

# Risk assessment of acquiring Avian Influenza from Poultry Products: References

- Abd El-Hack, M.E., El-Saadony, Mohamed.T., Alqhtani, A.H., Swelum, A.A., Salem, H.M., Elbestawy, Ahmed.R., Noreldin, A.E., Babalghith, A.O., Khafaga, A.F., Hassan, M.I., El-Tarabily, K.A., 2022. The relationship among avian influenza, gut microbiota and chicken immunity: an updated overview. *Poult. Sci.* 101, 102021.  
<https://doi.org/10.1016/j.psj.2022.102021>
- ACMSF, 2020. Fixed-term group on multidimensional representation of risks.
- ACMSF, 2015. Assessment of the risk of avian influenza viruses via the food chain.
- Air Products, 2018. Your in-depth guide to modified atmosphere packaging.
- APHA, 2023. [Confirmed findings of influenza of avian origin in non-avian wildlife \[WWW Document\]. GOV.UK.](#) URL (accessed 2.8.23).
- APHA, 2022a. Rapid Risk Assessment for spread of Highly Pathogenic Avian Influenza (HPAI) H5N1 from wild birds to poultry from the shooting of wild waterfowl and wild game (including formerly captive) birds.
- APHA, 2022b. [Bird flu \(avian influenza\): cases in wild birds \[WWW Document\]. GOV.UK.](#) URL (accessed 12.16.22).
- APHA, 2018. Guidance on Legislation Covering the Marketing of Eggs.
- Barrow, P., Nair, V., Baigent, S., Atterbury, R., Clark, M., 2021. *Poultry Health: A Guide for Professionals.* CABI.
- [BASC, 2022. Wildfowling. Br. Assoc. Shoot. Conserv.](#) (accessed 12.12.22).
- [BASC, Quarry Species & Shooting Seasons. Quarry species & shooting seasons.](#) Br. Assoc. Shoot. Conserv. URL (accessed 12.16.22).
- Bauer, N., Dearfield, K., Dennis, S., Disney, W.T., Forsythe, K., Latimer, H.E., Malladi, S., Potter, M., Ramirez, G., 2010. Interagency Risk Assessment for the Public Health Impact of Highly Pathogenic Avian Influenza Virus in Poultry, Shell Eggs, and Egg Products 164.
- Bean, W.J., Kawaoka, Y., Wood, J.M., Pearson, J.E., Webster, R.G., 1985. Characterization of virulent and avirulent A/chicken/Pennsylvania/83 influenza A viruses: potential role of defective interfering RNAs in nature. *J. Virol.* 54, 151–160.  
<https://doi.org/10.1128/JVI.54.1.151-160.1985>
- Beato, M.S., Mancin, M., Bertoli, E., Buratin, A., Terregino, C., Capua, I., 2012. Infectivity of H7 LP and HP influenza viruses at different temperatures and pH and persistence of H7 HP virus in poultry meat at refrigeration temperature. *Virology* 433, 522–527.  
<https://doi.org/10.1016/j.virol.2012.08.009>
- Beauclercq, S., Mignon-Grasteau, S., Petit, A., Berger, Q., Lefèvre, A., Métayer-Coustard, S., Tesseraud, S., Emond, P., Berri, C., Le Bihan-Duval, E., 2022. A Divergent Selection on Breast Meat Ultimate pH, a Key Factor for Chicken Meat Quality, is Associated With Different Circulating Lipid Profiles. *Front. Physiol.* 13.
- Bergervoet, S.A., Germeraad, E.A., Alders, M., Roose, M.M., Engelsma, M.Y., Heutink, R., Bouwstra, R., Fouchier, R.A.M., Beerens, N., 2019. Susceptibility of Chickens to Low Pathogenic Avian Influenza (LPAI) Viruses of Wild Bird– and Poultry–Associated Subtypes. *Viruses* 11, 1010. <https://doi.org/10.3390/v11111010>
- Bertran, K., Dolz, R., Majó, N., 2014. Pathobiology of avian influenza virus infection in minor gallinaceous species: a review. *Avian Pathol.* 43, 9–25.  
<https://doi.org/10.1080/03079457.2013.876529>
- Bertran, K., Lee, D.-H., Criado, M.F., Smith, D., Swayne, D.E., Pantin-Jackwood, M.J., 2018. Pathobiology of Tennessee 2017 H7N9 low and high pathogenicity avian influenza viruses in commercial broiler breeders and specific pathogen free layer chickens. *Vet. Res.*

- 49, 82. <https://doi.org/10.1186/s13567-018-0576-0>
- Bertran, K., Pérez-Ramírez, E., Busquets, N., Dolz, R., Ramis, A., Darji, A., Abad, F.X., Valle, R., Chaves, A., Vergara-Alert, J., Barral, M., Höfle, U., Majó, N., 2011. Pathogenesis and transmissibility of highly (H7N1) and low (H7N9) pathogenic avian influenza virus infection in red-legged partridge (*Alectoris rufa*). *Vet. Res.* 42, 24. <https://doi.org/10.1186/1297-9716-42-24>
  - Bertran, K., Swayne, D.E., 2014. High doses of highly pathogenic avian influenza virus in chicken meat are required to infect ferrets. *Vet. Res.* 45, 60. <https://doi.org/10.1186/1297-9716-45-60>
  - [Bird flu \(avian influenza\) movement licences, 2022. Bird flu \(avian influenza\) movement licences \[WWW Document\]. GOV.UK.](#) (accessed 11.29.22).
