Code of Practice for the Prevention and Control of *Salmonella* in Commercial Egg Laying Flocks

Defra deals with the essentials of life – food, air, land, water and people

www.defra.gov.uk

defra
Department for Environment Food and Rural Affairs

Department for Environment, Food and Rural Affairs
Defra Publications, Admail 6000, London SW1A 2XX
Tel 0645 556000

© Crown Copyright 2007.

www.defra.gov.uk

PB 2205

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 National Assembly of Wales, the Department of Agriculture and Rural Development (Northern Ireland), the Food Standards Agency, the British Egg Industry 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 (0645 556000). The Code of Practice for the Prevention and Control of *Salmonella* in Commercial Egg Laying Flocks is also to be made available on the Defra website.

Contents

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 infect and be transmitted by all animals, including humans. In the case of poultry, there is the possibility of transmission of infection inside intact eggs from breeding and laying flocks. If *Salmonella* is present in or on eggs it increases the risk that consumers may consume *Salmonella* and may occasionally suffer food poisoning. It is important to reduce this hazard at all steps in the production, storage and preparation of eggs.

There are more than 2,500 different types (serotypes) of *Salmonella*. Most do not normally cause clinical disease in poultry. Virulent strains such as *Salmonella* Enteritidis have been associated with illness and mortality in young chickens, although reports of disease in poultry caused by *Salmonella* are currently rare.

Salmonella Enteritidis infection in humans shows a strong epidemiological association with consumption of eggs or certain dishes which include eggs as an ingredient. Vertical transmission from breeding flocks to commercial flocks of two of the most significant serotypes, *Salmonella* Enteritidis and *Salmonella* Typhimurium, has been virtually eliminated[1] and the occurrence of all serotypes in breeding birds is rare. Horizontal transmission, that is introduction of infection to newly placed pullets from the environment including farm buildings and equipment, feed, infected rodents and other wildlife vectors, remains a key route for maintenance of infection in the layer sector.

---

[1] There has been statutory monitoring and control of *Salmonella* Enteritidis and *Salmonella* Typhimurium in layer and broiler breeder 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. New legislation relating to breeding flocks was introduced in 2007 (The Poultry Breeding Flocks and Hatcheries Order 2007).

Code of Practice for the Prevention and Control of *Salmonella* in Commercial Egg Laying Flocks

Some *Salmonella* organisms do occur in the environment and their complete elimination from poultry in all but the primary breeder sector is unlikely to be economically feasible. Despite this, good management can avoid the risk of introduction and persistence of infection by important types such as *Salmonella* Enteritidis in commercial laying flocks, particularly since improved *Salmonella* control in the breeder sector and in feed production has greatly reduced the risk from these sources.

An EU – wide survey of commercial laying flocks was carried out in 2004 -2005. The results showed that 8% of layer flock holdings in the United Kingdom (UK) were infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium. This indicates that UK levels of *Salmonella*e of public health significance within the laying flock sector are amongst the lowest in Europe and demonstrates excellent progress in the reduction of *Salmonella* in layer flocks in the UK. The success of industry led initiatives has played a considerable role in this. However, further work still needs to be done to reduce this level further, particularly in the case of larger farms which, according to the survey findings, are at greater risk of being infected with one of these *Salmonella* serotypes.[2]

From the 1st February 2008 a National Control Programme (NCP) to reduce the prevalence of *Salmonella* Enteritidis and *Salmonella* Typhimurium in laying flocks will be introduced to comply with the requirements laid down in new European legislation. This will require monitoring of day old layer chicks coming onto the rearing farm and further monitoring of pullets 2 weeks before transfer to the layer house. Laying flocks will be monitored every 15 weeks during production. Under the same legislation there will be a requirement, from 1st January 2009, for eggs going for human consumption from flocks infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium to undergo heat treatment to eliminate *Salmonella*.

---

[2] EFSA Community Report, published in 2007 at http://www.efsa.europa.eu/en/science/monitoring_zoonoses/reports/report_finlayinghens.html

The purpose of this Code is to assist flock owners in preventing the introduction, spread and persistence of *Salmonella* infection in commercial laying flocks[3]. 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 commercial eggs are produced in controlled environment housing systems; not all parts of the Code can be applied to free range or small scale 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 and diseases in laying flocks. Discuss the Code with your veterinary surgeon and consider how it may best be implemented on your premises taking into account factors such as location, housing and management, which are specific to your enterprise.

