic cases	With increased awareness that AI viruses can infect humans investigations of human contacts during poultry outbreaks with LPAI has detected a small number of human cases. Poor transmissibility with most LPAI viruses (less than 30 infection in humans), very few reported in Europe (Kim et al., 2016); one exception is an H7N9 LPAI confined to China that has caused 798 human cases since 2013 with approximately 30 % mortality (WHO, online). The composition of this virus is entirely distinct from viruses circulating in European poultry and wild birds.
	(b)(ii) 3 Occasional or substantial?	LPAI lacks transmissibility in humans.
	(b)(ii) 4 Epidemic or pandemic?	Sporadic but rare in Europe, pandemic potential theoretical.
	(b)(ii) 5 DALY	n/a
(b)(iii) Impact of the disease on animal welfare	(b)(iii) 1 severity of clinical signs at case level and related level and duration of impairment	Clinical as defined above even in extremis very mild ie laying birds going out of lay so impact very low unless exacerbated by secondary infections
(c) potential to generate a crisis situation and its potential use in bioterrorism	(c) 1 listed in OIE/CFSPH classification of pathogens	Y
	(c) 2 listed in the Encyclopedia of Bioterrorism Defense of Australia Group	N
	(c) 3 included in any other list of potential bio-agro-terrorism agents	

Question A(iv)

Question A(iv) diagnostic tools are available for the disease Interpretation: diagnostic tools are available for the disease in the Union **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(viii) existence of diagnostic and disease control tools	(a)(viii) 1 Existence of diagnostic tools	See Table 8 at the end of the document. Specified in laboratory manuals in EU (Commission Decision 2006/437/EC) and at global level (OIE, online).
	(a)(viii) 2 Existence of disease control tools	See Table 5 (Council Directive 2005/94/EC) at the end of the document.

Question A(v)

Question A(v) the risk-mitigating measures and, where relevant, surveillance of the disease are effective and proportionate to the risks posed by the disease in the Union **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(viii) existence of diagnostic and disease control tools	(a)(viii) 1 Existence of diagnostic tools	See Table 8 at the end of the document. Specified in laboratory manuals in EU (Commission Decision 2006/437/EC) and at global level (OIE, online).
	(a)(viii) 2 Existence of disease control tools	See Table 5 (Commission Decision 2006/437/EC) at the end of the document.
(b)(ii) Impact of the disease on human health	(b)(ii) 6 Availability of medical treatment and their effectiveness (therapeutic effect and any resistance)	Yes, anti-viral drugs are available but some levels of resistance, effective only if taken early in infection course (Loregian et al., 2014)
	(b)(ii) 7 Availability of vaccines and their effectiveness (reduced morbidity)	Vaccines are not routinely available for human application; WHO has pre-pandemic vaccines stock containing some LPAI strains for rapid production, if pandemic were to emerge from an LPAI virus (WHO, online)
(d)(i) feasibility, availability and effectiveness of diagnostic tools and capacities	(d)(i) 1 officially/internationally recognised diagnostic tool, OIE certified	See Table 8 (Commission Decision 2006/437/EC; OIE, online) at the end of the document.
	(d)(i) 2 Se and Sp of diagnostic test	
	(d)(i) 3 type of sample matrix to be tested (blood, tissue, etc.)	
(d)(ii) feasibility, availability and effectiveness of vaccination	(d)(ii) 1 types of vaccines available on the market	See Table 9 (FAO, 2009; EMA, 2010; Discontools, online). **Table 9:** LPAI vaccine availability and effectiveness[1]
	(d)(ii) 2 availability / production capacity (per year)	
	(d)(ii) 3 Field protection as reduced morbidity	

VACCINE	TYPE / ADMINISTRATION	EFFECTIVENESS	FIELD PROTECTION	DURATION OF PROTECTION	DIVA	AVAILABILITY / PRODUCTION CAPACITY *
Nobilis Flu H5N2[2]	Inactivated IM & SC	Reduced clinical signs & viral shedding	n/a	12m in chicken	Y[3]	Y Capacity unknown

	(reduced susceptibility to infection and/or to disease) (d)(ii) 4 Duration of protection	<table><tr><td>Nobilis Flu H7N1 / H7N7</td><td>Inactivated IM & SC</td><td>Reduced clinical signs & viral shedding</td><td>Italy 2002-03 R0 2.9 prevacc to 0.6 post vacc</td><td>45 weeks</td><td>Y[3]</td><td>Y Capacity unknown</td></tr><tr><td>Poulvac Flu-Fend H5N3</td><td>Inactivated IM & SC</td><td>Reduced clinical signs & viral shedding</td><td>n/a</td><td>14 weeks in ducks</td><td>Y[3]</td><td>Y Capacity unknown</td></tr><tr><td>Merial Trovac H5</td><td>Vectored HA insert SC</td><td>Reduced clinical signs & viral shedding</td><td>n/a</td><td>20 weeks in chicken</td><td>Y</td><td>Y Capacity unknown</td></tr><tr><td>Gallimune H5N9 or H7N1</td><td>Inactivated IM & SC</td><td>Reduced clinical signs & viral shedding</td><td>n/a</td><td>Not known</td><td>Y[3]</td><td>Y Capacity unknown</td></tr></table>[1] Note this is not an exhaustive list of vaccines but indicates some historically used in the EU [2] EMA authorisation [3] Companion diagnostics not on the shelf *Commercial suppliers tailor supply to demand SC – Subcutaneous IM – Intramuscular (Marangon et al., 2003; Busani et al., 2007; Capua et al., 2009; Beato et al., 2014)
	(d)(ii) 5 Way of administration	Large scale vaccination compromised by commercially available vaccines needing to be injected
(d)(iii) feasibility, availability and effectiveness of medical treatments	(d)(iii) 1 types of drugs available on the market and/or allowed by the EU regulatory system (d)(iii) 2 availability / production capacity (per year) (d)(iii) 3 therapeutic effect in the field (effectiveness) (d)(iii) 4 Way of administration	Antiviral drugs are prohibited for application in the veterinary sector
(d)(iv) feasibility, availability and effectiveness of biosecurity measures	(d)(iv) 1 available biosecurity measures	Procedures or practices that prevent or limit exposure to LPAI: farm hygiene, environmental control, medication to prevent secondary challenge, effective sanitation. Key elements: farm location to mitigate risk for introduction; farm design; access control of people and vehicles; sanitation of materials entering and leaving the site including equipment; vermin control; limiting access to wild birds or their faeces; water sanitation; physical barriers to poultry house, including boot changes and protective clothing; quarantine new stock; exclude access of wild birds to feed; litter disposal (Lister, 2008)
	(d)(iv) 2 effectiveness of biosecurity measure	A combination of factors will provide effective biosecurity but key elements for LPAI include limiting access for wild birds and reducing fomite transmission risk through effective sanitisation when entering into poultry houses. In some systems, mitigation of access to wild bird or their faeces, for example in outdoor system can be achieved by ensuring food is not readily accessible. Appropriate management to monitor changes in production and flock health are critical for prompt awareness of early indicators of infection, i.e. up to 5% reduction in feed or water intake or up to 5% of egg drop in laying birds. Implementation of biosecurity measures are key facts for disease freedom/control (Gonzales et al., 2014)
	(d)(iv) 3 feasibility of biosecurity measure	In large scale integrated commercial operations biosecurity programmes, are part of business as usual. However, in other production systems such as outdoor rearing implementation of biosecurity measures is more challenging and only limited elements in practice can be applied. The introduction of LPAI almost always can be attributed to failures in application of biosecurity measures. In reality when disease threat is perceived to increase measures are strengthened but maybe relaxed in lower risk periods.
(d)(v) feasibility, availability and effectiveness	(d)(v) 1 available restriction movement measures	See Table 5 (OIE, online) at the end of the document.