  - Bordes, L., Vreman, S., Heutink, R., Roose, M., Venema, S., Pritz-Verschuren, S.B.E., Rijks, J.M., Gonzales, J.L., Germeraad, E.A., Engelsma, M., Beerens, N., 2023. Highly Pathogenic Avian Influenza H5N1 Virus Infections in Wild Red Foxes (*Vulpes vulpes*) Show Neurotropism and Adaptive Virus Mutations. *Microbiol. Spectr.* 11, e02867-22. <https://doi.org/10.1128/spectrum.02867-22>
  - Bosch, A., Gkogka, E., Le Guyader, F.S., Loisy-Hamon, F., Lee, A., van Lieshout, L., Marthi, B., Myrmeel, M., Sansom, A., Schultz, A.C., Winkler, A., Zuber, S., Phister, T., 2018. Foodborne viruses: Detection, risk assessment, and control options in food processing. *Int. J. Food Microbiol.* 285, 110–128. <https://doi.org/10.1016/j.ijfoodmicro.2018.06.001>
  - British Lion Eggs, 2022. UK Egg Industry Data | Official Egg Info [WWW Document]. URL <https://www.egginfo.co.uk/egg-facts-and-figures/industry-information/da...> (accessed 11.24.22).
  - British Lion Eggs, n.d. [British Lion Eggs | What Does the Lion Stamp Mean | Egg Info](#) [WWW Document]. (accessed 12.28.22a).
  - British Lion Eggs, n.d. [Egg Codes | Egg Facts | Egg Info](#) [WWW Document]. (accessed 1.10.23b).
  - Brookes, S.M., Mansfield, K.L., Reid, S.M., Coward, V., Warren, C., Seekings, J., Brough, T., Gray, D., Núñez, A., Brown, I.H., 2022. Incursion of H5N8 high pathogenicity avian influenza virus (HPAIV) into gamebirds in England. *Epidemiol. Infect.* 150, e51. <https://doi.org/10.1017/S0950268821002740>
  - Brown, J.D., Goekjian, G., Poulson, R., Valeika, S., Stallknecht, D.E., 2009. Avian influenza virus in water: infectivity is dependent on pH, salinity and temperature. *Vet. Microbiol.* 136, 20–26. <https://doi.org/10.1016/j.vetmic.2008.10.027>
  - Busquets, N., Abad, F.X., Alba, A., Dolz, R., Allepuz, A., Rivas, R., Ramis, A., Darji, A., Majó, N., 2010, 2010. Persistence of highly pathogenic avian influenza virus (H7N1) in infected chickens: feather as a suitable sample for diagnosis. *J. Gen. Virol.* 91, 2307–2313. <https://doi.org/10.1099/vir.0.021592-0>
  - Byrne, A.M.P., Reid, S.M., Seekings, A.H., Núñez, A., Obeso Prieto, A.B., Ridout, S., Warren, C.J., Puranik, A., Ceeraz, V., Essen, S., Slomka, M.J., Banks, J., Brown, I.H., Brookes, S.M., 2021. H7N7 Avian Influenza Virus Mutation from Low to High Pathogenicity on a Layer Chicken Farm in the UK. *Viruses* 13, 259. <https://doi.org/10.3390/v13020259>
  - Cappucci, D.T., Johnson, D.C., Brugh, M., Smith, T.M., Jackson, C.F., Pearson, J.E., Senne, D.A., 1985. Isolation of Avian Influenza Virus (Subtype H5N2) from Chicken Eggs during a Natural Outbreak. *Avian Dis.* 29, 1195. <https://doi.org/10.2307/1590473>
  - CDC, 2023. [H5N1 Update: Two Human H5N1 Cases in Cambodia](#) [WWW Document]. *Cent. Dis. Control Prev.* URL (accessed 3.1.23).
  - CDC, 2022a. [Prevention and Antiviral Treatment of Bird Flu Viruses in People | Avian Influenza \(Flu\)](#) [WWW Document]. (accessed 12.16.22).
  - CDC, 2022b. [Influenza Type A Viruses](#) [WWW Document]. *Cent. Dis. Control Prev.* (accessed 1.6.23).
  - CDC, 2022c. [Reported Human Infections with Avian Influenza A Viruses](#) [WWW Document]. (accessed 1.5.23).
  - CDC, 2022d. [Avian Influenza A Virus Infections in Humans](#) [WWW Document]. *Cent. Dis. Control Prev.* (accessed 12.16.22).

- Center for Food Security and Public Health, 2022. Avian Influenza.
