

## Avian influenza Overview

### Literature search on phenotypic and genetic characterisation of AI viruses: Protocol and results

The aim of this document is to report on the literature searches performed in the context of the Avian Influenza Quarterly Reports updating on the avian influenza situation within the Union and worldwide published by EFSA, ECDC and EURL

Literature searches are designed to provide information on phenotypic and genotypic characterisation of HPAI viruses circulating on other continents and regions (Africa, Asia, the Middle East) in domestic or wild birds or mammals (excluding humans).

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## A.1. Search protocol

Bibliographic searches will be performed in PubMed database in order to retrieve peer reviewed literature. The search strings will combine concepts representing the Avian Influenza Viruses and populations of interest linked with the relevant Boolean operators.

Search terms will include a combination of free-text and subject index terms (Mesh terms). The results will be filtered using the date of introduction on the database in order to limit them to the relevant reporting period.

Two different search strings have been developed to identify the following:

- Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds
- Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

### A.1.1. Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds

Search terms considered

Concept	Terms
<b>Avian influenza</b>	Avian influenza, avian flu, influenza in birds, influenza in bird, bird flu, birds flu, bird influenza, birds influenza, influenza virus A, influenza viruses A, flu virus A, flu viruses A, influenzavirusA, influenza A, influenza A virus, Influenza A viruses, flu A, flu A virus, flu A viruses, fluvirus A, high pathogenic avian influenza, high pathogenic avian influenza virus, HPAI, HPAIV, HPAIVs, low pathogenic avian influenza, high pathogenic avian influenza virus, LPAI, LPAIV, LPAIVs, AIV, AIVs, H5N*, AH5N*, H7N*, AH7N*, H9N*, AH9N*, A(H5N*), A(H7N*), A(H9N*)
<b>Birds</b>	Bird, birds, aves, avian population, avian populations, poultry, poultries, fowl, fowls, chicken, chickens, gallus gallus, g. gallus, waterfowl, waterfowls, water fowl, water fowls, duck, ducks, swan, swans, anatidae, mallard, mallards, Anas platyrhynchos, A platyrhynchos, geese, goose, anser, turkey, turkeys, meleagris, quail, quails, coturnix, partridge, partridges, phasianidae, guineafowl, guineafowls, numida, numidae, ostrich, ostriches, struthio

Search strings

Search	Query	Concept
<b>#3</b>	<b>Search</b> (#1 AND #2)	<b>Avian influenza AND Birds</b>
<b>#2</b>	<b>Search</b> "Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR ((influenza*[tiab] OR flu[tiab]) AND ("virus A" OR "viruses A")) OR "influenza A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR LPAI [tiab] OR IPAIIV[tiab] OR AIV[tiab] OR AIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	<b>Avian influenza</b>
<b>#1</b>	<b>Search</b> "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge*[tiab] OR phasianidae[tiab] OR guineafowl*[tiab] OR numida*[tiab] OR ostrich*[tiab] OR struthio[tiab]	<b>Birds</b>

Date filter will be applied using relevant dates for the reporting period and the field [Date - Entrez].

### A.1.2. Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

Search terms considered

Concept	Terms
<b>Highly pathogenic avian influenza</b>	High/highly pathogen* avian influenza, high/highly pathogen* avian flu, high/highly pathogen* influenza in birds, high/highly pathogen* influenza in bird, high/highly pathogen* bird flu, high/highly pathogen* birds flu, high/highly pathogen* bird influenza , high/highly pathogen* birds influenza , high/highly pathogen* influenza virus A, high/highly pathogen* influenza viruses A, high/highly pathogen* flu virus A, high/highly pathogen* flu viruses A, high/highly pathogen* influenzavirusA, influenza A, high/highly pathogen* influenza A virus, high/highly pathogen* influenza A viruses, high/highly pathogen* flu A, high/highly pathogen* flu A virus, high/highly pathogen* flu A viruses, high/highly pathogen* fluvirus A, high/highly pathogen* AIV, high/highly pathogen* AIVs, HPAI, HPAIV, HPAIVs, H5N*, AH5N*, H7N*, AH7N*, H9N*, AH9N*, A(H5N*), A(H7N*), A(H9N*)
<b>Animals</b>	In order to simplify the retrieval of studies in animals, the search filter referenced below was used and adapted to include a better coverage of terms related to birds: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117 The search string is designed to retrieve studies in animal experimentation, but it also can be used to retrieve all type of studies in animals. It contains names of animals not relevant for avian influenza; these terms will not affect the results. However, the use of the already made filter simplifies the construction of the search string.