s of restrictions on the movement of animals and products, as control measure	(d)(v) 2 effectiveness of restriction of animal movement in preventing the between farm spread	Proven in EU; when applied promptly coupled with early reporting disease spread mitigated
	(d)(v) 3 feasibility of restriction of animal movement	Veterinary infrastructure in place in MSs to comply. Feasible because risk based derogations permitted.
(d)(vi) feasibility, availability and effectiveness of killing of animals	(d)(vi) 1 available killing of animal measures	Controlled through Regulation (EC) No 1099/2009 Competent authority can derogate the method of killing "where it considers that compliance is likely to affect human health or significantly slow down the process of eradication of a disease. Multiple methods principally on site to include gassing in containers and use of anoxic foam on site or through safe transport to slaughterhouse where a veterinary risk assessment deems the risk of spreading the virus to be very low. LPAI killed birds provided labelled are fit for food chain.
	(d)(vi) 2 effectiveness of killing animals (at farm level or within the farm) for reducing /stopping spread of the disease	Highly effective to kill animals on site, mitigating risk for transport animals away from infected premise contributes to reducing or stopping disease spread, needs to be done in a controlled environment to avoid aerosols and local windborne spread of virus.
	(d)(vi) 3 feasibility of killing animals	Logistical challenges and R_0 values will depend on speed of slaughter; to reduce risk for fast spreading outbreak infected flocks must be culled within 48 hours of diagnosis. Logistical challenges in some of operational settings such as outdoor production where for moderately small populations manual neck dislocation an option. Contingency plans are required under Regulation (EC) No 1099/2009. These plans need to factor animal welfare, public health risk (by not killing out fast and methods to reduce exposure) and personnel safety; practicality of measures applied and speed and all should be under official veterinary supervision.
(d)(vii) feasibility, availability and effectiveness of disposal of carcasses and other relevant animal by—products	(d)(vii) 1 disposal options available	Disposal options for poultry carcases and associated wastes are; commercial fixed plant incineration; rendering (category 1 and 2 Animal By-Product Regulation approved); permitted commercial landfill sites.
	(d)(vii) 2 effectiveness of disposal option	Incineration and Rendering are closed systems that produce an effective inactivation of LPAI viruses. Landfill may not inactivate all pathogens but could be used only for non-infected carcases.
	(d)(vii) 3 feasibility of disposal option	Operational protocols for use of incineration, rendering and permitted landfill have been successfully utilised in a number of exotic avian disease outbreaks.

Question B(i)

Question B(i) disease causes or could cause significant negative effects in the Union on animal health, OR poses or could pose a significant risk to public health due to its zoonotic character? **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(ii) morbidity and mortality rates of the disease in animal populations	(a)(ii) 1 Prevalence/ Incidence	See Table 1; see at the end of the document.
	(a)(ii) 2 Case-morbidity rate (% clinically diseased animals out of infected ones)	Morbidity can be variable and will depend on the virus strain and poultry species. In ducks morbidity will be very low with subclinical infection normal due to localised enteric infection; whereas in chicken layers it may be high often but will be influenced by flock size (Gonzales et al., 2012) whole flocks have been affected within several days (Parker et al., 2012) but more persistent circulation reported for up to six months, but this is exception.
	(a)(ii) 3 Case-fatality rate	Mortality rates in all avian species are usually less than 5% unless exacerbated by secondary pathogens. Localised infection normal (Swayne et al., 2013).
(a)(iii) zoonotic character of the disease	(a)(iii) 1 report of zoonotic human cases	Yes; rare mild cases principally with conjunctivitis and mild respiratory infection in those occupationally exposed. Number of cases worldwide less than 30 (Kim et al., 2016) H7N9 798 cases/c230 deaths see section (b)(ii)2.
(a)(iv) resistance to treatments, including antimicrobial resistance	(a)(iv) 1 resistant strain to any treatment even at laboratory level	Not applicable but resistant strains could theoretically emerge if anti-viral drugs were applied; prohibited for use in veterinary sector.