- Chmielewski, R.A., Beck, J.R., Swayne, D.E., 2013. Evaluation of the U.S. Department of Agriculture's Egg Pasteurization Processes on the Inactivation of High-Pathogenicity Avian Influenza Virus and Velogenic Newcastle Disease Virus in Processed Egg Products. *J. Food Prot.* 76, 640–645. <https://doi.org/10.4315/0362-028X.JFP-12-369>
- Dai, M., Yan, N., Huang, Y., Zhao, L., Liao, M., 2022. Survivability of highly pathogenic avian influenza virus on raw chicken meat in different environmental conditions. *Lancet Microbe* 3, e92. [https://doi.org/10.1016/S2666-5247\(21\)00333-5](https://doi.org/10.1016/S2666-5247(21)00333-5)
- de Graaf, M., Fouchier, R.A.M., 2014. Role of receptor binding specificity in influenza A virus transmission and pathogenesis. *EMBO J.* 33, 823–841. <https://doi.org/10.1002/emboj.201387442>
- De Nardi, M., Hill, A., von Dobschuetz, S., Munoz, O., Kosmider, R., Dewe, T., Harris, K., Freidl, G., Stevens, K., van der Meulen, K., Stærk, K. d. c., Breed, A., Meijer, A., Koopmans, M., Havelaar, A., van der Werf, S., Banks, J., Wieland, B., van Reeth, K., Dauphin, G., Capua, I., Consortium, the F., 2014. Development of a risk assessment methodological framework for potentially pandemic influenza strains (FLURISK). *EFSA Support. Publ.* 11, 571E. <https://doi.org/10.2903/sp.efsa.2014.EN-571>
- de Wit, J., Fabri, T., Hoogkamer, A., 2004. Survival of Avian Influenza Virus on Eggs. Animal Health Service. Sector Research and Development Poultry Health.
- Defra, 2023a. Highly pathogenic avian influenza (HPAI) in the UK and Europe.
- Defra, 2023b. [Latest poultry and poultry meat statistics](#) [WWW Document]. GOV.UK. (accessed 2.9.23).
- Defra, 2022a. [Bird flu: rules in disease control and prevention zones in England](#) [WWW Document]. GOV.UK. (accessed 1.9.23).
- Defra, 2022b. [Monthly statistics on the activity of UK hatcheries and UK poultry slaughterhouses \(data for October 2022\)](#) [WWW Document]. GOV.UK. (accessed 11.21.22).
- Defra, 2021. [Avian influenza \(bird flu\): epidemiology reports](#) [WWW Document]. GOV.UK. (accessed 1.5.23).
- Defra, 2017a. [Avian influenza \(bird flu\) controls: Rules on meat produced from poultry and farmed game birds originating in Protection Zone\(s\)](#) [WWW Document]. (accessed 12.2.22).
- Defra, 2017b. Highly Pathogenic Avian Influenza H5N8: Lessons identified from the December 2016 to June 2017 outbreak 31.
- Defra, 2011. Poultrymeat Quality Guide.
- DHSC, 2013. [Diet and nutrition survey of infants and young children, 2011](#) [WWW Document]. GOV.UK. (accessed 2.7.22).
- EFSA, 2023. Avian influenza overview September – December 2022. *EFSA J.* 21, e07786. <https://doi.org/10.2903/j.efsa.2023.7786>
- EFSA, 2014. [Scientific Opinion on the public health risks of table eggs due to deterioration and development of pathogens](#) | EFSA [WWW Document]. (accessed 12.28.22).
- EFSA, 2006. Scientific Report of the Scientific Panel on Biological Hazards on “Food as a possible source of infection with highly pathogenic avian influenza viruses for humans and other mammals.” *EFSA J.* <https://doi.org/10.2903/j.efsa.2006.74r>
- EFSA, E.F.S., European Centre for Disease Prevention and Control, Influenza, E.U.R.L. for A., Adlhoch, C., Fusaro, A., Gonzales, J.L., Kuiken, T., Marangon, S., Niqueux, É., Staubach, C., Terregino, C., Aznar, I., Guajardo, I.M., Baldinelli, F., 2022. Avian influenza overview March – June 2022. *EFSA J.* 20, e07415. <https://doi.org/10.2903/j.efsa.2022.7415>
- EFSA, Gonzales, J.L., Roberts, H., Smietanka, K., Baldinelli, F., Ortiz?Pelaez, A., Verdonck, F., 2018. Assessment of low pathogenic avian influenza virus transmission via raw poultry meat and raw table eggs. *EFSA J.* 16. <https://doi.org/10.2903/j.efsa.2018.5431>
- Ejaz, R., Ahmed, Z., Siddique, N., Naeem, K., 2007. Chicken Meat as a Source of Avian Influenza Virus Persistence and Dissemination. *Int. J. Poult. Sci.* 6, 871–874. <https://doi.org/10.3923/ijps.2007.871.874>

- EXD249(HPAI)(EW), 2022. [General licence for the movement of poultry meat from poultry originating in a protection zone or originating from an area that subsequently becomes a protection zone \(EXD249\(HPAI\)\(EW\)\)](#) [WWW Document]. GOV.UK. (accessed 11.29.22).