This Code complements the Code of Practice for the Handling and Storage of Eggs and the Code of Practice for Prevention of Rodent Infestation in Poultry Flocks.

It is also mandatory for British Egg Industry Council Assured farms to comply with the current edition of the Lion Code.

[3] Chickens (domestic fowl) *Gallus gallus*

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 already close to such sites, a higher level of protection against the introduction of disease is required. This includes wildlife and fly control and ensuring that no drainage or waste from nearby properties enters the farm.

1.2 Poultry Site

Good biosecurity[4] 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 or free-range paddocks should be restricted to those with essential duties.

There should be a hard standing for parking as far away as possible from the poultry houses, which should be kept clean and disinfected. On-farm roadways should ideally have a hard surface, which can be cleaned effectively. Roadways should be kept clear of faecal soiling to prevent

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

vehicles becoming contaminated and areas where pools of surface water collect should be filled in.

A disinfectant footbath (maintained in accordance with the guidance in section 7.1) and brush should be placed at the entrance to the site and/or near the vehicle parking area. Ideally a separate gatehouse should be provided, where visitors can change into overalls and boots provided by the farm and sign a visitors' book (see Annex 1 for suggested headings). Thorough cleaning followed by spray disinfection of the wheels and wheel arches of vehicles at the point of entry to the site is also advisable. Vehicles with obvious faecal soiling should not be admitted.

The site should be kept clean and tidy to discourage wild birds, rodents and flies. In particular feed spills and egg debris should be properly cleaned up and never left overnight.

1.3 Poultry Houses

Ideally, there should be a hard surface/gravel area around the perimeter of houses which is designed to avoid puddling and possibly help to discourage rodents.

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 or around the houses for the same reason.

The ventilation system used in the houses should be well maintained to minimise the build up of dust in the atmosphere and on surfaces and equipment.

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 are required to comply with the relevant legislation on the monitoring and control of *Salmonella* Enteritidis, *Salmonella* Typhimurium, *Salmonella* Hadar, *Salmonella* Virchow and *Salmonella* Infantis and action is taken if a flock is confirmed to be infected[5]. 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.

Farms receiving pullets or older hens rather than chicks should obtain these from a reputable source and ensure that results of previous *Salmonella* testing are satisfactory. From 2008, with the introduction of the National Control Programme, monitoring of day-old layer chicks coming onto the farm and further monitoring 2 weeks before transfer to the layer house for *Salmonella* will be required. Subsequent monitoring of adult birds every 15 weeks during production will also be a mandatory requirement.

Vaccination of pullets against *Salmonella* Enteritidis and/ or *Salmonella* Typhimurium should be discussed with your veterinary advisor. Vaccination is mandatory in certain farm assurance schemes.

The whole site should ideally 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 be sufficient time between disinfecting the last house and restocking the first to allow for action to be taken to correct any problems.

---

[5] Breeding flocks of 250 or more birds must be monitored for *Salmonella* Enteritidis, *Salmonella* Typhimurium, *Salmonella* Hadar, *Salmonella* Virchow and *Salmonella* Infantis under the Poultry Breeding Flocks and Hatcheries Order 2007. If a flock is confirmed to be infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium, no eggs may be sent for hatching and the flock is slaughtered. If infection with *Salmonella* Hadar, *Salmonella* Virchow or *Salmonella* Infantis is confirmed, an approved control plan to reduce the prevalence of infection in the flock must be implemented.

Where laying farms are occupied on a continuous basis there is a greater risk of *Salmonella* being established, so hygiene precautions to avoid transfer of infection between houses and consecutive flocks and effective control of rodents and other pests are even more important.

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. Other animals also may carry *Salmonella* and these should ideally be kept separate from poultry where possible. There is some risk to free-range flocks when these are co-grazed with sheep, cattle or game birds. Suitable precautions to minimize risk should be discussed with your veterinary adviser.

2.3 Wild and Feral Animals

All buildings, including storerooms, should be proofed against entry by wild birds. The presence of wild birds in the vicinity should be discouraged by general tidiness, clearing vegetation and other perching places, cleaning up feed spillages promptly and good drainage to reduce pooling of surface water. Flies and other arthropods, including red-mite and litter beetles, may be involved in *Salmonella* infection in housed poultry so these should be effectively controlled by appropriate insecticide treatment. Specialist advice should be sought on this. Rodent and red-mite populations in particular have been implicated in persistence of *Salmonella* on infected units.

