

ACTION



**ON
ANIMAL
HEALTH
AND
WELFARE**

Code of Practice
for the Prevention and Control of

Salmonella in Chickens reared for meat on farm

DEFRA

Department for
**Environment,
Food & Rural Affairs**

Scottish Executive
Environment and Rural
Affairs Department



Preface

This voluntary Code of Practice is issued by the Department for Environment, Food and Rural Affairs and the Scottish Executive Environment and Rural Affairs Department. It has been drawn up in consultation with the Welsh Assembly Government, the Department of Agriculture and Rural Development (Northern Ireland), the Food Standards Agency, the British Poultry Council, the British Veterinary Poultry Association and the National Farmers' Union.

All DEFRA Codes of Practice are available from DEFRA Publications, Admail 6000, London SW1A 2XX, telephone (08459 556000). The Code of Practice for the Prevention and Control of *Salmonella* in Chickens Reared for Meat on Farm is also available on the DEFRA website.

Codes of practice are also available from SEERAD, Room 350, Pentland House, 47 Robb's Loan, Edinburgh, EH14 1TY, telephone: 0131 244 6572.



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Introduction

Salmonella infection in farm animals may lead to animal disease, welfare and economic problems as well as health problems for farm workers, visitors and consumers of farm produce.

Salmonella are intestinal bacteria that can be transmitted by all animals, including humans and, in the case of poultry, there is the possibility of vertical transmission of infection in eggs.

There are approximately 2,500 different types (serotypes) of *Salmonella*. Most do not normally cause clinical disease in poultry. However, virulent strains such as *Salmonella typhimurium* DT104 have been associated with illness and mortality in chicks although cases in chickens reared for meat have been falling.

Currently only about 200 *Salmonella* serotypes are associated with foodborne infections in humans in any one year in the UK. At the time of going to print, vertical transmission from breeding flocks to commercial flocks of two of the most significant serotypes, *Salmonella enteritidis* and *Salmonella typhimurium*, has been substantially reduced¹. Horizontal transmission, that is introduction of infection from the environment, including feed, hatchery equipment, staff movements and contaminated farm equipment, however, remains a key route for infection.

If *Salmonella* is present in chickens reared for meat it increases the risk that consumers may suffer food poisoning or acquire infections with *Salmonella*, some of which may be pathogenic

1 There has been statutory monitoring and control of *Salmonella enteritidis* and *Salmonella typhimurium* in breeding flocks since 1989, reviewed in 1993 under the Poultry Breeding Flocks and Hatcheries Order 1993. When *Salmonella enteritidis* or *Salmonella typhimurium* is confirmed in a breeding flock no eggs may go for hatching and the flock is slaughtered.



strains resistant to antibiotics. It is important to reduce this hazard at all steps in the production and preparation of food.

Small numbers of *Salmonella* organisms are widespread and their complete elimination from the environment in all but the primary breeder sector is unlikely to be economically feasible. Despite this, good management can reduce the risk of introduction and persistence of infection to minimal levels, particularly since improved *Salmonella* control in the breeder sector and in feed production has greatly reduced the risk from these sources.

The purpose of this Code is to assist flock owners in preventing the introduction, spread and persistence of *Salmonella* infection in chickens reared for meat.

Flock owners are therefore strongly encouraged to include the Code as part of their standard management practice. This Code has been drawn up taking into account the fact that most chickens reared for meat are produced in controlled environment housing systems; not all parts of the code can be applied to free range or small scale rearing systems. Nevertheless, many of the basic principles are applicable and should be followed as far as possible. The measures outlined in the code should form the cornerstone of *Salmonella* control and, if rigorously applied, they will substantially assist in preventing and controlling other infections or diseases in chickens reared for meat. Discuss the Code with your veterinary surgeon and consider how it may be best implemented in your premises taking into account any factors such as location, housing and management, which are specific to your enterprise.

This Code complements the DEFRA Code of Practice for the Prevention and Control of *Salmonella* in Breeding Flocks and Hatcheries.



Preventing the Introduction of Infection

1. Farm

1.1 Location

When a new farm is being constructed, ideally it should be located as far away as possible from other commercial poultry premises, other livestock enterprises and other potential sources of contamination such as abattoirs, sewage treatment plants, land fill sites etc.

When a farm is close to such sites a higher level of protection against the introduction of disease is required, including wildlife control and ensuring that no drainage or waste from the nearby property enters the farm.

1.2 Poultry Site

Good biosecurity² is extremely important to prevent the introduction of a wide range of micro-organisms into poultry farms. Site design and management practices should be planned to facilitate this.