- Fernandes, R.T.V., Arruda, A.M.V., Melo, A.S., Marinho, J.B.M., Fernandes, R.T.V., Figueiredo, L.C., 2016. Chemical Composition and pH of the Meat of Broilers Submitted to Pre-Slaughter Heat Stress. *J. Anim. Behav. Biometeorol.* 4, 93–95. <https://doi.org/10.14269/2318-1265/jabb.v4n4p93-95>
- Fouchier, R.A.M., Schneeberger, P.M., Rozendaal, F.W., Broekman, J.M., Kemink, S.A.G., Munster, V., Kuiken, T., Rimmelzwaan, G.F., Schutten, M., van Doornum, G.J.J., Koch, G., Bosman, A., Koopmans, M., Osterhaus, A.D.M.E., 2004. Avian influenza A virus (H7N7) associated with human conjunctivitis and a fatal case of acute respiratory distress syndrome. *Proc. Natl. Acad. Sci. U. S. A.* 101, 1356–1361. <https://doi.org/10.1073/pnas.0308352100>
- Freath, L., Bacigalupo, S., Bronw, I., Banyard, A., Pacey, A., Gale, P., Perrin, L., 2022. Highly pathogenic avian influenza (HPAI) in the UK and Europe: 14 October 2022.
- FSA, 2022a. [Home food fact checker](#) [WWW Document]. Food Stand. Agency. (accessed 12.28.22).
- FSA, 2022b. Manual for Official Controls. Chapter 6 Notifiable Diseases.
- FSA, 2021. Food and You 2 - Wave 2 [WWW Document]. Food Stand. Agency. <https://doi.org/10.46756/sci.fsa.dws750>
- FSA, F., 2015. [Wild game guidance](#) [WWW Document]. Food Stand. Agency. (accessed 12.19.22).
- Gaide, N., Foret-Lucas, C., Figueroa, T., Vergne, T., Lucas, M.-N., Robertet, L., Souvestre, M., Croville, G., Le Loc'h, G., Delverdier, M., Guérin, J.-L., 2021. Viral tropism and detection of clade 2.3.4.4b H5N8 highly pathogenic avian influenza viruses in feathers of ducks and geese. *Sci. Rep.* 11, 5928. <https://doi.org/10.1038/s41598-021-85109-5>
- GFA | [Game Farming in The UK](#) [WWW Document], n.d. (accessed 12.16.22).
- GFA, G., 2021. [Standing advice on bird flu and gamebirds](#) [WWW Document]. (accessed 12.19.22).
- Golden, N.J., Schlosser, W.D., Ebel, E.D., 2009. Risk Assessment to Estimate the Probability of a Chicken Flock Infected with H5N1 Highly Pathogenic Avian Influenza Virus Reaching Slaughter Undetected. *Foodborne Pathog. Dis.* 6, 827–835. <https://doi.org/10.1089/fpd.2008.0253>
- GOV.UK, 2022a. [Poultry \(including game birds\): registration rules and forms](#) [WWW Document]. GOV.UK. (accessed 1.9.23).
- GOV.UK, 2022b. [Bird flu: rules if you keep game birds](#) [WWW Document]. GOV.UK. (accessed 12.19.22).
- GOV.UK, 2022c. [Avian influenza: Housing order to be introduced across England](#) [WWW Document]. GOV.UK. (accessed 12.28.22).
- Guan, J., Chan, M., Brooks, B.W., Rohonczy, E., 2015. Enhanced inactivation of avian influenza virus at 20°C by disinfectants supplemented with calcium chloride or other antifreeze agents. *Can. J. Vet. Res.* 79, 347–350.
- Guidance on Temperature Control in Food Premises, n.d.
- Harder, Buda, S., Hengel, H., Beer, M., Mettenleiter, T.C., 2016. Poultry food products—a source of avian influenza virus transmission to humans? *Clin. Microbiol. Infect.* 22, 141–146. <https://doi.org/10.1016/j.cmi.2015.11.015>
- Harris, K.A., Freidl, G.S., Munoz, O.S., von Dobschuetz, S., De Nardi, M., Wieland, B., Koopmans, M.P.G., Stärk, K.D.C., van Reeth, K., Dauphin, G., Meijer, A., de Bruin, E., Capua, I., Hill, A.A., Kosmider, R., Banks, J., Stevens, K., van der Werf, S., Enouf, V., van der Meulen, K., Brown, I.H., Alexander, D.J., Breed, A.C., the FLURISK Consortium, 2017. Epidemiological Risk Factors for Animal Influenza A Viruses Overcoming Species Barriers. *EcoHealth* 14, 342–360. <https://doi.org/10.1007/s10393-017-1244-y>
- Hauck, R., Crossley, B., Rejmanek, D., Zhou, H., Gallardo, R.A., 2017. Persistence of Highly Pathogenic and Low Pathogenic Avian Influenza Viruses in Footbaths and Poultry Manure. *Avian Dis.* 61, 64–69.

- HSE, H., 2018. Avoiding the risk of infection when working with poultry that is suspected of having H5 or H7 notifiable avian influenza.