Search strings

Search	Query	Concepts
#3	Search (#2 AND #1)	<b>Highly pathogenic avian influenza AND animals</b>
#2	Search ((high pathogen*[tiab] OR highly pathogen*[tiab] ) AND ("Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab]))) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR "influenza virus A"[tiab] OR "influenza viruses A"[tiab] OR "influenza A"[tiab] OR "flu virus A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR AIV[tiab] OR AIVs[tiab])) OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	<b>Highly pathogenic avian influenza</b>
#1 <sup>1</sup>	Search "animal experimentation"[MeSH Terms] OR "models, animal"[MeSH Terms] OR "invertebrates"[MeSH Terms] OR "Animals"[Mesh:noexp] OR "animal population groups"[MeSH Terms] OR "chordata"[MeSH Terms:noexp] OR "chordata, nonvertebrate"[MeSH Terms] OR "vertebrates"[MeSH Terms:noexp] OR "mammals"[MeSH Terms:noexp] OR "primates"[MeSH Terms:noexp] OR "artiodactyla"[MeSH Terms] OR "carnivora"[MeSH Terms] OR "cetacea"[MeSH Terms] OR "chiroptera"[MeSH Terms] OR "elephants"[MeSH Terms] OR	<b>Animals</b>

<sup>1</sup> Animals search string adapted from: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117