The perimeter of the site should be clearly identified and, if possible, fenced. Access should be via specific entry points where there should be a bell or other means of attracting attention along with a notice asking visitors to wait to be admitted by farm staff. Whilst there will be a need for people to enter the unit (managers, workmen, veterinary surgeons, auditors etc.) visits should be carefully controlled. Access to poultry houses should be restricted to those with essential duties.

² Biosecurity is a term that includes all those measures that may be taken to prevent the introduction of unwanted organisms into the flock.



There should be a hard standing for parking, which should be kept clean and disinfected so as to ensure that it is maintained in a hygienically acceptable condition. On-farm roadways should ideally have a hard surface, which can be cleaned effectively. Roadways should be kept clear of faecal soiling to prevent vehicles becoming contaminated.

A disinfectant footbath (maintained in accordance with the guidance at section 7.1) and brush should be placed at the entrance to the site and/or near the vehicle parking area. Endeavours should be made to provide a separate gatehouse where visitors can change into overalls and boots and sign a visitors' book (see Annex 1 for suggested headings). Spray disinfection of the wheels of vehicles at the point of entry to the site is also advisable.

The site should be kept clean and tidy to discourage wild birds, rodents and flies.

1.3 Poultry Houses

Ideally, there should be a hard surface/gravel around the perimeter of houses which is designed to avoid puddling.

Buildings should be of sound construction and well maintained to prevent access by wild birds and to deter rodents. Insulation cladding should be maintained in good repair as damage allows easy refuge for rodents. Avoid storing materials such as feed bags, litter and moveable equipment within the house for the same reason.

Where possible surfaces should be smooth, hard and impervious to enable effective cleaning and disinfection. Ancillary buildings such as storage rooms, rest rooms, toilets etc. should be of a similar standard.



2. Livestock

2.1 Poultry

Breeding flocks and hatcheries are required to comply with the relevant legislation on the monitoring of *Salmonella enteritidis* and *Salmonella typhimurium* and action is taken if the flocks are confirmed to be infected³. The aim is to deliver chicks which are free of these serotypes; nevertheless, there may still be a risk of contamination with other *Salmonella* serotypes. A check on the results of monitoring should be made by the private veterinary surgeon for the flock if required. *Salmonella* tests can be carried out on Dead-on-Arrival chicks and delivery box liners if there is a suspicion of infection in chicks and to check that supply and transportation are satisfactory.

The whole site should be managed on an all-in all-out basis where possible. If monitoring for *Salmonella* is carried out following cleaning and disinfection to check its efficiency, there should ideally be sufficient time between disinfecting the last house and restocking the first to allow for action to be taken to correct any deficiencies.

2.2 Domestic Animals

The entry of dogs, cats and other livestock to poultry buildings (including feed or equipment stores) should be prevented at all times including when being cleaned.

2.3 Wild and Feral Animals

All buildings, including storerooms, should be proofed against entry by wild birds and their presence in the vicinity should be discouraged by general tidiness, clearing vegetation and other

³ Breeding flocks of 250 or more birds and hatcheries with an incubator capacity of 1,000 or more eggs must be monitored for *Salmonella enteritidis* and *Salmonella typhimurium* under the Poultry Breeding Flocks and Hatcheries Order 1993. If a flock is confirmed to be infected with these serotypes no eggs may be sent for hatching and the flock is slaughtered. Check that equivalent schemes are in operation in the country of origin in the case of imported day old chicks or hatching eggs.



perching places, cleaning up feed spillages promptly and good drainage to reduce pooling of surface water. Rodent habitats should be eliminated by maintaining the premises in a tidy state and a planned programme of baiting and/or trapping in and around the buildings and around the site perimeter should be undertaken. This programme should be intensified during periods when houses are empty and if rodents, droppings, tracks, chewing damage or disturbed bait are seen. Proofing and control measures should be reviewed regularly to assess their effectiveness. Further guidance on rodent control is available in the DEFRA Code of Practice for the Prevention of Rodent Infestation in Poultry Flocks. On free-range farms, foxes and other small mammals as well as wild birds may be carriers of *Salmonella* and these should also be deterred. Prompt and careful removal of dead birds (see section 6.1) and frequent human activity on the site will help avoid encouraging foxes and other scavengers on to outdoor units.

3. Feed and Water

3.1 Feedstuffs

Finished feed or ingredients for home mixing should be obtained from a mill or supplier who operates in accordance with the relevant DEFRA and UKASTA codes of practice for the control of *Salmonella* (UKASTA's Feed Assurance Scheme, UFAS, requires compliance with DEFRA codes of practice) and who will make available the results of *Salmonella* monitoring. The responsible veterinary surgeon for the flock may be consulted to assist with interpretation of these results.

If feed is supplied by a mill operating to other codes then your veterinary or technical adviser should be able to confirm with the manufacturer that the processes being used are effective in the control of *Salmonella*.

