**Level of pathogen in matrix:**

*Dust*: Experimental studies found dust samples tested positive in RT-qPCR and virus isolation. At 1 dpi, one dust sample tested 101.6 EID50, at 2 dpi, one dust sample tested 101.7 EID50, and at 4 dpi, one dust sample tested 102.4 EID50. In a second experiment, on day 2 and day 3 dust samples tested positive in RT-qPCR and virus isolation (103.9 and 102.2 EID50, respectively) [1].

*Feathers*: Virus titre in duck feather calamus (quill) expressed as equivalent to 50% EID/ml from RT-PCR results were 6.8 at 4 dpi compared to 3.7 for oropharyngeal and 1.7 cloacal [2]. One study investigated AI H5N1 persistence in feathers detached from experimentally infected ducks compared to faeces and drinking water maintained at 4oC and 20°C. Viral infectivity persisted in the feathers for 160 days at 4°C and for 15 days at 20°C. Viral titres of 104.3 EID50/ml or greater were detected for 120 days in feathers stored at 4°C. Viral RNA in feathers was more stable than the infectivity [3]. Avian influenza virus in experimentally infected ducks was found isolated earlier and for a longer period in feathers than from cloacal or oropharyngeal swabs [2].

*Faeces:* Virus was detected after 6 days stored at 4oC for one strain of H5N1 but nothing at 20oC [3]. At 3 dpi, average viral titres in cloacal swab pools from H6N2-infected layers ranged from 4.33 to 4.42 log10, whereas H6N2 averaged cloaca swabs viral titres of 4.5 log10, estimated for broilers [4]. Infection was found 30 days after storage at 4oC but not at 20oC. One strain of H5N1 was still RT-PCR positive at 40 days [3] but this does not necessarily indicate the presence of infectious virus. AI virus (H5N1) was isolated only from a faecal sample at 4°C on day 6 with a titre of 102.5 EID50/ml.

*Oropharyngeal:* Avian influenza virus is mainly preferentially shed oropharyngeally in gallinaceous poultry; typical titres from experimental oral samples with LPAI range from 101 to 105 EID50/ml depending on the virus strain and inoculum dose [5]. Generally Highly pathogenic AI viruses are mostly shed orally with titres as high as 105 to 108 EID50/ml. Initial viral titres in drinking water were 101.8 EID50/ml for Ck/Miya/K11/07 strain and 102.3 EID50/ml for Ws/Akita/1/08 strain. Low viral titres not exceeding 102.3 EID50/ml were inconsistently detected in drinking water at 4°C over a maximum period of 30 days.

Collectively dust and faecal deposits were considered to contain a MEDIUM level of NAD virus while oropharyngeal deposits and feathers were considered to contain HIGH levels of virus.

**Rate of contact between equipment and matrix:**

Layer hens occupy the poultry house for up to 58 weeks and a high level of soiling (manure, dust etc.) can be expected. The possibility to thoroughly clean and disinfect a layer house only occurs every 12-13 months [6] in comparison to broiler rearer units whereby 7 different flocks may occupy the same shed in one year with an opportunity for thorough routine C&D between flocks. Each poultry house has its own specific design and therefore the critical points for each housing system will differ.

Drinking cups are capable of immediately contaminating a new flock. Because of their fragile and angular construction, drinking cups are difficult to clean and are therefore critical locations. In addition, broiler chickens can contaminate these drinking cups by defecating in them Heyndrickx *et al*. [7] showed that drinking water in broiler houses is one of the risk factors significantly related to the *Salmonella* flock status. Renwick *et al*. [8] also showed that there was a greater risk of contamination of drinking water with *Salmonella* from trough drinkers and plastic bell drinkers than from nipple drinkers.

Feed hoppers, roofs and air outlets have given the lowest bacterial counts and ATP values in broiler houses after C&D. These locations do not come into direct contact with any manure or chickens and often have a smooth surface and are therefore easy to clean. Roofs can become more contaminated with total aerobic bacteria after cleaning than before cleaning. This could be explained by the fact that when cleaning floors, dirt (manure) can be splashed on the roof [9].