Rodent habitats should be eliminated by maintaining the premises in a state of good repair and a planned programme of baiting and/or trapping in and around the buildings and around the site perimeter should be undertaken. The rodent control programme should be intensified during periods when houses are empty and if rodents, droppings, tracks, chewing damage or disturbed bait are seen.

It is essential to review the rodent control measures regularly, monitor the effectiveness and seek further specialist advice if the programme does not appear to be working. Further guidance on rodent control is available in the Defra Code of Practice for the Prevention of Rodent Infestation in Poultry Flocks. Care should be taken to ensure that rodent control does not impact on dormice which are legally protected and further advice is available from Natural England.

On free-range farms, foxes and other small mammals as well as wild birds may be carriers of *Salmonella* and therefore these animals should also be deterred. Prompt and careful removal of dead birds (see section 6.1), general tidiness, feeding birds and providing water indoors only, good quality fencing and frequent human activity on the site will help to discourage foxes and other scavengers from entering 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 AIC (Agricultural Industries Confederation) codes of practice for the control of *Salmonella* (AIC's Universal Feed Assurance Scheme, UFAS, requires compliance with Defra and AIC codes of practice). Results of *Salmonella* monitoring of feed and milling processes can be made available on request and 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 be at a high risk of *Salmonella* contamination such as cereals and oil seeds stored in flat stores or open bins on livestock farms should be avoided where possible. Consider with your veterinary adviser if there would be advantages in treating protein, cereal

ingredients and whole grain feed with aldehyde/acid mixtures (although on organic enterprises the use of aldehydes is not permitted). Use of an organic acid product which contains a high proportion of free acid may also be used to help protect feed when feed is not heat treated. Heat treated feed is rarely used for commercial layers. If it is used, it should be heated for a sufficient time and at an adequate temperature to minimise *Salmonella* contamination and cooled, 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, disinfected and fully dried before finished feed is carried. There should be a documented hygiene programme for all vehicles, with vehicles cleaned inside and out, including the interior of lorry cabs. Drivers should wear clean boots and overalls and should not enter poultry or storage buildings.

Feed should be stored in closed bulk storage bins, hoppers or sealed bags. Any rainwater leaks or condensation problems in feed storage areas must be corrected when seen. Attention should be paid to regular cleaning of bulk storage bins, augers and hoppers. Accumulations of older materials in feed troughs must be prevented as *Salmonella* in residual feed particles may multiply and is less susceptible to disinfection. Spillages and residues from feed augers and slave hoppers etc. should not be stored and re-used for the following flock. Storage and slave hoppers areas etc. should be kept free of birds and rodents.

Particular attention should be paid to health and safety requirements when cleaning bulk storage bins as these pose a significant safety hazard.

3.2 Water Supply

Water should be from a mains source. Any other source is acceptable only if it has been treated with chlorine or other suitable sanitisers and/or tests for bacteriological quality give satisfactory results. The delivery

system, including any header tank, should be enclosed to prevent dust contamination. If water quality is suspect, additional security against contamination may be obtained by acidification using acid or peroxygen products (the latter not for use however on organic enterprises). Chlorine and other sanitizers may inactivate some vaccines and data sheet recommendations should be followed if these are administered in the drinking water. On free range sites access to streams and surface water should be restricted.

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. Attention should also be given to education regarding the risk of introduction of infection to the flock by staff suffering from gastro-intestinal complaints, especially diarrhoea. A farm hygiene guide, which incorporates the principles of this Code, should be displayed in a prominent place.

Adequate toilet and washing facilities (including an alcohol based hand gel or spray to improve the antibacterial effect) should be readily available. Work boots, overalls and disposable plastic gloves should be provided for use only on the farm. It is preferable to provide separate boots and, if possible, protective clothing and gloves for each house. Those who enter poultry buildings should wear disposable overalls (ideal) 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 antiseptic soap, use a hand disinfectant spray or wear separate gloves in each house, and disinfect their boots.

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.

4.2 Visitors

Visitors (such as fieldsmen, maintenance personnel, delivery and collection staff, veterinarians, officials, etc.) are a potential means of introducing or spreading infection, especially if they visit other poultry farms. 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. They should enter poultry buildings or the range only if this is essential. Visitors should be discouraged from bringing any of their own equipment onto the farm. Where it is necessary for them to do so (e.g. electricians), attention should be given to hygiene.

Pullet delivery teams, catching and cleaning gangs, maintenance and pest control contractors and their vehicles may be a hazard. Operators should be encouraged to use the same high hygiene standards as farm staff.