Ingredients known to present a high risk of *Salmonella* contamination such as cereals and whole grains stored in flat



stores or open bins on livestock farms should be avoided. Consider with your veterinary adviser if there would be advantages in treating protein, cereal ingredients and whole grain feed with aldehyde/acid mixtures.

Feed should be heat treated for a sufficient time and at an adequate temperature to minimise *Salmonella* and stored, handled and transported in accordance with advice given in the relevant codes to prevent post-processing contamination. Finished feed should be delivered in vehicles that are dedicated to that purpose and that are not back loaded with ingredients or other feeds. If this is not possible, vehicles should be effectively cleaned and disinfected before finished feed is carried. There should be a documented hygiene programme for all vehicles. Drivers should wear clean boots and overalls and should not enter poultry or storage buildings.

Feed should be stored in closed bulk storage bins or hoppers or sealed bags. Any rainwater leaks or condensation problems in feed storage areas must be corrected when seen. Storage areas and slave hoppers etc. should be kept free of birds and rodents.

Equipment should be properly maintained and attention should be paid to regular cleaning of bulk storage bins, augers, hoppers, chain feeders and feeder pans. Particular attention should be paid to health and safety requirements when cleaning bulk storage bins as these pose a significant safety hazard.

Spillages and residues from feed augers and slave hoppers etc. should not be stored and reused for the following flock.

3.2 Water Supply

Water should be from a mains or other source provided it has been treated with chlorine and/or tests for bacteriological quality give satisfactory results. The delivery system, including any header tank, should be enclosed to prevent contamination.

If water quality is suspect additional security against contamination may be obtained by acidification using peroxygen



products. Chlorine will inactivate some medications and data sheet recommendations should be followed if these are to be administered in the drinking water.

4. Personnel

4.1 Farm Staff

Management should ensure that all farm staff, including relief and casual staff, understand the importance of personal hygiene and are aware of the means by which infection can be spread on hands, clothing and equipment. A farm hygiene guide, which incorporates the principles of this Code, should be displayed in a prominent place. Adequate toilet and washing facilities (including soap) should be available and work boots and overalls should be provided for use only on the farm. It is preferable to provide separate boots and, if possible, protective clothing for each house.

Staff should not keep or have contact with any other poultry and should avoid working with other livestock. Where this is not possible, cleaning and disinfection on entry and on leaving the poultry unit is most important, in addition to using clothing dedicated for use on the unit and kept there.

Those who enter poultry buildings should wear disposable overalls or overalls which are capable of being laundered and boots which can be cleaned and disinfected. When they leave the poultry house they should wash their hands with soap, or use a hand disinfectant spray, and disinfect their boots.

4.2 Visitors

Visitors (such as fieldsmen, maintenance personnel, delivery and collection staff, veterinarians, officials, etc.) are a potential means of introducing infection, especially if they visit other poultry farms.

Catching and cleaning gangs and their vehicles are a particular hazard especially during thinning as infection can be introduced



during this process. Operators should be encouraged to use the same high hygiene standards as farm staff.

Non-essential visitors to the farm should be discouraged. Visitors should sign a visitors' book (see Annex 1 for suggested headings) and wear protective clothing and waterproof boots provided by the farm. Visitors should enter poultry buildings only if this is essential.

5. Supplies

5.1 Litter

Litter should be obtained from a reliable source and be free from contamination by livestock, wild birds and rodents. Straw bedding obtained from specialist arable farms is less likely to be contaminated than from farms with pigs or cattle. Litter should be transported on vehicles which have been cleaned and disinfected and be stored in a clean rodent and bird proof area.

Replacement litter can be treated with acids and antibacterial products to reduce the risk of bacterial contamination.

5.2 Equipment

Equipment used for catching and transporting birds poses a high risk of introducing *Salmonella* onto a site, particularly crates which are a well known hazard. On each occasion, before and after items are used they should be thoroughly cleaned and disinfected with a DEFRA approved disinfectant applied at least at General Orders Concentration and visually inspected.

It is best to avoid sharing equipment with other farms. If this is unavoidable any equipment transferred from other sites should be cleaned and disinfected before transport and again before use on the site.

Facilities for spray disinfection of the exterior of cleaning and catching team vehicles and equipment before entry to the poultry houses are advisable.



6. Carcasses and Manure

6.1 Birds

Flocks should be checked on a daily basis and any dead birds and culled birds should be removed and placed in a closed leak proof and pest proof container at the perimeter of the site ready for disposal. Under the Animal By-Products Order 1999 disposal must be by incineration, rendering or removal to a knacker's yard. Only in exceptional circumstances may carcasses be burnt (other than in an incinerator) or buried on-site. Composting is not a permitted disposal option.