It was assumed that there would be a HIGH rate of contact for dust with all items of equipment with the exception of the following items: bulk bins (LOW) due to lack of access and smooth vertical surfaces; nipples (LOW) and drinkers (MEDIUM) due to disruption from birds; walls (MEDIUM) due to vertical surfaces; nest boxes (LOW) due to being curtained and enclosed areas; outdoor areas in free range farms (LOW) due to exposure to wind etc. and large surface area. The enriched colony caged bird environment was considered to be less dusty than other farm types based on literature evidence [10]. Therefore, for this farm type, in addition to the above items, the moving hopper and chain were assumed to be MEDIUM, floor and walls assumed to be LOW and the egg belt and packing area were assumed to be MEDIUM and LOW respectively.

The rate of contact between feathers and the equipment was mostly considered to be LOW with the exception for the floor and slatted areas which were assumed to be MEDIUM and the manure belt which was assumed to be HIGH for colony caged birds.

The rate of contact between oropharyngeal deposits and equipment was mostly considered to be HIGH due to the access of the birds and the frequency of production of these deposits. Exceptions were nest boxes (MEDIUM) due to the infrequency of contact and the frames (MEDIUM) due to inaccessibility.

The rate of contact of faecal deposits was assumed to be HIGH for those items of equipment which the birds were regularly in contact with such as scratching mats and slatted areas and floors (with exception of colony caged birds). Egg production items were assumed to be LOW whilst nest box linings were assumed to be MEDIUM due to the sporadic occupancy by the birds.

**Accumulation of matrix on equipment:**

Estimates for this parameter are largely based on observations from visits to colony caged and free range layer systems. Accumulation will also depend on the physical characteristics of the type of matrix and the type of equipment i.e. if its surfaces are vertical, horizontal, smooth, rough, moving, still etc.

Assuming a worst cases scenario of an AI outbreak in a poultry house just prior to regular depopulation between batches of birds then the time period for accumulation of organic material will be 50-60 weeks for the different layer houses and 7 weeks for the broiler houses.

For cage houses, the sample prevalence for bacterial contamination was (from highest to lowest): floors (24.8%), dropping boards/belts/flaps (22.7%), drinkers (15.2%), feeders (13.8%), cage interiors (11.4%) and egg belts (9.4%). In non-cage houses, the highest sample prevalence was in scratching areas (32.6%), drinkers (7.5%), feeders (5.7%), nest boxes (3.3%) and slats (2.7%). A total of 35.7% soil samples from the paddocks tested positive [11]. Using total aerobic flora as a proxy for contamination the highest counts at end of lay depopulation in an enriched cage system (experimental set up) were found on feeders, floor, egg belt and bottom of nest box and manure belt [12]. For barn system highest counts were floor, drinkers, slatted platforms, feeders, egg belt and manure belt. Droppings accumulated on the wire floor under perches because hens were perched during the night and droppings under the perches were not trampled through the floor by bird walking [13].

In a comparison of different cage lining materials all linings (i.e., for nest and pecking and scratching area (PSA)) were more heavily soiled than wired areas due to droppings stuck in the mats. Following the removal of hens from the cages, variable difficulty was encountered when cleaning. Artificial turf mats in PSA or in the nest were dirty: droppings were trapped and accumulated within the blades of these mats (even for perforated versions). In commercial conditions, this obliges farmers to remove all mats from the cages and clean them between 2 batches of laying hens. On the other hand, blades on artificial turf mats prevented eggs from coming into direct contact with the droppings trapped within the blades [13]. Perforated AstroTurf® nest pads placed on a wire mesh floor allow dust and muck to fall away to ensure cleaner eggs and better hatchability. The nest floor material is also removable to permit easy end of flock cleaning. AstroTurf® nest liners can become soiled by faeces. Cleaning programs carried out before population renewal seem to be difficult in poultry houses equipped with furnished cages due to the time consuming removal of linings, such as artificial turf mats, from the cages for individual cleaning [13].

The accumulation of faeces on all items of equipment was assumed to be the same as the rate of contact due to the build-up of deposits in those areas. Dust, however, was assumed to be disturbed regularly by the birds so was given a lower probability in general with the exception of those areas which were inaccessible to the birds such as the heaters and ventilation system where dust was assumed to accumulate.

The accumulation of feathers on equipment was generally assumed to be LOW to VERY LOW either due to the infrequency of their production and the texture of feathers which were assumed to fall downwards to the nearest horizontal surface before settling. The main exceptions were the floor where accumulation was considered to be MEDIUM and the manure belt (also MEDIUM) where feathers could become clustered with faecal deposits.