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 that 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 and modules, 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 for cleanliness.

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 on arrival and before use on the site.

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

5.3 Egg Collection Equipment

The laying house should be kept as free as possible from broken and liquid egg, feed spillage and dust. Egg belts, belt brushes and other egg handling equipment should be cleaned regularly. Debris on the floor beneath belts and conveyors should be regularly removed, ideally by using disposable paper or polythene matting, and floor surfaces regularly cleaned and disinfected. Grading and packing equipment should be kept clean and regularly disinfected with a suitable disinfectant such as a peroxygen, chlorine or QAC based product. Facilities for hand washing and sanitisation for egg packing staff should be readily available and maintained in a clean condition.

Eggs should be collected and moved to a cool (ideally temperature controlled) storeroom as soon as possible after collection. Vehicles used for transporting eggs should be maintained in a visibly clean condition. Cardboard (keyes) trays should be visibly clean – free from faeces, broken egg or feathers. Dirty cardboard egg trays should be discarded. Cardboard egg trays should ideally be used only once. If re-use is

unavoidable they should ideally only be used in the same house or premises where they have been used previously. Where plastic keyes trays are used, these should be cleaned with an appropriate sanitizer. They should be visibly clean and free from faeces, broken egg or feathers. All trays should be stored in a clean, dry environment which is free from dust, wild birds, rodents and significant arthropod populations.

6. Disposal of Farm Waste

6.1 Birds

Flocks should be checked on a daily basis and any dead birds and culled birds should be removed after collection of eggs or by separate staff 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 2005 disposal must be by incineration or rendering. 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 subject to a documented hygiene protocol and maintained in a clean and tidy state so as not to attract flies and wild animals.

6.2 Used Litter/Manure

Poultry manure contains valuable plant nutrients. Application to land should follow the guidelines in the Defra Codes of Good Agricultural Practice for the Protection of Water[6] 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 and manure should be stacked for at least four weeks before spreading, longer if *Salmonella* is known to be present. Litter should be stacked as far away as possible from the

[6] Available on Defra website www.defra.gov.uk, publication number PB 0587

poultry houses. Precautions to prevent establishment of populations of rodents, flies and wild birds around manure heaps should be taken. Where facilities exist, the incineration of used litter and manure from flocks infected with *Salmonella* is preferred as *Salmonella* infected litter constitutes a risk both to the flock present on the premises as well as neighbouring farms.

Care should be taken with the disposal of poultry litter and manure to ensure that it does not become a hazard to other livestock or the environment.

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, they 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 simple manual of working instructions, which contains a checklist of routine hygiene and husbandry tasks. Named farm staff should be given responsibility for monitoring and maintaining standards. Training and compliance with the hygiene programme should be monitored regularly by management.

7.1 Personnel

A footbath containing a Defra approved 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 with additional disinfectant daily to maintain sufficient depth and the whole contents of the bath renewed once soiled or, in any event, at least twice 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. This is referred to as a "Hygiene Barrier" and is especially recommended for non-cage houses where there may be direct contact between material carried in on footwear and the birds.

Care must be taken to avoid contaminating ante-room floors with material from outside the house, and two footbaths – one outside the ante-room and another at the entrance to the house itself – are recommended. Side and rear doors without footbaths or barriers should not be entered during the life of the flock other than for necessary safety procedures (although throwing through bales of litter without actually entering the house is acceptable). It is very important that these footbath facilities are not only provided, but actually used every time the house is entered. The use of non-disinfectable footwear such as trainers should be discouraged.

Rest rooms, toilets etc. should be kept clean and tidy and sweepings disposed of rather than returned to the house. Hands should be washed before and after handling birds or eggs and on leaving a poultry building. Disposable plastic gloves may be used for operations that would lead to significant hand contamination. Gloves should remain with a single house and be changed on completion of the task or before handling birds or feeding systems and hands should still be washed or sanitised once gloves are removed. Hands should also be washed with an antibacterial sanitiser before and after meals, visits to the toilet and smoking, which should be restricted to designated areas.

Protective clothing should be laundered regularly and, when clean, kept separate from that which is in use. Non-farm clothing should also be kept separate. On large farms separate boots, gloves and overalls should ideally be maintained and used in each separate building. This should be considered essential on multi-age sites when transfer of infection from older flocks to new flocks is the main way that *Salmonella* is maintained on the site.