Equipment used for the storage and disposal of dead birds should be subjected to a documented hygiene protocol.

6.2 Used Litter

Poultry manure contains valuable plant nutrients and application to land should follow the guidelines in the DEFRA Codes of Good Agricultural Practice for the Protection of Water and Air and must comply with the Action Programme in Nitrate Vulnerable Zones and any other official guidelines. Manure should not be spread on land whilst other livestock have access to it. Where possible litter should be stacked for at least four weeks before spreading. Where facilities exist, the incineration of used litter from flocks infected with *Salmonella* is preferred.

Animals should not be grazed on land on which poultry litter has been spread for at least five weeks.

Vehicles and equipment should be cleaned and disinfected after being used for removal of litter. They should not be used for carrying feedstuffs or new litter but if this is unavoidable, for example on small farms, the items should be cleaned and disinfected immediately after litter removal, left to dry completely then re-disinfected and dried before use for feedstuffs or new litter.



7. Routine Hygiene and Husbandry

Each farm should have its own operating procedures, preferably as a manual of working instructions, which contains a checklist of routine hygiene and husbandry tasks.

7.1 Personnel

A footbath containing an officially approved, preferably phenolic, disinfectant made up at the maximum recommended concentration and a brush should be provided outside each poultry house and used each time the building is entered or left. The bath should be replenished daily to maintain sufficient depth and the disinfectant renewed once soiled or, in any event, at least once a week. Additional guidance on the use of a disinfectant in footbaths may be given on the manufacturer's label or the safety data sheet. Step over barriers incorporating a footbath at the main service entrance to each house are more effective than footbaths alone. An alternative to footbaths is step-over barriers combined with separate boots (and preferably overalls) for each house. Care must be taken to avoid contaminating anteroom floors with material from outside the house if no footbaths are in use. Side and rear doors without footbaths or barriers should not be used during the life of the flock other than for necessary safety procedures.

Rest rooms, toilets etc., should be kept clean and tidy and sweepings disposed of rather than returned to the house. Adequate washing facilities should be provided. Hands should be washed with an antibacterial sanitiser before and after smoking, which should be restricted to designated areas. Hands should also be washed before and after meals as well as after visits to the toilet. An alcohol based gel or spray can also be used after hand washing to improve the antibacterial effect. Protective clothing should be laundered regularly and kept separate from that which is in use. Non-farm clothing should also be kept separate. On large farms separate boots and overalls



should ideally be maintained and used in each separate building. This should be considered essential on multi-age sites.

Hand washing facilities or disinfectant hand sprays should be provided in poultry buildings and hands should be washed before and after handling birds and on leaving a poultry building. Disposable plastic gloves may be used for operations that would lead to gross hand contamination. Gloves should be changed on completion of the task or before handling birds and hands should still be washed once gloves are removed.

Monitoring of the *Salmonella* Status of the Flock

Knowledge of the *Salmonella* status of flocks provides a check on the effectiveness of the biosecurity measures, helps with decision-making on disinfection at depopulation and on the organisation of slaughter, which is a major contributor to the reduction of *Salmonella* in the food chain. Although there is no statutory requirement to monitor the *Salmonella* status of chickens reared for meat, most producers now have monitoring regimes in place. Positive results should be discussed with your veterinary surgeon. Procedures should be reviewed and appropriate action taken in the case of persistently contaminated houses.

The details of the monitoring regime to be used should be discussed with your veterinary adviser but the following is provided as a guide. Veterinary advice should be sought if the results of tests on any samples are positive. Under the Zoonoses Order 1989 the presence of a *Salmonella* must be reported by the laboratory to a veterinary officer of the Secretary of State. This information is collated, analysed and published annually and helps to inform veterinary surgeons and advisers of changes and trends in *Salmonella* types found.



8. Time to Sample

8.1 Chicks

Salmonella tests can be carried out on Dead-on-Arrival chicks and delivery box liners (see Section 2.1). The manner in which samples are taken is extremely important. Chick box liner samples should be taken in an aseptic manner, using disposable plastic gloves, immediately after unpacking as these can be easily contaminated by residual *Salmonella* in dust in a poorly disinfected house.

8.2 Growing Birds

It is best to take samples as late in the growing stage as possible, to maximise detection of late infection. Results of testing must be available in time to take action so that positive flocks may be processed last at slaughter to reduce contamination of the processing plant. Usually, 1-2 weeks before depopulation is the optimum time but check arrangements with the laboratory and processing plant.

The best method of sampling is to take approximately 20g bulked samples comprising pinches of litter or dust from at least ten different places throughout the house. These can be taken into an inverted polythene bag or with new disposable plastic gloves. Alternatively, absorptive boot swabs or large drag swabs may be used. One such sample per house may be all that is practicable but increasing the number of separate tests will increase the chance of detection. Samples of dust should be collected from the most abundant sources, such as extractor fan baffles and low beams and should ideally be tested separately from litter samples.