(b)(ii) Impact of the disease on human health	(b)(ii) 1 types of routes of transmission between animals and humans - *see (a)(vi)2*	Avian influenza viruses do not readily infect people, but can do so when people have close contact with infected birds. Exposure to high viral load in untreated products. The illness caused by avian influenza viruses can present as a flu-like respiratory illness or conjunctivitis (Kim et al., 2016).
	(b)(ii) 2 Incidence of zoonotic cases	With increased awareness that AI viruses can infect humans investigations of human contacts during poultry outbreaks with LPAI has detected a small number of human cases. Poor transmissibility with most LPAI viruses (less than 30 infection in humans), very few reported in Europe (Kim et al., 2016); one exception is an H7N9 LPAI confined to China that has caused 798 human cases since 2013 with approximately 30 % mortality (WHO, online). The composition of this virus is entirely distinct from viruses circulating in European poultry and wild birds.
	(b)(ii) 3 Occasional or substantial?	LPAI lacks transmissibility in humans.
	(b)(ii) 4 Epidemic or pandemic?	Sporadic but rare in Europe, pandemic potential theoretical.
	(b)(ii) 5 DALY	n/a

Question B(ii)

Question B(ii) disease agent has developed resistance to treatments WHICH poses a significant danger to public and/or animal health in the Union?
Interpretation: disease agent has developed resistance to treatments AND therefore poses a significant danger to public and/or animal health. If no treatment exists the answer should be na
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(iv) resistance to treatments, including antimicrobial resistance	(a)(iv)1 list of any resistant strain to any treatment even at laboratory level	Not applicable but resistant strains could theoretically emerge if anti-viral drugs were applied; prohibited for use in veterinary sector.

Question B(iii)

Question B(iii) disease causes or could cause a significant negative economic impact affecting agriculture or aquaculture production in the Union?
Interpretation: disease and/or infection causes or could cause a significant negative economic impact affecting agriculture or aquaculture production in the Union if no intervention is in place
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(ii) morbidity and mortality rates of the disease in animal populations	(a)(ii) 3 Case-fatality rate	Mortality rates in all avian species are usually less than 5% unless exacerbated by secondary pathogens. Localised infection normal (Swayne et al., 2013).
(b)(i) the impact of the disease on agricultural and aquaculture production and other parts of the economy	(b)(i) 1 Number of MSs where the disease is present	See Table 6. Sporadic outbreaks usually <10/year in EU. In the period 2005 – 2015 272 LPAI outbreaks occurred in 13 member states (EFSA, 2016); see also Table 1 at the end of the document for prevalence data.

Table 6: LPAI outbreaks by Member State and H subtype (where reported)

Member State	H5	H7	H subtype unreported	Total LPAI
Belgium	2			2
Bulgaria	6			6
Czech Republic	1	1		2
Germany	7	17	58	82
Denmark	3	4		7
Spain	1	1		2
France	10		1	11
United Kingdom		6		6
Ireland	1			1
Italy	47	30	51	128
Netherlands	6	13		19
Portugal	4			4
Romania	1		1	2
Total	**89**	**72**	**111**	**272**

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	(b)(i) 2 Proportion of production losses (%) by epidemic/endemic situation (milk, growth, semen, meat, etc.)	See Table 7 at the end of the document.

Question B(iv)

Question B(iv) disease has the potential to generate a crisis or the disease agent could be used for the purpose of bioterrorism **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(c) potential to generate a crisis situation and its potential use in bioterrorism	(c) 1 listed in OIE/CFSPH classification of pathogens	Y
	(c) 2 listed in the Encyclopaedia of Bioterrorism Defense of Australia Group	N
	(c) 3 included in any other list of potential bio-agro-terrorism agents	

Question B(v)

Question B(v) disease has or could have a significant negative impact on the environment, including biodiversity, of the Union **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(b)(iv) impact of the disease on biodiversity and the environment	(b)(iv) 1 endangered wild species affected: listed species as in CITES and/or IUCN list	Not applicable as LPAI in wild species is asymptomatic
	(b)(iv) 2 mortality in wild species	Not applicable
	(b)(iv) 3 capacity of the pathogen to persist in the environment and cause mortality in wildlife	Whilst the pathogen can survive in the environment it presents no risk to wildlife in terms of mortality
(e)(iv) the impact of disease prevention and control measures, as regards the environment and biodiversity	(e)(iv) 2 Mortality in wild species	No

Article 9

Questions 1

Instruction to answer: The answer to the question 1CAq can be Y only for diseases affecting aquatic animal species, therefore do not assess this question for diseases affecting terrestrial animal species

Question 1A the disease is not present in the territory of the Union OR present only in exceptional cases (irregular introductions) OR present in only in a very limited part of the territory of the Union
Answer Y ☐ N ☐ na ☐

Question 1B the disease is present in the whole OR part of the Union territory with an endemic character AND (at the same time) several Member States or zones of the Union are free of the disease
Answer Y ☐ N ☐ na ☐

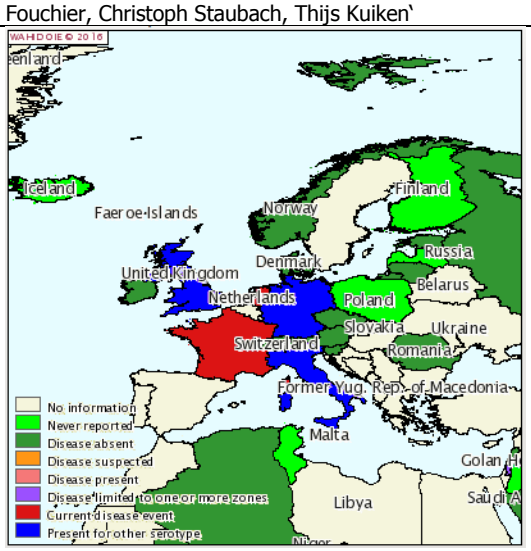
Question 1C the disease is present in the whole OR part of the Union territory with an endemic character
Answer Y ☐ N ☐ na ☐

Question 1CAq several Member States or zones of the Union are free of the disease
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(b)(i) the impact of the disease on agricultural and aquaculture production and other parts of the economy	(b)(i) 1 Number of MSs where the disease is present	See Table 6. Sporadic outbreaks usually <10/year in EU. In the period 2005 – 2015 272 LPAI outbreaks occurred in 13 member states (EFSA, 2016); See also Table 1 at the end of the document for prevalence data.