7.2 Feedstuffs

Equipment should be properly maintained and any spillage that does occur should be cleared away promptly, not swept into dumping pits. A regular check should be made of proofing and pest control measures and baiting increased if rodents' droppings, tracks, chewing damage or disturbed bait are seen in feed storage or distribution areas.

7.3 Egg Collection and Handling

Most egg collection is carried out automatically. Egg belts become contaminated with faecal material from the surfaces of eggs, contents of broken eggs, dust and rodent activity. The ends of the egg belts should be fitted with brushes which remove most of this contamination as the belts are run. Dust collection trays should be provided beneath the brushes to catch this material for disposal. Egg conveyors which run between houses or from houses to the packing area should be regularly cleaned and disinfected. Material falling beneath conveyors should be vacuumed or swept up and disposed of. Floor surfaces beneath conveyors should be regularly cleaned and disinfected.

Staff should wash their hands before and after handling eggs. Dirty, cracked or broken eggs should be removed from the collection system as early as possible and handled separately, as higher risk items, thereafter.

Egg grading and packing equipment should be kept clean and dry. Any flock health management or egg-handling problems leading to excessive breakage or faecal contamination of eggs should be investigated and corrected. If eggs from known infected flocks are being packed then this should be done after other flocks.

Egg handling and packing equipment including tables, vacuum lifters, candlers, grading machines, conveyors and surrounding floor surfaces etc. should be regularly cleaned and disinfected, ideally at the end of each working day. Machinery should be cleaned and disinfected, where possible whilst in motion so that all surfaces can be covered. An effective disinfectant compatible with food production use (e.g. a chlorine or

peroxygen based product at suitable concentration) should be applied to cleaned surfaces. Periodically, equipment should be dismantled to allow removal of organic matter which has built up in inaccessible parts of the machinery. Egg stores, trolleys, trays and pallets, as well as farm delivery vehicles, should also be regularly cleaned and disinfected.

Eggs collected for consumption should be kept in clean storerooms, separate from the poultry houses, under cool storage conditions as designated by the relevant assurance scheme. It is desirable to maintain eggs at a temperature of no more than 20˚C. Eggs should be packed in clean cardboard or disinfected plastic trays.

Staff collecting eggs should wash/sanitise their hands and preferably wear disposable gloves before collecting eggs and between collection from different flocks or after any other activity which may lead to contamination of hands before collecting eggs. If a known infected flock is present these eggs should be collected last and equipment cleaned and disinfected prior to use on the next day.

New trays, or dedicated colour-coded trays that do not leave the farm, should ideally be used for manual collection of eggs within the poultry house. After grading, a different set of trays which have not been used within the poultry house should be used for dispatch of eggs.

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 destination of eggs from infected flocks, which may be a major contributor to *Salmonella* infection in consumers. Some industry assurance schemes require monitoring programmes for the *Salmonella*s of public health importance to be in place. Ideally, however, all laying flocks should be tested for *Salmonella* regularly during rearing and lay to enable risk reduction measures to be introduced.

Under the Zoonoses Order 1989, the presence of a *Salmonella* must be reported by the laboratory that cultured the organism to a veterinary officer of the Minister. This information is collated, analysed and published annually and helps to inform veterinary surgeons and advisers of changes and trends in *Salmonella* types found.

From February 2008 the National Control Programme (NCP) for *Salmonella* in laying flocks will be implemented throughout the UK. This NCP complies with Regulation (EC) No 2160/2003 and Regulation (EC) No 1168/2006 making monitoring of the *Salmonella* status of commercial laying flocks a statutory requirement. From January 2009 the sale of fresh shell eggs direct for human consumption from flocks infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium will not be permitted. See section 11 for details of the sampling required by the NCP.

The details of any *Salmonella* monitoring programme, in addition to NCP sampling to be used on farm, should be discussed with your veterinary adviser but the following is provided as a guide. The guidelines in section 8, how to take samples are compatible with the requirements of the NCP given in section 11.

8. Time to Sample

8.1 Chicks

Salmonella tests should be carried out on Dead-on-Arrival chicks and delivery box liners or hatcher tray liners. The manner in which samples are taken is extremely important. Chick box or hatcher tray 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 Pullet Rearing Flocks

It is best to take samples as regularly as possible during the growing stage, to maximise detection of infection. Results of testing must be available in time to take action before birds are transferred to laying farms. Flock owners who purchase replacement birds should seek assurances regarding their *Salmonella* status and vaccination programme from the supplier.