Any sample taken for *Salmonella*, should be collected into a sterile plastic pot or bag. Samples should be despatched within 24 hours of collection and tested as soon as possible on arrival at the laboratory. Ideally, laboratories to which samples are sent for testing should hold a third party accreditation relevant to the test being carried out and issued by an organisation that conducts a quality control assessment.



Cleaning and Disinfection at Depopulation

Thorough cleaning, disinfection and rodent and arthropod (flies, beetles etc.) control should be part of every poultry farm's routine. The programme used should be capable of eliminating *Salmonella* from the environment and should be implemented even if it has not been identified during the life of the previous flock, as some infections will always evade detection.

If *Salmonella* has become persistent in a house it is advisable to allow sufficient time after depopulation for both cleaning and disinfection to be carried out thoroughly, for its effectiveness to be checked by bacteriological examination and for the process to be repeated if necessary.

On multi-age sites precautions should be taken during cleaning to reduce the chances of transmitting infection by aerosols or effluent to buildings that are still occupied. Likewise care should be taken to avoid transferring infection from older birds to cleaned houses or newly introduced birds (See sections 4, 5 & 7).

A checklist detailing each step of the cleaning and disinfection process is recommended to ensure that all aspects are dealt with. Full compliance with biosecurity and hygiene measures should also be monitored by fieldsmen as part of their work objectives.

9. Cleaning and Disinfection Procedures

9.1 Forward Planning

The timing of depopulation and restocking and organisation of cleaning and disinfection should allow for the maximum possible empty time. Planning will include booking contract workers in advance and arranging for minimal feed and other supplies to remain after depopulation. A list of items needing maintenance, repair or replacement once the buildings are empty should be



made. Planning must also include the necessary COSHH (Control of Substances Hazardous to Health) assessment.

Rodent and arthropod control should be part of the normal routine. If rodent infestations have built up, intensive baiting and trapping will be necessary at depopulation to reduce their dispersal into the surrounding environment and subsequent re-entry to buildings after restocking. (See section 2.3).

Disinfectant footbaths should be maintained at the entrances to the houses throughout the cleaning and disinfection procedure. Clean footbaths should be put in place immediately after washing is completed.

9.2 Dry Cleaning

Dead birds, rubbish and surplus feed should be removed from the site. All moveable equipment should be taken to a hard standing for cleaning and disinfection or after cleaning returned to the house for disinfection, ensuring that floor surfaces are still accessible for treatment.

Buildings should be treated for pests (arthropods, such as litter beetles, if present), immediately after removing the birds and rodent control measures intensified as necessary. In cases of severe arthropod infestation a residual insecticide/acaricide should also be applied after completion of disinfection. Rodent baiting points should be removed immediately before the washing and disinfection process and replaced with new or disinfected baiting equipment and new bait after completion of disinfection or fogging/fumigation.

Dust should be blown down or vacuumed from high fittings before mucking out and litter removed for disposal off the site.

Floors should be swept clean of remaining litter. When litter is removed from the site loads should be covered with sheeting.

Buildings, including passages, feed and equipment stores, rest rooms and other ancillary buildings should be dusted or



vacuumed and swept. The external surfaces and fittings of the house and the entrances and pathways should be well cleaned.

9.3 Washing

Use of a detergent/sanitiser applied through a power washer will assist with loosening adherent dirt. Steam cleaning may be useful for cleaning difficult equipment, such as metal tube feeders. Some manual scrubbing may also be necessary. Steam cleaning may also be used for the structure of the house but it has no sterilising effect so adequate disinfection should still be carried out. The shell of the building, ancillary rooms and equipment should then be cleaned by power washing, paying particular attention to litter trapped in cracks and holes in floors and dwarf walls at bird level.

Safety precautions should be followed particularly when cleaning electrical equipment, which should be disconnected as necessary. If the electric system is not waterproof, a higher standard of dusting together with fogging or fumigation should be used for high fittings. Small fittings, which cannot be power washed, may be wiped with a cloth soaked in disinfectant after dry cleaning. The inside and outside of the house should reach the same stage of cleaning before disinfection to avoid recontamination. After washing, surfaces should be allowed to dry as fully as possible before disinfection and in particular all pooled wash water should be swept away and disposed of safely. Pollution of water courses and drains must be avoided.