Accumulation of oropharyngeal deposits was considered to be HIGH for nipples, drinkers and enrichments where the rate of contact was also high. Slatted areas were also considered to be HIGH due to the frequency of production of these deposits by the birds collecting there. All other items of equipment were assumed to have a MEDIUM to LOW accumulation due to the lack of contact with birds or frequent disruption by birds preventing accumulation.

**Probability virus present in matrix on equipment after depopulation and before preliminary C&D (PC)**

The time period assumed here was 2 days between depopulation and preliminary C&D based on previous epidemiological reports of UK AI outbreaks. This probability will depend on the accumulation of contaminated matrices on equipment and natural decay of virus which in turn will depend on environmental factors such as temperature and relative humidity. The ventilation systems in some poultry house provide for a very dry environment which could speed up viral decay. The material from which the equipment is constructed will only be relevant for virus survival at the interface between the equipment and the organic deposit within which the virus is present and the focus should, therefore, be more on viral decay in the organic based matrices.

In chicken faeces, inactivation of AI virus can be rapid at temperatures above 25°C but is prolonged at low temperatures; for example, at 19 – 22.5°C AI virus can remain infectious in chicken faeces for >4 days [14], but at 4°C the virus can remain infectious for up to 56 days [15, 16]. Studies on the survival of viral stocks of LPAI in poultry litter found that infectivity was retained from 1-3 days depending on the litter source with wood shavings being only 1 day. Infectivity of H6N2 shed by experimentally infected layers and broilers was retained for one day. However, this was at 25oC and it is acknowledged that the viral load shed by an infected flock will be significantly higher than that shed under experimental conditions [4].

Assuming a period of two days between depopulation and preliminary C&D the probability that virus is present in oropharyngeal deposits and dust was assumed to be MEDIUM due to natural decay (this will depend on environmental conditions but it is assumed that due to the lack of organic matter associated with these deposits decay will be more rapid than for faeces). Conversely, the probability that virus is present in feathers and faeces was assumed to be HIGH due to some of the literature demonstrating the ability of virus to survive for long periods in these matrices.

**Viral load in matrix on equipment at time of preliminary C&D (VH)**

At the time of preliminary C&D the viral load will depend on the level of natural decay of virus between depopulation and when disinfectant is applied. This will be dependent on the matrix e.g. amount of organic matter which can ‘protect’ the virus and the environmental conditions e.g. temperature and humidity within the poultry house.

The viral load in all matrices present at the time of C&D was assumed to be the same values as for accumulation of matrix due to the high/medium probability of survival of virus.

**Probability of virus survival in matrix on equipment after preliminary C&D (PP)**

A trial comparing the efficiency of C&D in five different layer housing systems used bacterial colony forming units (CFU) counts after cleaning and after disinfection. After cleaning, high Adenosine triphosphate (ATP) values were still found for drinking cups, drain holes, and floor cracks, despite the latter two having been visually evaluated as clean. The ATP values indicate that these sampling points still contain a high amount of organic material and/or bacteria after cleaning. Results of swab samples also showed that mostly drain holes and floor cracks were still contaminated with *Escherichia coli* after disinfection. On the other hand, air outlets appeared visually to be one of the most soiled points after cleaning, but ATP measurements were low. The cleanliness of some sampling points, such as drain holes and floor cracks, are thus difficult to assess visually, leading to erroneous visual scoring. [17].

A study to evaluate C&D programmes in battery cage and on-floor layer houses in France [18] used a comparison between visual evaluation and bacterial monitoring to assess effectiveness. For visual inspection the average final score was 72% in barn layers and 57% in cage houses. In cage houses, poor cleaning was detected in locations difficult to access such as air outlets in the ceiling, cups under nipples and the floor beneath cages. In 12 out of 15 battery cage houses, droppings belts and conveyors remained soiled with hardened droppings. In cage houses the highest contamination before cleaning was found on the manure disposal system and on the house floor. They remained highly contaminated with counts of more than 100 CFU/CP for 37 and 16% of the samples, respectively. Cleaning and disinfection was thus less efficient on those surfaces that were most highly contaminated at the end of the laying period. In on-floor houses, a greater proportion of highly contaminated samples (>100 CFU/CP) was observed prior to cleaning on linear chain feeders, air inlets and egg sorting tables. Contamination after disinfection was reduced (P<0.001) for all surfaces sampled. However one count with more than 100 CFU after disinfection was observed in the nest boxes in two houses and on the egg sorting table in two other houses; this was attributed to error in the C&D process.