Table 6: LPAI outbreaks by Member State and H subtype (where reported)

Member State	H5	H7	H subtype unreported	Total LPAI
Belgium	2			2
Bulgaria	6			6
Czech Republic	1	1		2
Germany	7	17	58	82
Denmark	3	4		7
Spain	1	1		2

		France 10 1 11 United Kingdom 6 6 Ireland 1 1 Italy 47 30 51 128 Netherlands 6 13 19 Portugal 4 4 Romania 1 1 2 **Total 89 72 111 272** Reproduced from report (submitted to EFSA August 2016) with authors permission; currently under evaluation and unpublished. 'LPAI detection in wild birds and LPAI spread between European holdings in the period 2005-2015: Daisy Duncan, Kate Harris, Marjolein Poen, Stefan Kowalezyk, Ron Fouchier, Christoph Staubach, Thijs Kuiken'
(a)(vii) the absence or presence and distribution of the disease in the Union, and, where the disease is not present in the Union, the risk of its introduction into the Union	(a)(vii) 1 Map of MSs where the disease is present	 **Figure 1:** Distribution of LPAI in Europe in domestic and animal species from January to June 2016; *source*: OIE-WAHIS
	(a)(vii) 2 Type of epidemiological occurrence	Sporadic occasionally leading to wider epidemic i.e. H7N7 Germany 2011, H7N1 Italy 1999 – 2000 (EFSA, 2005)
	(a)(vii) 3, 4, 5, 6, 7, 8, Risk of introduction (all related parameters)	Not applicable because the disease is already present in the EU.

Questions 2.1

Question 2.1A the disease is highly transmissible **Answer:** Y ☐ N ☐ na ☐		
Question 2.1BC the disease is moderately to highly transmissible **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(vi) the routes and speed of transmission of the disease between animals and, when relevant, between animals and humans	(a)(vi) 3 Incidence between animals and, when relevant, between animals and humans	Efficient intra-species transmission; ease of transmission between species of the same taxonomic family such as chickens and turkeys (Pillai et al., 2010; Mughini-Gras et al., 2014); interspecies transmission across different orders, such as duck to turkey less efficient (Mughini-Gras et al., 2014; Claes et al., 2015) even greater reduced efficiency between species of different classes, i.e. avian to human
	(a)(vi) 4 Transmission rate (beta) (from R_0 and infectious period) between animals and, when relevant, between animals and humans	See Tables 3.1, 3.2 and 3.3 at the end of the document.

Question 2.2

Question 2.2AB there be possibilities of airborne or waterborne or vector-borne spread
Interpretation: the disease or the infection can be transmitted via airborne or waterborne or vector-borne (mechanical or biological vector) spread
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(vi) the routes and speed of transmission of the disease between animals and, when relevant, between animals and humans	(a)(vi) 1 types of routes of transmission from animal to animal (horizontal, vertical)	See Table 2 (Pantin-Jackwood et al., 2012; Claes et al., 2013, 2014).

Table 2: Routes of LPAI transmission from animal to animal

MODE	CHICKEN	TURKEY	DUCK
HORIZONTAL INTRASPECIES	+++	+++	+++
VERTICAL	_	_	_
FOMITE	++	++	++
WILD BIRD ORIGIN	+	++	+++
HORIZONTAL INTERSPECIES	+	++	++

+++ Highly efficient
++ Effective
+ Can occur but low efficiency
_ Not reported

Question 2.3

Question: 2.3A the disease affects multiple species of kept and wild animals OR single species of kept animals of economic importance
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(a)(i) animal species concerned by the disease	(a)(i) 1 naturally susceptible wildlife species	Aquatic birds, Anseriformes (Daoust et al., 2011; Kuiken, 2013) charadriiformes; over a hundred species of birds from at least 13 different orders (EFSA, 2006)
	(a)(i) 2 naturally susceptible domestic species	All species of domestic poultry to include the family phasianidae (chickens, turkeys and related poultry such as quail, guinea fowl and pheasant). Other birds native and introduced; farmed anseriformes, particularly to include ducks and geese; ratites. In general viruses from birds rarely infect mammals (reviewed in Swayne (2016))
	(a)(i) 3 experimentally susceptible wildlife species	No additional information
	(a)(i) 4 experimentally susceptible domestic species	Pigs, mustelid, horses, companion animals (cats and dogs), seals and other sea mammals, rats, rabbits, guinea pigs, mice, non-human primates (Short et al., 2015)
	(a)(i) 5 wild reservoir species	Bird of the orders anseriformes (Verhagen et al., 2014) and charadriiformes
	(a)(i) 6 domestic reservoir species	No natural reservoirs but spill over from wild bird reservoir species (Swayne, 2016). In some eco-systems domestic ducks may maintain virus for long periods

Questions 2.4

Instruction to answer: The answer to the question 2.4CAq can be Y only for diseases affecting aquatic animal species, therefore do not assess this question for diseases affecting terrestrial animal species

Question 2.4A the disease may result in high morbidity and significant mortality rates
Answer Y ☐ N ☐ na ☐

Question 2.4B the disease may result in high morbidity and in general low mortality
Answer Y ☐ N ☐ na ☐

Question 2.4C the disease usually does not result in high morbidity and has negligible or no mortality AND often the most observed effect of the disease is production loss
Answer Y ☐ N ☐ na ☐

Question 2.4CAq the disease may result in high morbidity and usually low mortality AND often the most observed effect of the disease is production loss
Answer Y ☐ N ☐ na ☐