- Hutchinson, E.C., 2018. Influenza Virus. *Trends Microbiol.* 26, 809–810. <https://doi.org/10.1016/j.tim.2018.05.013>
- Kabir, Md.H., Miyaoka, Y., Hasan, Md.A., Yamaguchi, M., Shoham, D., Murakami, H., Takehara, K., 2021. Synergistic effects of quaternary ammonium compounds and food additive grade calcium hydroxide on microbicidal activities at low temperatures. *J. Vet. Med. Sci.* 83, 1820–1825. <https://doi.org/10.1292/jvms.21-0275>
- Karunakaran, A.C., Murugkar, H.V., Kumar, M., Nagarajan, S., Tosh, C., Pathak, A., Mekhemadhom Rajendrakumar, A., Agarwal, R.K., 2019. Survivability of highly pathogenic avian influenza virus (H5N1) in naturally preened duck feathers at different temperatures. *Transbound. Emerg. Dis.* 66, 1306–1313. <https://doi.org/10.1111/tbed.13148>
- Keawcharoen, J., Oraveerakul, K., Kuiken, T., Fouchier, R.A.M., Amonsin, A., Payungporn, S., Noppornpanth, S., Wattanodorn, S., Theamboonlers, A., Tantilertcharoen, R., Pattanarangsarn, R., Arya, N., Ratanakorn, P., Osterhaus, A.D.M.E., Poovorawan, Y., 2004. Avian Influenza H5N1 in Tigers and Leopards. *Emerg. Infect. Dis.* 10, 2189–2191. <https://doi.org/10.3201/eid1012.040759>
- Keeler, S.P., Dalton, M.S., Cressler, A.M., Berghaus, R.D., Stallknecht, D.E., 2014. Abiotic factors affecting the persistence of avian influenza virus in surface waters of waterfowl habitats. *Appl. Environ. Microbiol.* 80, 2910–2917. <https://doi.org/10.1128/AEM.03790-13>
- Kuiken, T., Rimmelzwaan, G., van Riel, D., van Amerongen, G., Baars, M., Fouchier, R., Osterhaus, A., 2004. Avian H5N1 Influenza in Cats. *Science* 306, 241–241. <https://doi.org/10.1126/science.1102287>
- Limsuwat, N., Suptawiwat, O., Boonarkart, C., Puthavathana, P., Auewarakul, P., Wiriyarat, W., 2014. Susceptibility of human and avian influenza viruses to human and chicken saliva. *J. Med. Virol.* 86, 872–878. <https://doi.org/10.1002/jmv.23751>
- Limsuwat, N., Suptawiwat, O., Boonarkart, C., Puthavathana, P., Wiriyarat, W., Auewarakul, P., 2016. Sialic acid content in human saliva and anti-influenza activity against human and avian influenza viruses. *Arch. Virol.* 161, 649–656. <https://doi.org/10.1007/s00705-015-2700-z>
- Liu, W.J., Xiao, H., Dai, L., Liu, D., Chen, J., Qi, X., Bi, Y., Shi, Y., Gao, G.F., Liu, Y., 2021. Avian influenza A (H7N9) virus: from low pathogenic to highly pathogenic. *Front. Med.* 15, 507–527. <https://doi.org/10.1007/s11684-020-0814-5>
- [Love Food Hate Waste, 2022. Poultry](#) (for example, chicken and turkey) [WWW Document]. *Love Food Hate Waste*. (accessed 1.17.23).
- Lu, H., Dunn, P.A., Wallner-Pendleton, E.A., Henzler, D.J., Kradel, D.C., Liu, J., Shaw, D.P., Miller, P., 2004. Investigation of H7N2 Avian Influenza Outbreaks in Two Broiler Breeder Flocks in Pennsylvania, 2001–02. *Avian Dis.* 48, 26–33. <https://doi.org/10.1637/6063>
- Mallapaty, S., 2023. Girl who died of bird flu did not have widely-circulating variant. *Nature*. <https://doi.org/10.1038/d41586-023-00585-1>
- More, S., Bicout, D., Bøtner, A., Butterworth, A., Calistri, P., Depner, K., Edwards, S., Garin ?Bastuji, B., Good, M., Gortázar Schmidt, C., Michel, V., Miranda, M.A., Nielsen, S.S., Raj, M., Sihvonen, L., Spoolder, H., Thulke, H., Velarde, A., Willeberg, P., Winckler, C., Breed, A., Brouwer, A., Guillemain, M., Harder, T., Monne, I., Roberts, H., Baldinelli, F., Barrucci, F., Fabris, C., Martino, L., Mosbach?Schulz, O., Verdonck, F., Morgado, J., Stegeman, J.A., 2017. Avian influenza. *EFSA J.* 15, e04991. <https://doi.org/10.2903/j.efsa.2017.4991>
- NADIS, N., 2016. [NADIS Animal Health Skills - Avian Influenza](#) [WWW Document]. (accessed 1.17.23).
- Nazir, J., Haumacher, R., Ike, A.C., Marschang, R.E., 2011. Persistence of Avian Influenza Viruses in Lake Sediment, Duck Feces, and Duck Meat ?. *Appl. Environ. Microbiol.* 77, 4981–4985. <https://doi.org/10.1128/AEM.00415-11>
- Ngunjiri, J.M., Taylor, K.J.M., Ji, H., Abundo, M.C., Ghorbani, A., KC, M., Lee, C.-W., 2021. Influenza A virus infection in turkeys induces respiratory and enteric bacterial dysbiosis correlating with cytokine gene expression. *PeerJ* 9, e11806.

<https://doi.org/10.7717/peerj.11806>

- NHS, 2018. [Bird flu](#) [WWW Document]. nhs.uk. (accessed 1.6.23).