Generally virus was considered to have a very low probability of survival after primary C&D in oropharyngeal and dust matrices and a low probability of survival in faecal deposits due to the increased protection from the organic matter present in these deposits. Virus in feathers were estimated to have a high probability of survival due to the protection provided by the external matrix of the feather structure and experimental data whereby virus infectivity persisted for 160 days at 4oC [3]. These probabilities were assigned for easily accessible areas of the poultry house where there is a high probability that disinfectant would be thoroughly applied. In more intricate items of equipment which may contain areas which could be missed during primary C&D then the probability of virus survival was increased.

Based on evidence in literature it was assumed that virus present on those items of equipment which were easy to access or which did not have a large accumulation of organic matter would have LOW levels of survival. This was assuming that the presence of organic matter would reduce the efficacy of the disinfectant. Virus within faecal deposits was assumed to have a MEDIUM probability of survival with the exception of frames, metal troughs and egg belts which all had a low accumulation of faeces and therefore less protection against C&D. The probability of virus survival in the outdoor areas of free range farms was assumed to be HIGH as preliminary C&D does not affect these areas.

The probability of virus survival was generally assumed to be LOW to VERY LOW for dust deposits as they were assumed to be readily removed by C&D procedures. However, survival was considered to be MEDIUM for virus in dust on floors, nest box linings, heaters and ventilation due to these items being inaccessible or subject to contamination during cleaning of other items i.e. the floor. Virus survival in feathers was assumed to be HIGH due to the protection afforded to the virus by the actual feather structure. Preliminary C&D is assumed to be more a dampening down of virus rather than a thorough C&D so it is assumed that feathers could still be present. Oropharyngeal deposits were assumed to be more protective of the virus than dust but less so than faeces. With this in mind the probability of virus survival was assumed to be MEDIUM for inaccessible areas such as tubular pan feeders, nipples, enrichments and nest box linings but LOW for all other items of equipment

**Viral load in matrix on equipment after preliminary C&D and at time of restocking (VP)**

This scenario assumes that restocking takes place immediately after preliminary C&D has been shown to be effective i.e. at least 24 hours later. This unrealistic assessment has been included only to provide a contrast with risk after a combination of secondary C&D and the time elapsed. It does, however, serve to suggest areas which may deserve special focus in the process of final C&D and sign-off of an affected site. Proxy data from *Salmonella* studies was used to highlight those areas where C&D were assumed to be most effective at removing contamination. In a comparison of the efficacy of different disinfection methods in eliminating Salmonella contamination from turkey houses 58% of the sampled houses had at least one positive sample in the category ‘nest boxes’, followed by ‘anteroom’ (52%), ‘walls’ (38%), ‘floor cracks’ (29%), ‘miscellaneous’ (23%), ‘floor’ (22%), ‘feeders’ (19%) and ‘drinkers’ (14%) [19]. Prevalence of *Salmonella* was 0.093 for anteroom, 0.071 nest boxes, 0.049 floor cracks, 0.033 for heaters and miscellaneous equipment, 0.031 for floor, 0.024 for wall, 0.023 for feeders, 0.016 for drinkers. Areas which were more difficult to clean had a higher sample prevalence than the intact floor. Feeders and drinkers had the lowest sample prevalence in the study. These are less likely than other surfaces to be subject to faecal contamination and are usually made of metal and plastic, which is easier to clean than concrete or wooden surfaces [19].

The qualitative assessment of the viral load in the oropharyngeal deposits was generally assumed to be the same as the probability of survival with the exception of the colony cages, frames and nest boxes (except floor liners) which were VERY LOW and LOW respectively due to an initial low viral load in these items. The viral load in dust was generally assumed to be LOW to VERY LOW for most items of equipment with the exception of the bulk bins where the viral load was assumed to be NEGLIGIBLE due to the very low probability of survival of initially very low levels of virus. The floor (except colony caged birds), manure belt, heaters and ventilation systems were assumed to have a MEDIUM viral load due to the medium probability of survival of a medium/high initial level of virus.