"hyraxes"[MeSH Terms] OR "insectivora"[MeSH Terms] OR "lagomorpha"[MeSH Terms] OR "marsupialia"[MeSH Terms] OR "monotremata"[MeSH Terms] OR "perissodactyla"[MeSH Terms] OR "rodentia"[MeSH Terms] OR "scandentia"[MeSH Terms] OR "sirenia"[MeSH Terms] OR "xenarthra"[MeSH Terms] OR "haplorhini"[MeSH Terms:noexp] OR "strepsirhini"[MeSH Terms] OR "platyrrhini"[MeSH Terms] OR "tarsii"[MeSH Terms] OR "catarrhini"[MeSH Terms:noexp] OR "cercopithecidae"[MeSH Terms] OR "hylobatidae"[MeSH Terms] OR "hominidae"[MeSH Terms:noexp] OR "gorilla gorilla"[MeSH Terms] OR "pan paniscus"[MeSH Terms] OR "pan troglodytes"[MeSH Terms] OR "pongo pygmaeus"[MeSH Terms] OR ((animals[tiab] OR animal[tiab] OR mice[tiab] OR mus[tiab] OR mouse[tiab] OR murine[tiab] OR woodmouse[tiab] OR rats[tiab] OR rat[tiab] OR murinae[tiab] OR muridae[tiab] OR cottonrat[tiab] OR cottonrats[tiab] OR hamster[tiab] OR hamsters[tiab] OR cricetinae[tiab] OR rodentia[tiab] OR rodent[tiab] OR rodents[tiab] OR pigs[tiab] OR pig[tiab] OR swine[tiab] OR swines[tiab] OR piglets[tiab] OR piglet[tiab] OR boar[tiab] OR boars[tiab] OR "sus scrofa"[tiab] OR ferrets[tiab] OR ferret[tiab] OR polecat[tiab] OR polecats[tiab] OR "mustela putorius"[tiab] OR "guinea pigs"[tiab] OR "guinea pig"[tiab] OR cavia[tiab] OR callithrix[tiab] OR marmoset[tiab] OR marmosets[tiab] OR cebuella[tiab] OR hapale[tiab] OR octodon[tiab] OR chinchilla[tiab] OR chinchillas[tiab] OR gerbillinae[tiab] OR gerbil[tiab] OR gerbils[tiab] OR jird[tiab] OR jirds[tiab] OR merione[tiab] OR meriones[tiab] OR rabbits[tiab] OR rabbit[tiab] OR hares[tiab] OR hare[tiab] OR diptera[tiab] OR flies[tiab] OR fly[tiab] OR dipteral[tiab] OR drosophila[tiab] OR drosophilidae[tiab] OR cats[tiab] OR cat[tiab] OR carus[tiab] OR felis[tiab] OR nematoda[tiab] OR nematode[tiab] OR nematoda[tiab] OR nematode[tiab] OR nematodes[tiab] OR sipunculida[tiab] OR dogs[tiab] OR dog[tiab] OR canine[tiab] OR canines[tiab] OR canis[tiab] OR sheep[tiab] OR sheeps[tiab] OR mouflon[tiab] OR mouflons[tiab] OR ovis[tiab] OR goats[tiab] OR goat[tiab] OR capra[tiab] OR capras[tiab] OR rupicapra[tiab] OR chamois[tiab] OR haplorhini[tiab] OR monkey[tiab] OR monkeys[tiab] OR anthropoidea[tiab] OR anthropoids[tiab] OR saguinus[tiab] OR tamarin[tiab] OR tamarins[tiab] OR leontopithecus[tiab] OR hominidae[tiab] OR ape[tiab] OR apes[tiab] OR pan[tiab] OR paniscus[tiab] OR "pan paniscus"[tiab] OR bonobo[tiab] OR bonobos[tiab] OR troglodytes[tiab] OR "pan troglodytes"[tiab] OR gibbon[tiab] OR gibbons[tiab] OR siamang[tiab] OR siamangs[tiab] OR nomascus[tiab] OR symphalangus[tiab] OR chimpanzee[tiab] OR chimpanzees[tiab] OR prosimians[tiab] OR "bush baby"[tiab] OR prosimian[tiab] OR bush babies[tiab] OR galagos[tiab] OR galago[tiab] OR pongidae[tiab] OR gorilla[tiab] OR gorillas[tiab] OR pongo[tiab] OR pygmaeus[tiab] OR "pongo pygmaeus"[tiab] OR orangutans[tiab] OR pygmaeus[tiab] OR lemur[tiab] OR lemurs[tiab] OR lemuriidae[tiab] OR horse[tiab] OR horses[tiab] OR pongo[tiab] OR equus[tiab] OR cow[tiab] OR calf[tiab] OR bull[tiab] OR reptile[tiab] OR reptilia[tiab] OR reptiles[tiab] OR snakes[tiab] OR snake[tiab] OR lizard[tiab] OR lizards[tiab] OR alligator[tiab] OR alligators[tiab] OR crocodile[tiab] OR crocodiles[tiab] OR turtle[tiab] OR turtles[tiab] OR amphibian[tiab] OR amphibians[tiab] OR amphibia[tiab] OR frog[tiab] OR frogs[tiab] OR bombina[tiab] OR salientia[tiab] OR toad[tiab] OR toads[tiab] OR "epidalea calamita"[tiab] OR salamander[tiab] OR salamanders[tiab] OR eel[tiab] OR eels[tiab] OR fish[tiab] OR fishes[tiab] OR pisces[tiab] OR catfish[tiab] OR catfishes[tiab] OR siluriformes[tiab] OR arius[tiab] OR heteropneustes[tiab] OR sheatfish[tiab] OR perch[tiab] OR perches[tiab] OR percidae[tiab] OR perca[tiab] OR trout[tiab] OR trouts[tiab] OR char[tiab] OR chars[tiab] OR salvelinus[tiab] OR "fathead minnow"[tiab] OR minnow[tiab] OR cyprinidae[tiab] OR carps[tiab] OR carp[tiab] OR zebrafish[tiab] OR zebrafishes[tiab] OR goldfish[tiab] OR goldfishes[tiab] OR guppy[tiab] OR guppies[tiab] OR chub[tiab] OR chubs[tiab] OR