<table>
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Questions 3

Question 3C the disease has a zoonotic potential with significant consequences for public health or possible significant threats to food safety **Answer** Y ☐ N ☐ na ☐		
Question 3B the disease has a zoonotic potential with significant consequences on public health, including epidemic potential OR possible significant threats to food safety **Answer** Y ☐ N ☐ na ☐		
Question 3A the disease has a zoonotic potential with significant consequences on public health, including epidemic or pandemic potential OR possible significant threats to food safety **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(iii) zoonotic character of the disease	(a)(iii) 1 report of zoonotic human cases	Yes; rare mild cases principally with conjunctivitis and mild respiratory infection in those occupationally exposed. Number of cases worldwide less than 30 (Kim et al., 2016) H7N9 798 cases/c230 deaths see section (b)(ii)2.
(a)(vi) the routes and speed of transmission of the disease between animals and, when relevant, between animals and humans	(a)(vi) 2 types of routes of transmission between animals and humans (direct and indirect including foodborne)	Direct exposure to aerosolised droplet materials in poultry environment through the conjunctiva or the upper respiratory tract
	(a)(vi) 3 Incidence between animals and, when relevant , between animals and humans	Efficient intra-species transmission; ease of transmission between species of the same taxonomic family such as chickens and turkeys (Pillai et al., 2010; Mughini-Gras et al., 2014); interspecies transmission across different orders, such as duck to turkey less efficient (Mughini-Gras et al., 2014; Claes et al., 2015) even greater reduced efficiency between species of different classes, i.e. avian to human
	(a)(vi) 4 Transmission rate (beta) (from R_0 and infectious period) between animals and, when relevant ,between animals and humans	See Tables 3.1, 3.2 and 3.3 at the end of the document.
(b)(ii) Impact of the disease on human health	(b)(ii) 5 Disability-adjusted life year (DALY)	n/a
	(b)(ii) 6 Availability of medical treatment and their effectiveness (therapeutical effect and any resistance)	Yes, anti-viral drugs are available but some levels of resistance, effective only if taken early in infection course (Loregian et al., 2014)
	(b)(ii) 7 Availability of vaccines and their effectiveness (reduced morbidity)	Vaccines are not routinely available for human application; WHO has pre-pandemic vaccines stock containing some LPAI strains for rapid production, if pandemic were to emerge from an LPAI virus (WHO, online)
(c) potential to generate a crisis situation and its potential use in bioterrorism	(c) 1 listed in OIE/CFSPH classification of pathogens	Y
	(c) 2 listed in the Encyclopaedia of Bioterrorism Defense of Australia Group	N
	(c) 3 included in any other list of potential bio- agro-terrorism agents	

Questions 4

Question 4AB the disease in question has a significant impact on the economy of the Union, causing substantial costs, mainly related to its direct impact on the health and productivity of animals Interpretation: due to the substantial costs related to the disease's direct impact on the health and productivity of animals, the disease has a significant impact on the economy **Answer** Y ☐ N ☐ na ☐		
Question 4C the disease has a significant impact on the economy of the Union, mainly related to its direct impact on certain types of animal production systems Interpretation: due to its direct impact on certain types of animal production systems, the disease has a significant impact on the economy **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(a)(ii) morbidity and mortality rates of the	(a)(ii) 1 Prevalence/ Incidence	See Table 1; see at the end of the document.
	(a)(ii) 2 Case-morbidity rate (% clinically diseased animals out of infected ones)	Morbidity can be variable and will depend on the virus strain and poultry species. In ducks morbidity will be very low with subclinical infection normal due to localised enteric infection; whereas in chicken layers it may be high often but

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Question 5a

Question 5a the disease has a significant impact on society, with in particular an impact on labour markets
Interpretation: the disease has a significant impact on society with (as the most important but not the only one) an impact on labour markets
Answer Y ☐ N ☐ na ☐

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	(b)(i) 2 Proportion of production losses (%) by epidemic/endemic situation (milk, growth, semen, meat, etc.)	See Table 7 at the end of the document.

Question 5b

Question 5b the disease has a significant impact on animal welfare, by causing suffering to large numbers of animals
Interpretation: due to the suffering of large numbers of animals caused by the disease, the disease has a significant impact on animal welfare
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(b)(iii) impact of the disease on animal welfare	(b)(iii) 1 severity of clinical signs at case level and related level and duration of impairment	Clinical as defined above even in extremis very mild ie laying birds going out of lay so impact very low unless exacerbated by secondary infections
(a)(ii) morbidity and mortality rates of the disease in animal populations	(a)(ii) 2 Case-morbidity rate (% clinically diseased animals out of infected ones)	Morbidity can be variable and will depend on the virus strain and poultry species. In ducks morbidity will be very low with subclinical infection normal due to localised enteric infection; whereas in chicken layers it may be high often but will be influenced by flock size (Gonzales et al., 2012) whole flocks have been affected within several days (Parker et al., 2012) but more persistent circulation reported for up to six months, but this is exception.

Question 5c

Question 5c the disease has a significant impact on the environment, due to the direct impact of the disease OR due to the measures taken to control it
Interpretation: due to the direct impact of the disease OR to the impact of the measures taken to control it, the disease has a significant impact on the environment
Answer: Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(b)(iv) impact of the disease on biodiversity and the environment	(b)(iv) 1 endangered wild species affected: listed species as in CITES and/or IUCN list	Not applicable as LPAI in wild species is asymptomatic
	(b)(iv) 2 Mortality in wild species	Not applicable
(e)(iv) the impact of disease prevention and control measures	(e)(iv) 2 Mortality in wild species	No

Question 5d

Question 5d The disease has a significant impact on the long term on biodiversity or the protection of endangered species or breeds, including the possible disappearance or long-term damage to those species or breeds
Interpretation: the consequences of the impact of the disease can even lead to the possible disappearance or long-term damage of endangered species or breeds
Answer Y ☐ N ☐ na ☐