As the probability of virus survival within feathers is considered to be high the viral load after preliminary C&D was assumed to be the same as VH i.e. viral load on equipment at the time of preliminary C&D. This is assuming that the feather structure protects the virus from the effects of disinfection which is unknown.

The viral loads in faecal deposits were assumed to vary as a result of the initial viral load and the probability of survival. As a result levels were generally considered to be MEDIUM with the exception of LOW for troughs and nest boxes (except floor liners) and VERY LOW for frames and egg belts. Levels were considered to be HIGH for outdoor areas (free range only).

**Probability birds exposed to virus in matrix on or from equipment (PE) and Viral load in matrix to which the birds are exposed (VE)**

This is based on the access of the birds to the equipment e.g. high for drinkers and feeders or access of the contaminated matrix from the equipment to the birds e.g. dust falling from overhead augers down to the birds.

It was assumed that virus present within the feather matrix is clustered and not dispersed within the environment. The probability that birds are exposed to virus from feathers was therefore assumed to be LOW to VERY LOW with a NEGLIGIBLE to VERY LOW viral load. Exceptions were the tubular pan feeders and the floor for all farm types except colony caged layers. A LOW viral load was assumed here. This is assuming that feathers could become trapped within the feeders and birds could access them there and that they would have full access to feathers on the floor.

The probability of birds being exposed to virus in dust was generally considered to be LOW to VERY LOW for most items of equipment with the exception of nipples/drinkers, floor (not colony caged), outdoor areas (free-range only) and nest box linings i.e. those areas to which the birds could have close contact. The viral load in dust on equipment was assumed to be LOW to VERY LOW but MEDIUM for the floor (not colony caged) and manure belt and NEGLIGIBLE for bulk bins, walls and egg belts.

The probability that birds could be exposed to virus in oropharyngeal deposits was still considered to be HIGH for nipples and MEDIUM for drinkers, enrichments and nest box linings i.e. those areas to which the birds have close contact. All other probabilities were considered to be LOW to VERY LOW. Viral loads were similarly assumed to be LOW to VERY LOW with a slightly higher estimation of MEDIUM for nipples, enrichments and outdoor areas (free range only).

Faecal deposits containing virus are still assumed to be present in certain areas after preliminary C&D due to the protection of the virus by the organic faecal material and the probability of birds being exposed to this virus is therefore considered to be MEDIUM for troughs, outdoor areas (free range only), floor (except colony caged), nest box linings, perches, scratching mats and slatted areas. All other items are assumed to be LOW to VERY LOW with the exception of the egg packing area and manure store which are now assumed to be NEGLIGIBLE due to the lack of access to the birds.

**Probability of infection in sentinel flock (PI)**

This probability is calculated assuming the houses are repopulated immediately after preliminary C&D has been carried out to illustrate the risk of infection at this point as a comparison for reference between the different scenarios.

A study of the infection dynamics of HPAI H5N1 in poultry found chickens to be susceptible to infection with an ID50 of 10 3.4 EID50 and for H7N1 an ID50 of 10 4.6 EID50 [20]. The mean infectious doses of selected AI virus isolates, determined in domestic poultry under experimental conditions, were shown to be both host-dependent and virus strain-dependent. The intranasal (IN) mean bird infectious doses (BID50) were determined for 11 HPAI virus isolates of turkey and chicken origin for white leghorn (WL) chickens, and for LPAI virus isolates of chicken (n = 1) and wild mallards (n = 2) for turkeys, and WL and white Plymouth rock (WPR) chickens, domestic ducks and geese, and Japanese quail. The BID50 for HPAI virus isolates for WL chickens ranged from 10(1.2) to 10(4.7) mean embryo infectious dose (EID50) (median = 10(2.9)). For chicken-origin HPAI virus isolates, the BID50 in WL chickens ranged from 10(1.2) to 10(3.0) EID50 (median = 10(2.6)), whereas for HPAIV virus isolates of turkey origin, the BID50 in WL chickens was higher, ranging from 10(2.8) to 10(4.7) EID50 (median = 10(3.9)). Although the upper BID50 limit for predicting infectivity and sustainable transmissibility for a specific species is unknown, a BID50 < 10(4.7) was suggestive of such transmissibility [21].