The best method of sampling a flock is to take at least 2 pairs of boot swabs in non-cage houses or at least 60g of faeces from belts or scrapers in cage rearing houses. In addition to this, dust samples from surfaces close to the birds can be taken. These can be taken into an inverted polythene bag or with new disposable plastic gloves. 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 or floor surfaces beneath cages but dust originating from feeding systems should not be sampled. Dust should be tested separately from boot swabs or faeces samples.

A sampling procedure can be formulated with the help of your veterinary advisor, tailored to the situation on farm. More frequent sampling can be carried out to detect infection more quickly or more individual samples may be tested to increase the chance of detecting low level infections. More intensive sampling is recommended when the previous flock to be

housed was infected or if infection exists elsewhere on site. Additional serological monitoring may also be useful in some cases.

Any sample taken for *Salmonella* should be collected into a sterile plastic pot or bag with an airspace. Samples should be kept cool and dispatched within 24 hours of collection and tested as soon as possible, and in any case within 48 hours of arrival at the laboratory. If samples are not dispatched to the laboratory on the day of collection, they must be stored at 4˚C but not frozen, and must be submitted within 48 hours of collection. Laboratories to which samples are sent for testing should hold a third party accreditation relevant to the test being carried out and all samples taken as part of the National Control Programme must be sent to a Defra-approved laboratory (see section 11).

8.3 Monitoring During Lay

Most *Salmonella* infections begin after moving birds to laying accommodation. The frequency of infection in individual birds and eggs is low, so it is best to monitor bulked samples of faeces taken from droppings belts, scrapers or boot swabs from slatted and littered areas. Two samples consisting of 150g of faeces each and one sample of 100g of dust should be taken to represent as wide a distribution within the house as possible. Where automatic egg collection is used, dust collected at the end of egg belts is a convenient sample. In cage systems, dusty faecal material beneath cages or droppings belts can be sampled and in most types of house accumulated dust on horizontal surfaces in areas close to birds is a good sample. Dust is less useful in small naturally ventilated houses. The best sampling programme for a particular house is dependant on its design so it is best to discuss sampling programmes with the veterinary advisor for the farm or with a *Salmonella* reference laboratory. Where sampling is already in place according to an existing assurance scheme, it is still desirable to carry out regular monitoring as above, especially if there has been previous infection in the house or elsewhere on site.

8.4 Depopulation

As depopulation approaches it is desirable to monitor more intensively if previous sample results have been negative, using larger numbers of the samples described in 8.3. Potential wildlife vectors such as rodents and flies may also be sampled. Identification of infection in good time prior to depopulation will allow decisions to be made on improved cleaning and disinfection, pest control and protection of the incoming flock by enhanced vaccination or competitive exclusion.

Thorough cleaning, disinfection and rodent and arthropod (flies, beetles, red mite, etc.) control should be part of every poultry farm's routine. The programme used should be capable of limiting *Salmonella* contamination of the environment as far as possible and should ideally be implemented even if infection 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 cleaning, disinfection and pest control 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, movement of pests, 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 and farm management as part of their work objectives.

9. Cleaning and Disinfection Procedures

9.1 Forward Planning

The planning 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 before and after depopulation to reduce their dispersal into the surrounding houses or subsequent re-entry to buildings after restocking. If this has been left to the end of the life of the flock it is usually too late. (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 immediately after removing the birds and rodent control measures intensified as necessary. In cases of severe arthropod or red mite infestation, a residual insecticide/acaricide should also be applied before or immediately after depopulation of the house/ banks of cages and again 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. If there is a gap of more than 2 days between washing and disinfection bait points should be replaced during this time.

Dust should be blown down or preferably vacuumed from high fittings before mucking out and litter or manure removed for disposal off the site. In cage or slatted houses manure should be removed from pits or other storage areas for disposal off the site. It is recommended that the pit of deep pit systems should always be included in the cleaning and disinfection of the house, especially if *Salmonella* infection or a build up of pests has been identified. However, the regulations surrounding

restricted nitrogen zoning must be considered and adhered to, which may mean investing in more manure storage facilities.

Floors should be swept clean of remaining litter. Where there is a risk of disturbance of dust during cleaning which may enter other occupied houses on multi-age sites, adjustment of ventilation systems, vacuuming or damping down may be used to minimise exit of dust from the house. When contaminated waste material 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 and vacuumed/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 or foaming lance will assist with loosening adherent dirt. Steam cleaning may be useful for cleaning difficult equipment, such as cages and to reduce the amount of wash water required. 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, drinkers, feeders, egg belts, droppings belts/boards/scrapers and floor surfaces around and beneath cages. Ledges within cages and nipple line spillage cups or troughs should receive particular attention in cage systems.