Art. 7 criteria	Art. 7 parameters	Assessment of the Art. 7 parameters from the fact-sheet
(b)(iv) impact of the disease on biodiversity and the environment	(b)(iv) 1 endangered wild species affected: listed species as in CITES and/or IUCN list	Not applicable as LPAI in wild species is asymptomatic
	(b)(iv) 2 Mortality in wild species	Not applicable
	(b)(iv) 3 Capacity of the pathogen to persist in the environment and cause mortality in wildlife	Whilst the pathogen can survive in the environment it presents no risk to wildlife in terms of mortality

Question D

Question D The risk posed by the disease in question can be effectively and proportionately mitigated by measures concerning movements of animals and products in order to prevent or limit its occurrence and spread **Answer** Y ☐ N ☐ na ☐		
Art. 7 criteria	**Art. 7 parameters**	**Assessment of the Art. 7 parameters from the fact-sheet**
(d)(v) feasibility, availability and effectiveness of restrictions on the movement of animals and products, as control measure	(d)(v) 1 available restriction movement measures	See Table 5 (OIE, online) at the end of the document.
	(d)(v) 2 effectiveness of restriction of animal movement in preventing the between farm spread	Proven in EU; when applied promptly coupled with early reporting disease spread mitigated (Commission)
	(d)(v) 3 feasibility of restriction of animal movement	Veterinary infrastructure in place in MSs to comply. Feasible because risk based derogations permitted.

Tables

Table 1: Prevalence of LPAI in poultry in the EU

CATEGORY	**YEAR**				
	2010	2011	2012	2013	2014
HOLDINGS SAMPLED	29,484	29,806	29,404	25,220	19,813
HOLDINGS POSTIVE	63 (0.2%)	65 (0.22%)	43 (0.15%)	63 (0.25%)	43 (0.22%)
H5 POSITIVE HOLDINGS	50	50	40	57	38
H7 POSITIVE HOLDINGS	14	15	4	6	5
NUMBER MEMBER STATES POSITIVE	8	10	9	11	8
POULTRY CATEGORY					
CHICKEN BREEDERS				1	2
LAYING HENS	4	4	4	1	4
FREE RANGE LAYING HENS	1	1	3	7	4
BROILERS					
FATTENING TURKEYS			1		
TURKEY BREEDERS					
FATTENING DUCKS		6	7	8	11
BREEDER DUCKS	4	25	21	27	7
FATTENING GEESE	22	2	1	1	2
BREEDER GEESE	8	8	4	5	10
BACKYARD	4	8	1	3	
FARMED GAMEBIRDS	15	3	1	2	
RATITES					1
OTHER	5	6		7	2

Note that the mandatory EU annual poultry survey provides the opportunity to conduct risk based surveillance. Therefore this may lead to biases in prevalence and incidence estimates between Member States.

Table 8: Diagnostic tests applied for LPAI

METHOD	TEST PERFORMANCE		PURPOSE				SAMPLE TYPE	REF
	Dse	Dsp	POPULATION FREEDOM	ANIMAL FREEDOM	DISEASE CONFIRMATION	SURVEILLANCE INC POST VACC		
DETECTION / CULTURE VIRUS ISOLATION*			+	+++	+++	+	Tissues C&O swabs	(Commission Decision 2006/437/EC)
PCR (real-time)[1]							Tissues C&O swabs	(Commission Decision 2006/437/EC)
INFLUENZA A	NK	NK	++	+++	+++	++	Tissues C&O swabs	(Commission Decision 2006/437/EC; Slomka et al., 2010)
H5	100%	-	++	+++	+++	++	Tissues C&O swabs	(Commission Decision 2006/437/EC; Slomka et al., 2007)
H7	100%	90%	++	+++	+++	++	Tissues C&O swabs	(Commission Decision 2006/437/EC; Slomka et al., 2009)
IMMUNE RESPONSE HI	-	-	+++	++	++ convalescent	+++	Serum	(Commission Decision 2006/437/EC)
ELISA	NK	NK	+	+	+ convalescent	++	Serum	(Marche and van den Berg, 2010; OIE, online)
VIRUS CHARACTERISATION Gene Sequencing	NK	100%	-	-	+++	-	Tissue /swab or virus	(OIE, online)
IVPI	-	-	-	-	+++	-	Virus	(OIE, online)

C & O swabs – Cloacal and oropharyngeal swabs
*Gold standard but proven to be less sensitive and furthermore, real time PCR reactors specific from known population
[1]Dse and Dsp values measured against Virus isolation

Table 5: Disease control tools for LPAI (Council Directive 2005/94/EC)

MEASURE	APPLICATION
Farm restrictions	Live birds Hatching eggs Meat : products Animal by-product Table eggs Equipment Vehicles People Slurry/manure Litter
Zoning/Quarantine/Surveillance	1km protection zone Farm census / inspection Laboratory testing of farms
Movement Restrictions	Live birds Hatching eggs Meat : products Animal By-product Table eggs
Culling and disposal	Infected farm
Biosecurity	Specified requirements
Transport	Specified requirements
Epidemiological enquiry	Determine spread Identify source
Cleansing and disinfection	Specified requirements
Vaccination	No unless Commission preapprove plan Exceptional use
Repopulation	Controlled

Table 7: Production losses through LPAI outbreak depopulation in the EU 2005-2015