tinca[Tiab] OR barbels[Tiab] OR barbus[Tiab] OR pimephales[Tiab] OR promelas[Tiab] OR "poecilia reticulata"[Tiab] OR mullet[Tiab] OR mullets[Tiab] OR seahorse[Tiab] OR seahorses[Tiab] OR mugil curema[Tiab] OR atlantic cod[Tiab] OR shark[Tiab] OR sharks[Tiab] OR catshark[Tiab] OR anguilla[Tiab] OR salmonid[Tiab] OR salmonids[Tiab] OR whitefish[Tiab] OR whitefishes[Tiab] OR salmon[Tiab] OR salmons[Tiab] OR sole[Tiab] OR solea[Tiab] OR "sea lamprey"[Tiab] OR lamprey[Tiab] OR lampreys[Tiab] OR pumpkinseed[Tiab] OR sunfish[Tiab] OR sunfishes[Tiab] OR tilapia[Tiab] OR tilapias[Tiab] OR turbot[Tiab] OR turbots[Tiab] OR flatfish[Tiab] OR flatfishes[Tiab] OR sciuridae[Tiab] OR squirrel[Tiab] OR squirrels[Tiab] OR chipmunk[Tiab] OR chipmunks[Tiab] OR suslik[Tiab] OR susliks[Tiab] OR vole[Tiab] OR voles[Tiab] OR lemming[Tiab] OR lemmings[Tiab] OR muskrat[Tiab] OR muskrats[Tiab] OR lemmus[Tiab] OR otter[Tiab] OR otters[Tiab] OR marten[Tiab] OR martens[Tiab] OR martes[Tiab] OR weasel[Tiab] OR badger[Tiab] OR badgers[Tiab] OR ermine[Tiab] OR mink[Tiab] OR minks[Tiab] OR sable[Tiab] OR sables[Tiab] OR gulo[Tiab] OR gulos[Tiab] OR wolverine[Tiab] OR wolverines[Tiab] OR minks[Tiab] OR mustela[Tiab] OR llama[Tiab] OR llamas[Tiab] OR alpaca[Tiab] OR alpacas[Tiab] OR camelid[Tiab] OR camelids[Tiab] OR guanaco[Tiab] OR guanacos[Tiab] OR chiroptera[Tiab] OR chiropteras[Tiab] OR bat[Tiab] OR bats[Tiab] OR fox[Tiab] OR foxes[Tiab] OR iguana[Tiab] OR iguanas[Tiab] OR xenopus laevis[Tiab] OR parakeet[Tiab] OR parakeets[Tiab] OR parrot[Tiab] OR parrots[Tiab] OR donkey[Tiab] OR donkeys[Tiab] OR mule[Tiab] OR mules[Tiab] OR zebra[Tiab] OR zebras[Tiab] OR shrew[Tiab] OR shrews[Tiab] OR bison[Tiab] OR bisons[Tiab] OR buffalo[Tiab] OR buffaloes[Tiab] OR deer[Tiab] OR deers[Tiab] OR bear[Tiab] OR bears[Tiab] OR panda[Tiab] OR pandas[Tiab] OR "wild hog"[Tiab] OR "wild boar"[Tiab] OR fitchew[Tiab] OR fitch[Tiab] OR beaver[Tiab] OR beavers[Tiab] OR jerboa[Tiab] OR jerboas[Tiab] OR capybara[Tiab] OR capybaras[Tiab] OR mammal\*[tiab]) NOT medline[subset]) OR "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr\*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken\*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl\*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge\*[tiab] OR phasianidae[tiab] OR guineafowl\*[tiab] OR numida\*[tiab] OR ostrich\*[tiab] OR struthio[tiab]

Date filter will be applied using relevant dates for the reporting period and the field [Date - Entrez].