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, including accumulates in feeders and drinkers, should be swept away and disposed of safely. Pollution of water courses and drains must be avoided. House fans can be used to accelerate drying after washing.

9.4 Feed Bins and Other Equipment

Feed-bins within houses, together with other parts of the distribution system such as augers, slave hoppers, reservoirs, chain or spiral feeding systems etc. should be emptied as soon as possible after depopulation, 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 on rearing farms 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. If *Salmonella* has been present in a house it is advisable to include organic acid or formaldehyde (the latter not in the case of organic enterprises) products in the feed for at least 2 weeks before and after restocking to help decontaminate inaccessible areas of feed delivery systems.

9.5 Water System

Water lines should be cleaned by flushing through followed by internal disinfection using a water system sanitiser such as an acid or peroxygen compound. The header tank and surrounding platforms, beams etc. should be thoroughly cleaned and disinfected. Lime scale aggregate on bell or cup drinkers should be removed using acid products before thorough disinfection. Spillage channels and cups beneath nipples in cages are a particular hazard and these should be well cleaned and

dried before disinfection or replaced. Water can also be acidified during the final weeks to reduce contamination of drinkers and spillage cups/troughs.

9.6 Repairs and Maintenance

Staff and contractors carrying out repairs 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 filled with bait then sealed. Drain holes 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 a Defra approved disinfectant which must be used in accordance with the label instructions. In most cases the Defra General Orders concentrations are appropriate for *Salmonella* control on clean surfaces. However, in difficult to clean houses (e.g. old structures, inaccessible equipment and cages, 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. These dilution rates are more concentrated than those of the 'Diseases of Poultry' or 'General Application' rates. As with any chemical usage, the necessary COSHH assessment should be carried out first. It is important that all disinfectants are made up to the correct concentration otherwise they will be ineffective.

In general formaldehyde based 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 feed hoppers and reservoirs, drinkers, feed

troughs, cages and floors beneath, egg belts and lifts, droppings boards, scrapers and belts, ventilation ducting and high beams, platforms and pipes. Ancillary rooms and the outside areas surrounding doors and ventilation ducts should also be disinfected. If *Salmonella* is present it may be advisable to use a specialist decontamination contractor to apply formaldehyde by spray.

Free-range houses should be cleaned and disinfected to the same standard as enclosed housing since the greatest risk of carry-over of infection relates to the interior of the house. If the previous flock has been infected, it is best to move to new pasture if possible or to plough or cultivate and reseed before restocking. If this is not possible, remove obvious faecal matter from the areas immediately surrounding the house and spray with a formaldehyde-based disinfectant. Reduction of *Salmonella* in paddocks will be greatest if depopulation is carried out in summer rather than winter. Keeping range grass short facilitates UV penetration of the soil.

9.8 Assembly and Check of Equipment

After it has been cleaned and disinfected, moveable 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, although drinkers and feeding systems should remain empty until after disinfection.

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 (undiluted formalin) or a formaldehyde based compound product is the most effective method, especially if carried out after earlier spray disinfection. Fumigation is most effective at an ambient temperature of over 20°C

with high humidity but fogging is more adaptable to lower temperatures and larger airspaces. 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 before fogging. Although fogging in rearing houses or barns after laying new litter and final setting up of the house is sometimes carried out, this is not fully effective and fogging should never be seen as a substitute for a high standard of prior disinfection because it does not disinfect all surfaces.

9.10 Vehicles

The Transport of Animals (Cleansing and Disinfection) (England) (No.3) Order 2003[7] (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, crates, trolleys and other equipment 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/ foot well 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

[7] The Transport of Animals (Cleansing and Disinfection)(England)(No.3) Order 2003 (SI 1724/2003)

disinfection, the process should be repeated. There may be insufficient time to allow this before restocking but positive results will signal the need for a higher standard of disinfection in future.

For reasons of safety, buildings that have been sprayed, fogged or fumigated with formalin, 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, as relevant to the different housing systems, gauze swabs/ sponge pads are taken from the following:

- Floor surfaces (including cracked areas)
- Walls (including cracked areas) and bases of wooden support posts and partitions
- High beams/ledges and pipe-work
- Fans and fan housing/boxes
- Manure belts/droppings boards, scratching areas
- In-house open feed hoppers/feeders
- Drinkers/nipple spillage troughs/cups
- Nest boxes/ cage interiors
- Egg delivery belts/elevators
- Ante-room fittings

Composite samples of litter trapped in holes and cracks in dwarf walls, floor sweepings and rodent faeces are also recommended. Any dead rodents or insect pests found may be tested for *Salmonella*. It is also possible to sample soil and pooled water from previously occupied paddocks on free range units.