9.4 Feed Bins and Other Equipment

Feedbins, together with other parts of the distribution system such as augers, slave hoppers, reservoirs, chain feeding systems etc., should be emptied as soon as possible after depopulation and cleaned to a high standard and allowed to dry completely. Residual feed from bulk hoppers should ideally not be taken to other farms, especially if *Salmonella* was present on the farm of origin. Feed and water trays or pans, gas heaters, and wire to be used in brooders as well as space heaters and mobile stir fans should also be cleaned



and disinfected to a high standard. Cleaning equipment such as scrapers, brushes, power washers etc., should be cleaned and disinfected before transfer to another house.

9.5 Water System

Water lines should be cleaned by flushing through followed by internal disinfection using a water system sanitiser. The header tank and surrounding platforms, beams etc., should be thoroughly cleaned and disinfected. Limescale aggregate on bell or cup drinkers should be removed using acid products before disinfection.

9.6 Repairs and Maintenance

Staff and contractors carrying out repairs etc. should wear clean protective clothing provided by the farm. The exterior of toolboxes and stepladders etc., used by contractors, should be disinfected on entry to the farm. Holes, which allow easy access to rodents, should be sealed. This includes drain holes, which can be sealed with wire plugs. All repairs, which are likely to dislodge hidden litter or dust, should be completed preferably before washing but certainly before disinfection. If this is not possible the area worked on should be cleaned and re-disinfected.

9.7 Disinfection

Cleaning of buildings and equipment should be followed by disinfection using an officially approved disinfectant which must be used in accordance with the label instructions at DEFRA General Orders dilution rates (or TB rates if disinfection is particularly difficult) and the necessary COSHH assessment. It is important that all disinfectants are made up to the correct concentration otherwise they may be ineffective.

In most cases the DEFRA General Orders concentrations are appropriate for *Salmonella* control on clean surfaces but in difficult to clean houses (e.g. old structures, earth floors, crevices and damaged surfaces etc.) incompletely dry houses or recurrently infected houses higher concentrations (e.g. DEFRA T.B. Orders Concentration or concentrations up to the



manufacturers maximum recommended concentration) may be more appropriate. In general formaldehyde based disinfectants and, to a lesser extent, phenolic disinfectants are the most effective when residual organic matter is present. All surfaces should be thoroughly sprayed to saturation point with disinfectant and special attention should be given to slave hoppers and reservoirs, dwarf walls, ventilation ducting and high beams, platforms and pipes. Ancillary rooms and the outside areas surrounding doors and ventilation ducts should also be disinfected.

9.8 Assembly and Check of Equipment

After it has been cleaned and disinfected equipment should be reassembled and replaced in the buildings. It is advisable to also include as much equipment as possible in the house disinfection to avoid recontamination (e.g. by wild bird droppings, splashes from pressure washing etc.). All equipment should be checked to ensure that it is functioning correctly, except that drinkers should remain empty until after fogging or fumigation.

9.9 Fogging and Fumigation

Careful attention should be given to health and safety considerations during fogging, which should be conducted in accordance with the necessary COSHH assessment. Fogging with formaldehyde or a formaldehyde based product is the most effective method, especially if carried out after earlier spray disinfection with a phenolic product. Fumigation is most effective at an ambient temperature of over 20°C with high humidity but fogging is more adaptable to lower temperatures. All doors and hatches should be kept closed and fans turned off for as long as possible during and after fogging. Surfaces should be allowed to dry as much as possible after disinfection and before fogging. Although repeat fogging after laying new litter and final setting up of the house is sometimes carried out, this is not fully effective and should not be seen as a substitute for a high standard of prior disinfection.



9.10 Vehicles

The Transport of Animals (Cleansing and Disinfection) (England) (No.2) Order 2000 (and equivalent legislation in Scotland, Wales and Northern Ireland) requires that vehicles used for transporting birds must have been cleaned and disinfected. Following a journey vehicles must be cleaned and disinfected as soon as reasonably practicable but, in any case, within 24 hours of the journey being completed and before they are used again to transport livestock. If after cleaning and disinfection they have become dirty, they must by law be cleaned and disinfected again before they are used. Vehicles used for the removal of manure and feed during the cleaning process should be cleaned and disinfected before use on another site. Farm vehicles used for serving poultry houses or handling wastes should be cleaned and disinfected as part of the routine site programme before repopulating. When necessary other vehicles used on the farm, including the inside floor and boot of private cars, should be cleaned.

9.11 Microbiological Assessment of Cleaning and Disinfection

The purpose of this is to ensure that the cleaning and disinfection procedures have been effective particularly if *Salmonella* was detected in the house before depopulation. Ideally if *Salmonella* is detected after disinfection, the process should be repeated. There may be insufficient time to allow this before restocking and positive results may signal the need for a higher standard of disinfection in future.