The probability of infection in a sentinel flock immediately following preliminary C&D was assumed to be MEDIUM for the floor (except colony caged), nest box linings, perches, outdoor areas (free range only), scratching mats and slatted areas as a result of exposure to virus from faecal deposits. A LOW probability of infection was assumed as a result of contact with faeces in troughs, colony cages and manure belts. All other items of equipment were assumed to have either a VERY LOW or NEGLIGIBLE probability.

The probability of infection as a result of contact with virus in feathers was generally assumed to be NEGLIGIBLE, but increased to VERY LOW for outdoor areas (free range only) and nest boxes and LOW for tubular pan feeders and the floor (except colony caged layers).The area considered to have the highest probability of infection from dust deposits was the floor area (except colony caged birds) which was MEDIUM. A LOW probability was also assumed for outdoor areas (free range only), nest boxes, scratching mats, slatted areas, manure belt, heaters and ventilation equipment. These items were all considered to contain sufficient virus to cause infection and to which the birds could access or virus in the dust could access the birds. All other items were considered to have a probability of either VERY LOW or NEGLIGIBLE from virus in dust.

The highest probability of infection in a sentinel flock as a result of virus in oropharyngeal deposits was assumed to be MEDIUM for outdoor areas (Free range only) nipples and enrichments. This was assumed because of the inaccessibility of these items to the effects of preliminary C&D and then the levels of exposure to the new birds. A LOW probability was considered for tubular pan feeders, drinkers, nest boxes, perches, scratching mats, slatted areas and manure belt. All other items were assumed to have a VERY LOW probability of infecting a sentinel flock.

**Probability of virus survival in matrix on equipment after secondary C&D (no dismantling) (PSND)**

An estimate of a 14 day period between preliminary and secondary C&D was based on information from an AI outbreak as a guide for reference. It is acknowledged that this will vary according to the farm type, the company employed and the state of facilities etc. There is then a statutory period of 21 days between secondary C&D and restocking i.e. the time period for natural decay will be ~ 35 days combined. The degree of natural decay of virus during this time will depend upon the temperature and relative humidity within the poultry house and the amount of organic matter protecting the virus from decay.

The probability of virus survival in oropharyngeal deposits was considered to be NEGLIGIBLE for all items of equipment after secondary C&D taking into account the ~35 day period of natural decay and the diligence that is assumed to be shown during C&D whereby cleaning of all areas including those that are hard to access such as nest boxes, will be thorough enough to remove organic matter and disinfection will again be applied to all areas including those that are difficult to access.

For virus within the dust and feathers matrices the probability of virus survival was assumed to be NEGLIGIBLE for all items with the exception of the floor which was VERY LOW for all farm types except colony caged. Assuming a procedure of top to bottom C&D and using evidence from the literature it’s considered that some virus may survive on the floor area especially if it is worn giving a rough surface or contains cracks where the virus may be able to survive. For dust the manure belt was also considered to be VERY LOW for colony caged whilst for feathers a VERY LOW probability of virus survival was assumed for outdoor areas on free range farms where virus may still survive in feathers after ~35 day period.

Whilst the probability for virus survival in faecal matter was generally assumed to be NEGLIGIBLE for most items of equipment a VERY LOW probability was assumed for the floor (except colony caged), the nest box lining, scratching mat and the manure belt. These areas are all assumed to have a high accumulation of faecal matter which could retard natural viral decay by protecting the virus from external conditions. They are also the areas where, even assuming thorough secondary C&D, the virus may survive within, for example, the AstroTurf plastic blades. A LOW probability of virus survival was assumed for outdoor areas on free range farms given a~35 day period for natural decay but no effect from secondary C&D.

**Viral load in matrix on equipment after secondary C&D (no dismantling) (VSND)**

The assumption is that there is a 21 day period between secondary C&D and restocking. As the probability of virus survival in oropharyngeal deposits was considered to be NEGLIGIBLE for all items of equipment after secondary C&D the viral load on all items of equipment was also considered to be NEGLIGIBLE. Given the very low probability of virus survival after secondary C&D the viral load was considered to be NEGLIGIBLE for virus within faeces for all items of equipment with the exception of VERY LOW for the manure belt and LOW for the outdoor areas (free range only). All probabilities were NEGLIGIBLE for viral load in dust except VERY LOW for the manure belt and all were assumed to be NEGLIGIBLE for viral load in feathers except VERY LOW for outdoor areas (free range only)

**Probability birds exposed to virus in matrix on or from equipment (PE) and Viral load in matrix to which the birds are exposed (VE)**

(See above)

This was assumed to be NEGLIGIBLE for virus in oropharyngeal deposits, dust and feathers on all items of equipment. It was also assumed to be NEGLIGIBLE for virus in faecal deposits on all items of equipment with the exception of the outdoor areas of free range farms where a LOW probability of exposure to a LOW viral load was assumed.