- O'Brien, B., Goodridge, L., Ronholm, J., Nasheri, N., 2021. Exploring the potential of foodborne transmission of respiratory viruses. *Food Microbiol.* 95, 103709. <https://doi.org/10.1016/j.fm.2020.103709>
- Oliver, I., Roberts, J., Brown, C.S., Byrne, A.M., Mellon, D., Hansen, R.D., Banyard, A.C., James, J., Donati, M., Porter, R., Ellis, J., Cogdale, J., Lackenby, A., Chand, M., Dabrera, G., Brown, I.H., Zambon, M., 2022. A case of avian influenza A(H5N1) in England, January 2022. *Euro Surveill. Bull. Eur. Sur Mal. Transm. Eur. Commun. Dis. Bull.* 27, 2200061. <https://doi.org/10.2807/1560-7917.ES.2022.27.5.2200061>
- Ota, M., Toyofuku, C., Thammakarn, C., Sangsriratanakul, N., Yamada, M., Nakajima, K., Kitazawa, M., Hakim, H., Alam, M.S., Shoham, D., Takehara, K., 2016. Calcinated egg shell as a candidate of biosecurity enhancement material. *J. Vet. Med. Sci.* 78, 831–836. <https://doi.org/10.1292/jvms.16-0004>
- Pantin-Jackwood, M.J., Stephens, C.B., Bertran, K., Swayne, D.E., Spackman, E., 2017. The pathogenesis of H7N8 low and highly pathogenic avian influenza viruses from the United States 2016 outbreak in chickens, turkeys and mallards. *PLoS ONE* 12, e0177265. <https://doi.org/10.1371/journal.pone.0177265>
- Peng, Xiuming, Liu, F., Wu, H., Peng, Xiaorong, Xu, Y., Wang, L., Chen, B., Sun, T., Yang, F., Ji, S., Wu, N., 2018. Amino Acid Substitutions HA A150V, PA A343T, and PB2 E627K Increase the Virulence of H5N6 Influenza Virus in Mice. *Front. Microbiol.* 9, 453. <https://doi.org/10.3389/fmicb.2018.00453>
- PHE, FSA, 2020. [NDNS: results from years 9 to 11 \(2016 to 2017 and 2018 to 2019\)](#) [WWW Document]. GOV.UK. (accessed 2.7.22).
- PHE, FSA, 2018. [NDNS: results from years 7 and 8 \(combined\)](#) [WWW Document]. GOV.UK. (accessed 2.7.22).
- PHE, FSA, 2016. [NDNS: results from Years 5 and 6 \(combined\)](#) [WWW Document]. GOV.UK. (accessed 2.7.22).
- PHE, FSA, 2014. [NDNS: results from Years 1 to 4 \(combined\)](#) [WWW Document]. GOV.UK. (accessed 2.7.22).
- Pillai, S.P.S., Saif, Y.M., Lee, C.W., 2010. Detection of Influenza A Viruses in Eggs Laid by Infected Turkeys. *Avian Dis.* 54, 830–833.
- Post, J., Burt, D.W., Cornelissen, J.B., Broks, V., van Zoelen, D., Peeters, B., Rebel, J.M., 2012. Systemic virus distribution and host responses in brain and intestine of chickens infected with low pathogenic or high pathogenic avian influenza virus. *Virology* 9, 61. <https://doi.org/10.1186/1743-422X-9-61>
- Promkuntod, N., Antarasena, C., Prommuang, Porntip, Prommuang, Praisorn, 2006. Isolation of Avian Influenza Virus A Subtype H5N1 from Internal Contents (Albumen and Allantoic Fluid) of Japanese Quail ( *Coturnix coturnix japonica* ) Eggs and Oviduct during a Natural Outbreak. *Ann. N. Y. Acad. Sci.* 1081, 171–173. <https://doi.org/10.1196/annals.1373.020>
- Qi, X., Tan, D., Wu, C., Tang, C., Li, T., Han, X., Wang, Jing, Liu, C., Li, R., Wang, Jingyu, 2016. Deterioration of eggshell quality in laying hens experimentally infected with H9N2 avian influenza virus. *Vet. Res.* 47, 35. <https://doi.org/10.1186/s13567-016-0322-4>
- Reg (EC) 852/2004, E., 2004. [Regulation \(EC\) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs](#) [WWW Document]. (accessed 12.19.22).
- Reg (EC) 853/2004, E., 2004. [Regulation \(EC\) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin](#) [WWW Document]. (accessed 12.12.22).