## A.2. Search results

### A.2.1. Avian influenza overview August – November 2019

#### Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds in the reporting period

Date of the search: 15/11/2019

Search	Query	Items found
#4	<b>Search</b> #3 AND ("2019/08/15"[Date - Entrez]:"2019/11/15"[Date - Entrez])	138
#3	<b>Search</b> (#1 AND #2)	11879
#2	<b>Search</b> "Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR ((influenza*[tiab] OR flu[tiab]) AND ("virus A" OR "viruses A")) OR "influenza A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR LPAI [tiab] OR IPAIV[tiab] OR AIV[tiab] OR AIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	54454
#1	<b>Search</b> "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge*[tiab] OR phasianidae[tiab] OR guineafowl*[tiab] OR numida*[tiab] OR ostrich*[tiab] OR struthio[tiab]	314057

Final number of results to be screened: 135 (after de-duplication with previous searches)

#### Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

Date of the search 15/11/2019

Search	Query	Items found
#4	<b>Search</b> (#3) AND ("2019/08/15"[Date - Entrez]:"2019/11/15"[Date - Entrez])	118
#3	<b>Search</b> (#2 AND #1)	8690
#2	<b>Search</b> ((high pathogen*[tiab] OR highly pathogen*[tiab] ) AND ("Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR "influenza virus A"[tiab] OR "influenza viruses A"[tiab] OR "influenza A"[tiab] OR "flu virus A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR AIV[tiab] OR AIVs[tiab])) OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	10983
#1	<i>Animals search string adapted from: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117</i> <i>As reported in the protocol</i>	6965105

Final number of results to be screened: 115 (after de-duplication with previous searches)

## A.2.2. Avian influenza overview February – August 2019

### Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds in the reporting period

Date of the search: 19/08/2019

Search	Query	Items found
#4	Search #3 AND ("2019/02/01"[Date - Entrez] : "2019/08/15"[Date - Entrez])	307
#3	Search (#1 AND #2)	11722
#2	Search "Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR ((influenza*[tiab] OR flu[tiab]) AND ("virus A" OR "viruses A")) OR "influenza A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR LPAI [tiab] OR IPAIV[tiab] OR AIV[tiab] OR AIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	53790
#1	Search "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge*[tiab] OR phasianidae[tiab] OR guineafowl*[tiab] OR numida*[tiab] OR ostrich*[tiab] OR struthio[tiab]	311016

Final number of results to be screened: 284 (after de-duplication with previous searches)

### Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

Date of the search 19/08/2019

Search	Query	Items found
#4	Search (#3) AND ("2019/02/01"[Date - Entrez] : "2019/08/15"[Date - Entrez])	259
#3	Search (#2 AND #1)	8561
#2	Search ((high pathogen*[tiab] OR highly pathogen*[tiab] ) AND ("Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR "influenza virus A"[tiab] OR "influenza viruses A"[tiab] OR "influenza A"[tiab] OR "flu virus A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR AIV[tiab] OR AIVs[tiab])) OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	10834
#1	<i>Animals search string adapted from: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117</i> <i>As reported in the protocol</i>	6909627

Final number of results to be screened: 238 (after de-duplication with previous searches)

### A.2.3. Avian influenza overview November 2018 – February 2019

#### Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds in the reporting period

Date of the search: 18/02/2019

Search	Query	Items found
#4	Search #3 AND ("2018/11/15"[Date - Entrez] : "2019/02/15"[Date - Entrez])	117
#3	Search (#1 AND #2)	11408
#2	Search "Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR ((influenza*[tiab] OR flu[tiab]) AND ("virus A" OR "viruses A")) OR "influenza A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR LPAI [tiab] OR IPAIV[tiab] OR AIV[tiab] OR AIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	52522
#1	Search "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge*[tiab] OR phasianidae[tiab] OR guineafowl*[tiab] OR numida*[tiab] OR ostrich*[tiab] OR struthio[tiab]	304322

Final number of results to be screened: 116 (after de-duplication with previous searches)

#### Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

Date of the search 18/02/2019

Search	Query	Items found
#4	Search (#3) AND ("2018/11/15"[Date - Entrez] : "2019/02/15"[Date - Entrez])	108
#3	Search (#2 AND #1)	8299
#2	Search ((high pathogen*[tiab] OR highly pathogen*[tiab] ) AND ("Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR "influenza virus A"[tiab] OR "influenza viruses A"[tiab] OR "influenza A"[tiab] OR "flu virus A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR AIV[tiab] OR AIVs[tiab])) OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	10511
#1	<i>Animals search string adapted from: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117</i> <i>As reported in the protocol</i>	6790084

Final number of results to be screened: 108



#### A.2.4. Avian influenza overview August – November 2018

##### Phenotypic characterisation of HPAI viruses circulating in the EU in domestic and wild birds in the reporting period

Date of the search: 16/11/2018

Search	Query	Items found
#4	<b>Search</b> #3 AND ("2018/08/15"[Date - Entrez] : "2018/11/15"[Date - Entrez])	131
#3	<b>Search</b> (#1 AND #2)	11 273
#2	<b>Search</b> "Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR ((influenza*[tiab] OR flu[tiab]) AND ("virus A" OR "viruses A")) OR "influenza A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR LPAI [tiab] OR IPAIV[tiab] OR AIV[tiab] OR AIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	51 907
#1	<b>Search</b> "Birds"[Mesh] OR bird[tiab] OR birds[tiab] OR aves[tiab] OR "avian population"[tiab] OR "avian populations"[tiab] OR poultr*[tiab] OR fowl[tiab] OR fowls[tiab] OR chicken*[tiab] OR "gallus gallus"[tiab] OR "g gallus"[tiab] OR waterfowl*[tiab] OR duck[tiab] OR ducks[tiab] OR anatidae[tiab] OR mallard[tiab] OR mallards[tiab] OR swan[tiab] OR swans[tiab] OR "Anas platyrhynchos"[tiab] OR "A platyrhynchos"[tiab] OR geese[tiab] OR goose[tiab] OR anser[tiab] OR turkey[tiab] OR turkeys[tiab] OR meleagris[tiab] OR quail[tiab] OR quails[tiab] OR coturnix[tiab] OR partridge*[tiab] OR phasianidae[tiab] OR guineafowl*[tiab] OR numida*[tiab] OR ostrich*[tiab] OR struthio[tiab]	301 405

Final number of results to be screened: 131

##### Phenotypic and genetic characterisation of HPAI viruses circulating on other continents in domestic or wild birds or mammals (excluding humans)

Date of the search: 16/11/2018

Search	Query	Items found
#4	<b>Search</b> (#3) AND ("2018/08/15"[Date - Entrez] : "2018/11/15"[Date - Entrez])	123
#3	<b>Search</b> (#2 AND #1)	8 178
#2	<b>Search</b> ((high pathogen*[tiab] OR highly pathogen*[tiab] ) AND ("Influenza in Birds"[Mesh] OR "Influenzavirus A"[Mesh] OR (avian[tiab] AND (influenza*[tiab]OR flu[tiab])) OR "influenza in bird"[tiab] OR "influenza in birds"[tiab] OR "bird flu"[tiab] OR "birds flu"[tiab] OR bird influenza*[tiab] OR "birds influenza"[tiab] OR "influenza virus A"[tiab] OR "influenza viruses A"[tiab] OR "influenza A"[tiab] OR "flu virus A"[tiab] OR "flu A"[tiab] OR "influenzavirus A"[tiab] OR "fluvirus A"[tiab] OR AIV[tiab] OR AIVs[tiab])) OR HPAI[tiab] OR HPAIV[tiab] OR HPAIVs[tiab] OR H5N*[tiab] OR H7N*[tiab] OR H9N*[tiab] OR AH5N*[tiab] OR AH7N*[tiab] OR AH9N*[tiab]	10 352
#1	<i>Animals search string adapted from: Hooijmans CR, Tillema A, Leenaars M and Ritskes-Hoitinga M, 2010. Enhancing search efficiency by means of a search filter for finding all studies on animal experimentation in PubMed. Lab Anim, 44, 170-175. doi:10.1258/la.2010.009117</i> <i>As reported in the protocol</i>	6 729 856

Final number of results to be screened: 122