**Probability of infection in sentinel flock after secondary C&D with no dismantling (PI)**

This was determined to be NEGLIGIBLE for all items of equipment in all poultry house types taking into account initial viral load, natural decay of virus over the time period ~ 37 days from depopulation, effect of preliminary and secondary C&D (assuming carried out with due diligence) and exposure of sentinel birds to infectious dose of virus. A LOW probability of infection in a sentinel flock was considered for the outdoor areas of free range farms assuming that no risk mitigation strategies had been carried out.

**Probability of virus survival in matrix on equipment after secondary C&D (inc. dismantling) (PSD)**

(See above)

The probability of virus survival in oropharyngeal deposits was considered to be NEGLIGIBLE for all items of equipment after secondary C&D taking into account the ~35 day period of natural decay and the diligence that is assumed to be shown during C&D whereby cleaning of all areas including those that are hard to access such as nest boxes, will be thorough enough to remove organic matter and disinfection will again be applied to all areas including those that are difficult to access.

For virus within the dust and feathers matrices the probability of virus survival was assumed to be NEGLIGIBLE for all items with the exception of the floor which was VERY LOW for all farm types except colony caged. Assuming a procedure of top to bottom C&D and using evidence from the literature it’s considered that some virus may survive on the floor area especially if it is worn giving a rough surface or contains cracks where the virus may be able to survive. For dust the manure belt was also considered to be VERY LOW for colony caged whilst for feathers a VERY LOW probability of virus survival was assumed for outdoor areas on free range farms where virus may still survive in feathers after ~35 day period.

Whilst the probability for virus survival in faecal matter was generally assumed to be NEGLIGIBLE for most items of equipment a VERY LOW probability was assumed for the floor (except colony caged), the nest box lining, scratching mat and the manure belt. These areas are all assumed to have a high accumulation of faecal matter which could retard natural viral decay by protecting the virus from external conditions. They are also the areas where, even assuming thorough secondary C&D, the virus may survive within, for example, the AstroTurf plastic blades. A LOW probability of virus survival was assumed for outdoor areas on free range farms given a~35 day period for natural decay but no effect from secondary C&D.

**Viral load in matrix on equipment after secondary C&D (Inc. dismantling) (VSD)**

The assumption is that there is a 21 day period between secondary C&D and restocking. As the probability of virus survival in oropharyngeal deposits was considered to be NEGLIGIBLE for all items of equipment after secondary C&D the viral load on all items of equipment was also considered to be NEGLIGIBLE. Given the very low probability of virus survival after secondary C&D the viral load was considered to be NEGLIGIBLE for virus within faeces for all items of equipment with the exception of VERY LOW for the manure belt and LOW for the outdoor areas (free range only). All probabilities were NEGLIGIBLE for virus in dust except VERY LOW for the manure belt and all were assumed to be NEGLIGIBLE for virus in feathers except VERY LOW for outdoor areas (free range only)

**Probability birds exposed to virus in matrix on or from equipment (PE) and Viral load in matrix to which the birds are exposed (VE)**

(See above)

This was assumed to be NEGLIGIBLE for virus in oropharyngeal deposits, dust and feathers on all items of equipment. It was also assumed to be NEGLIGIBLE for virus in faecal deposits on all items of equipment with the exception of the outdoor areas of free range farms where a LOW probability of exposure to a LOW viral load was assumed.

**Probability of infection in sentinel flock after secondary C&D inc. dismantling (PI)**

This was determined to be NEGLIGIBLE for all items of equipment in all poultry house types taking into account initial viral load, natural decay of virus over the time period ~ 37 days from depopulation, effect of preliminary and secondary C&D (assuming carried out with due diligence) and exposure of sentinel birds to infectious dose of virus. A LOW probability of infection in a sentinel flock was considered for the outdoor areas of free range farms assuming that no risk mitigation strategies had been carried out.

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