- Reperant, L.A., van de Bildt, M.W.G., van Amerongen, G., Leijten, L.M.E., Watson, S., Palser, A., Kellam, P., Eissens, A.C., Frijlink, H.W., Osterhaus, A.D.M.E., Kuiken, T., 2012. Marked endotheliotropism of highly pathogenic avian influenza virus H5N1 following intestinal inoculation in cats. *J. Virol.* 86, 1158–1165. <https://doi.org/10.1128/JVI.06375-11>

- Rice, E.W., Adcock, N.J., Sivaganesan, M., Brown, J.D., Stallknecht, D.E., Swayne, D.E., 2007. Chlorine Inactivation of Highly Pathogenic Avian Influenza Virus (H5N1). *Emerg. Infect. Dis.* 13, 1568–1570. <https://doi.org/10.3201/eid1310.070323>
- Roy Chowdhury, I., Yeddula, S.G.R., Kim, S.-H., 2019. Pathogenicity and Transmissibility of North American H7 Low Pathogenic Avian Influenza Viruses in Chickens and Turkeys. *Viruses* 11, 163. <https://doi.org/10.3390/v11020163>
- Samanta, I., Bandyopadhyay, S., 2017. Infectious Diseases. *Pet Bird Dis. Care* 13–166. [https://doi.org/10.1007/978-981-10-3674-3\\_2](https://doi.org/10.1007/978-981-10-3674-3_2)
- Shahid, M.A., Abubakar, M., Hameed, S., Hassan, S., 2009. Avian influenza virus (H5N1); effects of physico-chemical factors on its survival. *Virolog. J.* 6, 38. <https://doi.org/10.1186/1743-422X-6-38>
- Shibata, A., Okamatsu, M., Sumiyoshi, R., Matsuno, K., Wang, Z.-J., Kida, H., Osaka, H., Sakoda, Y., 2018. Repeated detection of H7N9 avian influenza viruses in raw poultry meat illegally brought to Japan by international flight passengers. *Virology* 524, 10–17. <https://doi.org/10.1016/j.virol.2018.08.001>
- Shinya, K., Makino, A., Tanaka, H., Hatta, M., Watanabe, T., Le, M.Q., Imai, H., Kawaoka, Y., 2011. Systemic Dissemination of H5N1 Influenza A Viruses in Ferrets and Hamsters after Direct Intra-gastric Inoculation ?. *J. Virol.* 85, 4673–4678. <https://doi.org/10.1128/JVI.00148-11>
- Shu, Y., Li, C.K., Li, Z., Gao, R., Liang, Q., Zhang, Y., Dong, L., Zhou, J., Dong, J., Wang, D., Wen, L., Wang, M., Bai, T., Li, D., Dong, X., Yu, H., Yang, W., Wang, Y., Feng, Z., McMichael, A.J., Xu, X., 2010. Avian Influenza A(H5N1) Viruses Can Directly Infect and Replicate in Human Gut Tissues. *J. Infect. Dis.* 201, 1173–1177. <https://doi.org/10.1086/651457>
- Skufca, J., Bell, L., Molino, J.C.P., Saulo, D., Lee, C.-K., Otsu, S., Co, K.C., Chiew, M., Leuangvilay, P., Patel, S., Khalakdina, A., Ieng, V., Matsui, T., Olowokure, B., 2022. An epidemiological overview of human infections with HxNy avian influenza in the Western Pacific Region, 2003–2022. *West. Pac. Surveill. Response J.* 13. <https://doi.org/10.5365/wpsar.2022.13.4.987>
- Sonthipet, S., Ruenphet, S., Takehara, K., 2018. Bactericidal and virucidal efficacies of potassium monopersulfate and its application for inactivating avian influenza virus on virus-spiked clothes. *J. Vet. Med. Sci.* 80, 568–573. <https://doi.org/10.1292/jvms.17-0599>
- Spackman, E., 2020. A Brief Introduction to Avian Influenza Virus. *Methods Mol. Biol.* Clifton NJ 2123, 83–92. [https://doi.org/10.1007/978-1-0716-0346-8\\_7](https://doi.org/10.1007/978-1-0716-0346-8_7)
- Steel, J., Lowen, A.C., Mubareka, S., Palese, P., 2009. Transmission of Influenza Virus in a Mammalian Host Is Increased by PB2 Amino Acids 627K or 627E/701N. *PLOS Pathog.* 5, e1000252. <https://doi.org/10.1371/journal.ppat.1000252>
- Swayne, D., 2022. [Avian Influenza](#) [WWW Document]. MSD Vet. Man. (accessed 1.6.23).
- Swayne, D.E., 2006. Microassay for measuring thermal inactivation of H5N1 high pathogenicity avian influenza virus in naturally infected chicken meat. *Int. J. Food Microbiol.* 108, 268–271. <https://doi.org/10.1016/j.ijfoodmicro.2005.08.032>
- Swayne, D.E., Beck, J.R., 2005. Experimental study to determine if low-pathogenicity and high-pathogenicity avian influenza viruses can be present in chicken breast and thigh meat following intranasal virus inoculation. *Avian Dis.* 49, 81–85. <https://doi.org/10.1637/7260-081104R>
- Swayne, D.E., Beck, J.R., 2004. Heat inactivation of avian influenza and Newcastle disease viruses in egg products. *Avian Pathol.* 33, 512–518. <https://doi.org/10.1080/03079450400003692>
- Swayne, D.E., Eggert, D., Beck, J.R., 2012. Reduction of high pathogenicity avian influenza virus in eggs from chickens once or twice vaccinated with an oil-emulsified inactivated H5 avian influenza vaccine. *Vaccine* 30, 4964–4970. <https://doi.org/10.1016/j.vaccine.2012.05.041>
- [The Avian Influenza and Influenza of Avian Origin in Mammals \(England\) \(No.2\) Order 2006](#), E., 2006. [The Avian Influenza and Influenza of Avian Origin in Mammals \(England\) \(No.2\) Order 2006](#) [WWW Document]. (accessed 12.14.22).