For reasons of safety, buildings that have been fogged or fumigated, should be thoroughly ventilated before they are entered for sampling. Ideally disinfectants should have had time to dry before samples are taken. It is recommended that the following samples are taken – floor sweepings, litter trapped in holes and cracks in dwarf walls, swabs (large gauze or cotton wool swabs in all cases) from high fittings (i.e. beams, pipes,



header tank platforms, air extractors), bases of wooden support posts and partitions, wall mounted fan boxes and mobile stir fans, slave feed hoppers and reservoirs, brooder feed and water pans and floors and fittings in ante-rooms. Any dead rodents found may be tested for *Salmonella*.

Test samples should be tested as soon as possible after collection, ideally on the same day. A sensitive *Salmonella* culture method suitable for environmental samples should be used. Laboratories to which samples are sent for testing should ideally hold an accreditation relevant to the test being carried out (See section 8.2). Additional tests to determine surface coliform counts may also be useful to assess the effectiveness of cleaning and disinfection where *Salmonella* is not present.

10. Restocking

10.1 Rodent Control

Baiting inside the buildings should be resumed as soon as possible after completion of disinfection. In heavily infested houses, contact rodenticides and traps should be used on rodent runs which are out of reach of the birds, to supplement feed based baiting points inside and outside the building and around the perimeter of the site.

10.2 Transport

Equipment and vehicles used for transporting chicks from the hatchery should be dedicated to that purpose and must be cleaned and disinfected with an officially approved disinfectant in accordance with the Transport of Animals (Cleansing and Disinfection) (England) (No.2) Order 2000 (and equivalent legislation in Scotland, Wales and Northern Ireland) (See section 9.10). Personnel and equipment involved in depopulating houses, especially loaders and transport crates, are potential sources of contamination and precautions should be taken to reduce this risk before they enter or are taken into the poultry houses.



10.3 Aids to Salmonella Control

In a situation when *Salmonella* or a particular strain of *Salmonella* has become prevalent within a poultry flock, the chances of the infection spreading, becoming persistent or a high proportion of birds carrying *Salmonella* at slaughter, can often be reduced. Consider with your veterinary adviser procedures and operations that will help reduce the chance of persistence of *Salmonella* between flocks.

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Annex 1 Visitors' Book

Date	Name of visitor	Company name/address	Purpose of visit	Date of last contact with poultry/livestock	Time of arrival	Time of departure

Annex 2 *Salmonella* control – a summary

Control point	Keeping <i>Salmonella</i> out	Controlling the spread
Unit	<p>For new units – locate well away from other farms and landfill sites.</p> <p>Keep clean and tidy.</p> <p>Perimeter fence/information signs.</p> <p>Clean parking for vehicles off-site.</p> <p>Provide washing/disinfection facilities/footbaths.</p> <p>Clean and disinfect houses and surrounding areas regularly.</p>	<p>Keep clean and tidy.</p> <p>Provide washing/disinfection facilities/footbaths/protective clothing.</p> <p>Clean and disinfect houses and surrounding areas regularly.</p> <p>All in/all out system.</p>
Flocks	<p>Obtain day old chicks from breeding flocks or hatcheries complying with relevant legislation for the monitoring of <i>Salmonella enteritidis</i> and <i>Salmonella typhimurium</i>.</p> <p>Introduce an effective <i>Salmonella</i> monitoring programme.</p> <p>Ensure adequate empty time between flocks.</p> <p>Ensure adequate hatchery procedures in place to detect and control <i>Salmonella</i>.</p> <p>Check from a reliable source.</p>	<p>Use separate protective clothing and/or disinfectant footbaths for each house.</p> <p>Control wild birds and rodents.</p> <p>Step-over barriers.</p> <p>Review positive results with veterinary surgeon.</p>
Staff	<p>Train and inform.</p> <p>Keep “work clothes” on site and clean and disinfect regularly.</p> <p>Provide written hygiene protocols and monitor for compliance.</p> <p>Clean rest room, washing and toilet facilities.</p>	<p>Keep “work clothes” on site and clean and disinfect regularly.</p> <p>Provide written hygiene protocols and monitor for compliance.</p> <p>Wash hands before handling birds.</p>
Pest control	<p>Effective control programme.</p> <p>Tidiness/avoid feed spills.</p>	<p>Check controls effective.</p> <p>Increase controls at depopulation.</p>



Control point	Keeping <i>Salmonella</i> out	Controlling the spread
Visitors	Restrict entry. Visitors' book. Provide clean protective clothing.	Provide clean protective clothing. Inform visitors of hygiene rules.
Feed	Ensure adequate procedures in place at feedmill to detect and control <i>Salmonella</i> . Secure, clean storage away from birds.	Avoid re-use of feed from empty houses.
Litter	Clean source, not contaminated.	Dispose of safely.
Water	Mains or tested/chlorinated source.	Enclosed system. Clean and disinfect system before/after each flock.
Animal waste	Careful disposal of litter away from site.	Clean up spillages of litter around houses after mucking out. Dispose of dead birds safely.
Equipment	Do not share equipment. Clean and disinfect regularly.	Clean and disinfect equipment when shared between different houses of the farm. Clean and disinfect regularly.
Depopulation	Clean personnel. Clean vehicles. Clean crates.	Implement cleaning and disinfection programme. Plan ahead. All in/all out.