Row Labels	H subtype unreported			H5			H7			LPAI total		
	Count of NUTScode	Count of depopulated	Sum of depopulated2	Count of NUTScode	Count of depopulated	Sum of depopulated2	Count of NUTScode	Count of depopulated	Sum of depopulated2	Total Count of NUTScode	Total Count of depopulated	Total Sum of depopulated2
	3			3	2	8730				6	2	8730
BYF	3	2	64							3	2	64
CHICKENS	25	18	102750	14	13	90338	30	23	438539	69	54	631627
CHICKENS / DUCKS / GOOSE / TURKEYS				1						1		
CHICKENS / GEESE / DUCKS / TURKEYS	1									1		
CHICKENS / GOOSE / DUCKS / QUAIL							1			1		
CHICKENS / OSTRICH				1						1		
CHICKENS / TURKEY / DUCKS	1									1		
CHICKENS / TURKEY / GOOSE / DUCKS / QUAIL				1						1		
DUCKS	10	2	2607	12	4	182	4	2	3959	26	8	6748
DUCKS / CHICKENS / GEESE	2									2		
DUCKS / GEESE	1									1		
GAME BIRDS	3			2	1	4230				5	1	4230
GEESE	5	2	6000							5	2	6000
GEESE / CHICKENS	1									1		
GEESE / DUCKS	1	1	2750							1	1	2750
GUINEA FOWL				1						1		
MALLARD				6	1	1064	1	1	5118	7	2	6182
MIXED	25	23	83674	16	15	27684	20	17	35824	61	55	147182
ORNAMENTAL	1	1	2114	7	5	3463	1	1	741	9	7	6318
PARTRIDGES	2	2	10515							2	2	10515
PHEASANTS				1	1	150				1	1	150
QUAIL / CHICKEN / GOOSE / DUCKS	1									1		
TURKEYS	48	10	112222	10	10	191969	7	2	26200	65	22	330391
Grand Total	**133**	**61**	**322696**	**75**	**52**	**327810**	**64**	**46**	**510381**	**272**	**159**	**1160887**

Table 3.1: Transmission rate of LPAI

VIRUS SEROTYPE	HOST SPECIES	TRANSMISSION RATE (BETA) Days^{-1}	STUDY DESIGN	VIRUS ORIGIN	REF
H7N1	Chicken	0.49 (0.3 - 0.75)	transmission	poultry	Gonzales et al. (2011)
H7N1	Chicken	0.38 (0.11 - 0.44)	transmission	poultry	Claes et al. (2013)
H7N7	Chicken	0.1 (0.04 - 0.18)	transmission	poultry	Gonzales et al. (2012a)
H7N3	Chicken	0.91 (0.45 - 1.62)	transmission	poultry	Gonzales et al. (2012b)
H7N3	Chicken	0.72 (0.68 - 0.77)	field	poultry	Gonzales et al. (2012b)
H7N3	Chicken	0.5 (0.45 - 0.55)	field	poultry	Gonzales et al. (2012b)
H7N8†	Chicken	0.78 (0.3 - 1.7)	challenge	wild bird	Lee et al. (2012)
H7N8†	Chicken	0.26 (0.07 - 0.7)	challenge	wild bird	Lee et al. (2012)
H5N2	Chicken	0.24 (0.12 - 0.45)	transmission	poultry	van der Goot et al. (2003)
H5N2	Chicken	0.37 (0.14 - 0.61)	transmission	poultry	Claes et al. (2013)
H6N2†	Chicken	2.46 (1.2 - 4.56)	transmission	poultry	Yee et al. (2009)
H9N2†	Chicken	1.57 (0.9 - 2.74)	challenge	poultry	Youn et al. (2012)
H10N1†	Chicken	0.43 (0.21 - 0.79)	challenge	wild bird	Bonfante et al. (2014)
H11N9†	Chicken	1.42 (0.75 - 2.45)	transmission	poultry	Li et al. (2010)
H7N1	Turkey	2.01 (1.6 - 2.5)	transmission	poultry	Saenz et al. (2012)
H7N1†	Turkey	0.08 (0.004 - 0.345)	challenge	wild bird	Mondal et al. (2013)
H6N8†	Turkey	0.2 (0.03 - 0.62)	challenge	wild bird	Mondal et al. (2013)
H5N1	Muscovi ducks	1.84 (1.09 - 3.11)	transmission	duck	Niqueux et al. (2014)
H5N2	Muscovi ducks	2.41 (1.41 - 4.13)	transmission	wild bird	Niqueux et al. (2014)
H5N3	Muscovi ducks	1.07 (0.64 - 1.78)	transmission	poultry	Niqueux et al. (2014)
H11N9†	Pekin ducks	0.31 (0.13 - 0.6)	transmission	poultry	Li et al. (2010)

† These were challenge experiments where contacts were introduced. Parameters values were estimated from manuscrip data
† For all beta calculations 1 day latent period was assumed
Source- SLR made by Consortium for AI mandate

Table 3.2: Infectious period of LPAI

VIRUS SEROTYPE	HOST SPECIES	INFECTIOUS PERIOD (T) Days	STUDY DESIGN	VIRUS ORIGIN	REF
H7N1	Chicken	7.7 (6.7 - 8.7)	transmission	poultry	Gonzales et al. (2011)
H7N1	Chicken	6.1 (0.45 - 11.75)	transmission	poultry	Claes et al. (2013)
H7N7	Chicken	7.1 (6.5 - 7.8)	transmission	poultry	Gonzales et al. (2012a)
H7N3	Chicken	10.03 (8.5 - 11.56)	transmission	poultry	Gonzales et al. (2012b)
H7N3	Chicken	7.69 (5.88 - 11.11)	field	poultry	Gonzales et al. (2012b)
H7N3	Chicken	9.09 (6.25 - 20)	field	poultry	Gonzales et al. (2012b)
H5N2	Chicken	4.25 (2.57 - 5.93)	transmission	poultry	van der Goot et al. (2003)
H5N2	Chicken	5.5 (2.36 - 8.64)	transmission	poultry	Claes et al. (2013)
H10N1	Chicken	7.4 (6.1 - 8.8)	transmission	wild bird	Bonfante et al. (2014)
H7N1	Turkey	7.65 (7 - 8.3)	transmission	poultry	Saenz et al. (2012)
H7N1	Turkey	8.1 (6.4 - 10.5)	challenge	poultry	Comin et al. (2011)
H5N1	Muscovi ducks	8.1 (4.9 - 13.4)	transmission	poultry	Niqueux et al. (2014)
H5N1	Muscovi ducks	6.5 (3.9 - 10.7)	transmission	poultry	Niqueux et al. (2014)
H5N2	Muscovi ducks	5.1 (3.1 - 8.5)	transmission	wild bird	Niqueux et al. (2014)