- [The Eggs and Chicks \(England\) Regulations 2009](#) [WWW Document], n.d. (accessed 12.28.22).
- [The Food Safety and Hygiene \(England\) Regulations 2013](#) [WWW Document], n.d. (accessed 3.3.23).
- Tumpey, T.M., Suarez, D.L., Perkins, L.E.L., Senne, D.A., Lee, J., Lee, Y.-J., Mo, I.-P., Sung, H.-W., Swayne, D.E., 2002. Characterization of a Highly Pathogenic H5N1 Avian Influenza A Virus Isolated from Duck Meat. *J. Virol.* 76, 6344–6355. <https://doi.org/10.1128/JVI.76.12.6344-6355.2002>
- Uchida, Y., Takemae, N., Tanikawa, T., Kanehira, K., Saito, T., 2016. Transmission of an H5N8-Subtype Highly Pathogenic Avian Influenza Virus from Infected Hens to Laid Eggs. *Avian Dis.* 60, 450–453. <https://doi.org/10.1637/11312-110315-Reg>
- UKHSA, 2023. [Technical risk assessment for avian influenza \(human health\): influenza A H5N1 2.3.4.4b](#) [WWW Document]. GOV.UK. (accessed 3.3.23).
- UKHSA, 2022. Investigation into the risk to human health of avian influenza (influenza A H5N1) in England: technical briefing 1.
- [Vietnamese Has Bird Flu After Drinking Duck Blood](#) [WWW Document], n.d. (accessed 1.9.23).
- Vreman, S., Bergervoet, S., Zwart, R., Stockhofe-Zurwieden, N., Beerens, N., 2022. Tissue tropism and pathology of highly pathogenic avian influenza H5N6 virus in chickens and Pekin ducks. *Res. Vet. Sci.* 146. <https://doi.org/10.1016/j.rvsc.2022.03.010>
- Wanaratana, S., Tantilertcharoen, R., Sasipreeyajan, J., Pakpinyo, S., 2010. The inactivation of avian influenza virus subtype H5N1 isolated from chickens in Thailand by chemical and physical treatments. *Vet. Microbiol.* 140, 43–48. <https://doi.org/10.1016/j.vetmic.2009.07.008>
- Wang, D., Zhu, W., Yang, L., Shu, Y., 2021. The Epidemiology, Virology, and Pathogenicity of Human Infections with Avian Influenza Viruses. *Cold Spring Harb. Perspect. Med.* 11, a038620. <https://doi.org/10.1101/cshperspect.a038620>
- WHO, 2023. Avian Influenza Weekly Update Number 878.
- WHO, 2022. Assessment of risk associated with recent influenza A(H5N1) clade 2.3.4.4b viruses.
- WHO, 2020. [Influenza: Avian](#) [WWW Document]. (accessed 12.16.22).
- WHO, 2018. [Influenza \(Avian and other zoonotic\)](#) [WWW Document]. (accessed 12.16.22).
- WHO, 2023, n.d.
- Wiwanitkit, V., 2007. Can avian bird flu virus pass through the eggshell? An appraisal and implications for infection control. *Am. J. Infect. Control* 35, 71. <https://doi.org/10.1016/j.ajic.2006.08.006>
- Wood, J.P., Choi, Y.W., Chappie, D.J., Rogers, J.V., Kaye, J.Z., 2010. Environmental Persistence of a Highly Pathogenic Avian Influenza (H5N1) Virus. *Environ. Sci. Technol.* 44, 7515–7520. <https://doi.org/10.1021/es1016153>
- Wu, L., Mitake, H., Kiso, M., Ito, M., Iwatsuki-Hirimoto, K., Yamayoshi, S., Lopes, T.J.S., Feng, H., Sumiyoshi, R., Shibata, A., Osaka, H., Imai, M., Watanabe, T., Kawaoka, Y., 2020. Characterization of H7N9 avian influenza viruses isolated from duck meat products. *Transbound. Emerg. Dis.* 67, 792–798. <https://doi.org/10.1111/tbed.13398>
- Yamamoto, Y., Nakamura, K., Mase, M., 2017. Survival of Highly Pathogenic Avian Influenza H5N1 Virus in Tissues Derived from Experimentally Infected Chickens. *Appl. Environ. Microbiol.* 83, e00604-17. <https://doi.org/10.1128/AEM.00604-17>
- Yamamoto, Y., Nakamura, K., Yamada, M., Mase, M., 2010. Persistence of avian influenza virus (H5N1) in feathers detached from bodies of infected domestic ducks. *Appl. Environ. Microbiol.* 76, 5496–5499. <https://doi.org/10.1128/AEM.00563-10>
- Zhao, C., Pu, J., 2022. Influence of Host Sialic Acid Receptors Structure on the Host Specificity of Influenza Viruses. *Viruses* 14, 2141. <https://doi.org/10.3390/v14102141>
- Zou, S., Guo, J., Gao, R., Dong, L., Zhou, J., Zhang, Y., Dong, J., Bo, H., Qin, K., Shu, Y., 2013. Inactivation of the novel avian influenza A (H7N9) virus under physical conditions or chemical agents treatment. *Virol. J.* 10, 289. <https://doi.org/10.1186/1743-422X-10-289>