Annex 3 Checklist for preparation of a detailed plan for cleaning and disinfection of units at depopulation

Preparation

- Note depopulation date and prepare a plan
- Consult COSHH assessments
- Ensure rodent controls are effective
- List items for repair and maintenance and order replacements
- Ensure cleaning equipment, disinfectant (officially approved) available
- Ensure competent staff available
- Ensure other animals on adjacent land will not be contaminated during cleaning
- Run down feed supply
- Remove and store end of crop feed stocks in a manner which avoids contamination

At depopulation

- Remove all birds from the building
- Remove and dispose of carcasses
- Remove residual feed
- Check rodent control effective/intensify as necessary
- Apply control measures for insects, mites, beetles etc. as necessary
- Carry out repairs to building structure as necessary

Cleaning and washing

- Clean out manure, bedding, dust, waste, etc.
- Take all movable equipment outside, clean and wash



- DANGER – disconnect electrical equipment as necessary
- Drain, flush, clean water system, dismantle as necessary
- Clean feeding system thoroughly, feed areas, bins, hoppers etc.
- Clean ancillary rooms, fans, storage areas, rest rooms, farm vehicles and other equipment
- Clean bins used for waste material, boot dips
- Clean equipment used for the storage and disposal of dead birds
- Pressure wash the building, pens, other areas to remove remaining dirt
- Dispose of all waste safely
- Ensure that all cleaning equipment is cleaned and disinfected
- Complete repairs and maintenance

Apply disinfectant

- Ensure the building is dry
- Follow label instructions and COSHH
- Apply officially approved disinfectants at General Orders rates or formaldehyde at 2% to
 - the building structures
 - moveable equipment and reassemble
 - all ancillary and common areas
 - feed storage areas, bins, hoppers
 - flush water system and drinkers with appropriate disinfectant, such as a peroxygen product
 - equipment used for the storage and disposal of dead birds



Fogging

- Apply 30-40% formaldehyde solution (formalin) or other suitable disinfectant at fogging concentration through a thermal fogger to re-saturate surfaces after spray disinfectant has dried

Before restocking

- Replace rodent bait
- Check no areas overlooked and equipment is functioning
- Ensure there is no potential for contamination of bedding, feed or replacement stock on entry to the farm

Annex 4 Other sources of useful information

Code of practice for the prevention and control of *salmonella* in breeding flocks and hatcheries
(DEFRA publications PB 1564)★▲

DEFRA Codes of practice for the control of *salmonella* in the production of final feed for livestock
(DEFRA publications PB 2200 and PB 2201)★▲

DEFRA Code of practice for the control of *salmonella* during the storage, handling and transport of raw materials intended for incorporation into, or direct use as, animal feedingstuffs
(DEFRA publication PB2202)★▲

Code of practice for the prevention of rodent infestation in poultry flocks (DEFRA publication PB 2630)★▲

Code of Good Agricultural Practice: The Air Code
(DEFRA publication PB 0618)★

Code of Good Agricultural Practice: The Water Code
(DEFRA publication PB 0587)★

Code of good practice – Prevention of Environmental Pollution from agricultural activity▲



Guidelines for farmers in NVZs
(DEFRA publication PB 5505)★▲

Codes of Recommendations for the welfare of breeding chickens
(DEFRA publication PB7274)★▲

Codes of Recommendations for the welfare of meat chickens
(DEFRA publication PB7275)★▲

General Control of Substances Hazardous to Health (COSHH)
Approved Code of Practice (ISBN 0717616703)†

The Transport of Animals (Cleansing and Disinfection)
(England) (No2) Order 2000 (SI 2000/1618)†

The Transport of Animals (Cleansing and Disinfection)
(Scotland) Order 2000 (SSI 2000/167)▲

Guidance note to the Transport of Animals (Cleansing and
Disinfection) (England) (No2) Order 2000
(available from DEFRA)◆

The Animal By-Products Order 1999 (SI 1999/646)†▲

List of DEFRA approved disinfectants
(available from DEFRA)◆

Available from:

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† Stationery Office, Publications Carre, PO Box 276,
London SW8 5DT

◆ Animal Disease Control Division, 1A Page Street,
London SW1P 4PQ

▲ SEERAD, Livestock Animal Health and Welfare Division,
Room 350, Pentland House, 47 Robbs Loan,
Edinburgh EH14 1TY



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