Source- SLR made by Consortium for AI mandate

Table 3.3: Basic reproduction ratio of LPAI

VIRUS SEROTYPE	HOST SPECIES	BASIC REPRODUCTION RATIO (RO)	STUDY DESIGN	VIRUS ORIGIN	REF
H7N1	Chicken	3.8 (1.3 - 6.3)	transmission	poultry	Gonzales et al. (2011)
H7N1	Chicken	2.32 (0.12 - 4.52)	transmission	poultry	Claes et al. (2013)
H7N7	Chicken	0.8 (0.4 - 1.8)	transmission	poultry	Gonzales et al. (2012a)
H7N3	Chicken	9.1 (3.6 - 19.5)	transmission	poultry	Gonzales et al. (2012b)
H7N3	Chicken	5.6 (4.3 - 7.7)	field	poultry	Gonzales et al. (2012b)
H7N3	Chicken	4.7 (3 - 8.6)	field	poultry	Gonzales et al. (2012b)
H5N2	Chicken	2.11 (0.85 - 6.15)	transmission	poultry	Claes et al. (2015)
H5N2	Chicken	2.04 (0.79 - 3.28)	transmission	poultry	Claes et al. (2013)
H5N2	Chicken	1.17 (0.47 - 2.39)	transmission	poultry	van der Goot et al. (2003)
H5N2	Chicken	1.1 (0.5 - 3.8)	challenge	poultry	Pillai et al. (2010)†
H5N2	Chicken	0.36 (0.1 - 1.9)	challenge	poultry	Pillai et al. (2010)
H5N2	Chicken	0.22 (0.005 - 1.2)	challenge	turkey	Pillai et al. (2010)
H5N3	Chicken	0.63 (0.22 - 3.08)	challenge	wild bird	Pillai et al. (2010)
H5N2	Chicken	0 (0 - 0.62)	challenge	wild bird	Pillai et al. (2010)
H5N2	Chicken	0 (0 - 0.62)	challenge	wild bird	Pillai et al. (2010)
H5N5	Chicken	0 (0 - 0.66)	challenge	wild bird	Pillai et al. (2010)
H5N1	Chicken	0.44 (0.01 - 2.28)	challenge	wild bird	Pillai et al. (2010)
H5N7	Chicken	0 (0 - 0.75)	challenge	wild bird	Pillai et al. (2010)
H5N9	Chicken	0 (0 - 0.75)	challenge	wild bird	Pillai et al. (2010)
H10N1	Chicken	3.2 (1.4 - 5.1)	challenge	wild bird	Bonfante et al. (2014)
H7N1	Turkey	15.3 (11.8 - 19.7)	transmission	poultry	Saenz et al. (2012)
H7N1	Turkey	5.5 (3.36 - 18.33)	field	poultry	Comin et al. (2011)
H7N1	Turkey	0.56 (0.03 - 44.18)	challenge	wild bird	Mondal et al. (2013)
H5N2	Turkey	1.3 (0.05 - 2.12)	challenge	wild bird	Pillai et al. (2010)†
H5N2	Turkey	inf (1 - inf)	challenge	poultry	Pillai et al. (2010)
H5N2	Turkey	2.1 (0.5 - 2.6)	challenge	poultry	Pillai et al. (2010)
H5N3	Turkey	0.9 (0.05 - 1.9)	challenge	poultry	Pillai et al. (2010)
H5N3	Turkey	1.83 (0.56 - 5.1)	challenge	wild bird	Pillai et al. (2010)
H5N5	Turkey	0 (0 - 1.04)	challenge	wild bird	Pillai et al. (2010)
H5N1	Turkey	1.6 (0.11 - 2.2)	challenge	wild bird	Pillai et al. (2010)
H5N8	Turkey	1.45 (0.07 - 4.45)	challenge	wild bird	Pillai et al. (2010)
H6N8	Turkey	0.88 (0.03 - 44.18)	challenge	wild bird	Mondal et al. (2013)
H5N1	Muscovi ducks	14.9 (7.2 - 30.8)	transmission	Duck	Niqueux et al. (2014)
H5N2	Muscovi ducks	15.6 (7.4 - 32.7)	transmission	wild bird	Niqueux et al. (2014)
H5N3	Muscovi ducks	5.5 (2.7 - 11.3)	transmission	poultry	Niqueux et al. (2014)
H5N3	Pekin ducks	2.55 (0.33 - 4.8)	challenge	wild bird	Pillai et al. (2010)
H5N2	Pekin ducks	0.7 (0.2 - 1.8)	challenge	poultry	Pillai et al. (2010)
H5N2	Pekin ducks	0.7 (0.2 - 1.8)	challenge	poultry	Pillai et al. (2010)
H5N2	Pekin ducks	2.7 (0.84 - 7.28)	challenge	poultry	Pillai et al. (2010)
H5N2	Pekin ducks	1.3 (0.06 - 2.37)	challenge	wild bird	Pillai et al. (2010)
H5N5	Pekin ducks	1.2 (0.04 - 1.7)	challenge	wild bird	Pillai et al. (2010)
H5N1	Pekin ducks	1.6 (0.12 - 2.3)	challenge	wild bird	Pillai et al. (2010)
H5N7	Pekin ducks	1.3 (0.05 - 1.95)	challenge	wild bird	Pillai et al. (2010)

H5N9	Pekin ducks	1.24 (0.04 - 1.71)	challenge	wild bird	Pillai et al. (2010)

† To make these calculations the follwoing assumtions were made:
1) Only contacts were considered susceptible.
2) Inoculated that remained negative were not included in the analysis.
3) Contacts were considered positive (looking at PCR data) only when they were serologically positive 2 weeks after challenge
Source- SLR made by Consortium for AI mandate.