Samples should be tested as soon as possible after collection. A sensitive *Salmonella* culture method, e.g. ISO 6579 Annex D method, suitable for environmental samples, should be used. Laboratories to which samples are sent for testing should hold an accreditation relevant to the test being carried out. 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, in addition to intensive baiting, contact rodenticides and traps should be used on rodent runs which are out of reach of the birds. Feed based baiting points should also be placed outside the building and around the perimeter of the site. It is important to ensure that harbourage for rodents has been eliminated and that the take of bait is monitored. In deep pit houses baiting should always include the pit[8]. When *Salmonella* is present in a layer house it is essential to effectively control rodents or all other measures, including vaccination and cleaning and disinfection, are likely to be ineffective. This may necessitate emptying pits or removing cladding from areas of walls or ceilings to gain access to protected rodent populations.

[8] PB 2630- Code of Practice for the prevention of Rodent infestations in poultry flocks

10.2 Transport

Equipment and vehicles used for transporting chicks from the hatchery or pullets from a rearing farm should be dedicated to that purpose and must be cleaned and disinfected with a Defra approved disinfectant in accordance with the Transport of Animals (Cleansing and Disinfection) (England) (No.3) Order 2003 (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, especially on multi-age sites when new infections may spread to other flocks.

10.3 Vaccination and Other Aids to *Salmonella* Control

Vaccination and other aids to *Salmonella* control should be discussed with your veterinary advisor as the best vaccine options may vary according to the type of *Salmonella* present and the conditions on the rearing and laying farms. Vaccination of pullets against *Salmonella* Enteritidis, either using an inactivated injectable vaccine or a live vaccine in the drinking water may be considered. If there is a particular risk of infection with *Salmonella* Typhimurium, a combined vaccine containing S. Enteritidis and S. Typhimurium may be used. If infection at the rearing stage is a significant risk then a live vaccine, which can be given at day old, may be preferable.

All vaccines should be stored and used according to the manufacturer's instructions and full courses given. Careful technique is needed for injectable vaccine to ensure that the full dose is accurately injected and no birds are missed. Live vaccines should not be given at the same time or shortly after antimicrobial treatment, including after treatment of chicks in the hatchery, or for a longer time if fluoroquinolone antibiotics have been used. It is often difficult to ensure correct administration of live vaccine in water lines and it is advisable to request an advisory visit from the vaccine manufacturer to ensure that application is correct.

Competitive exclusion treatment (CE) using a proprietary product comprising an anaerobic culture of harmless caecal bacteria can be given to enhance the effect of vaccination or to help reduce *Salmonella*s other than S. Enteritidis or S. Typhimurium for which vaccines are not available. CE should ideally be given to pullets at 'day old' (in which case the first live vaccination should be delayed until week 3) and just before moving to the laying house. In a continuously occupied house there may also be advantages in treating all birds in the house as new pullets are introduced to decrease the overall level of *Salmonella* excretion at that time.

Acidification of feed can be used to decrease the risk of new *Salmonella* infection being acquired from contaminated non-heat treated poultry meal. Acidification of water or feed may sometimes also reduce the extent of infection or excretion of *Salmonella* within a flock and thereby minimise contamination of eggs. Liquid feed acidification products containing the highest level of free formic and propionic acids or formaldehyde/acid combinations are the most effective but these should not be used at the same time as administering live vaccines. Compliance with the requirements for organic production must also be considered in the case of organic enterprises.

Antimicrobials are not permitted for the control of *Salmonella* of human health significance in breeding or laying birds unless there are clear animal health or welfare reasons for doing so. Most *Salmonella* infections in poultry do not cause obvious disease.

The National Control Programme for *Salmonella* in layers

A survey of laying farms for *Salmonella* was carried out in each Member State from 2004-2005. In the UK, samples of faeces, litter and dust material were collected from 454 farms. The results of this survey were used to establish a baseline prevalence of *Salmonella* on holdings with laying flocks in individual Member States and for the EU Community as a whole. The baseline figure for the UK was 8.0% for *Salmonella*s of public health significance (S. Enteritidis and S. Typhimurium). The baseline for other Member States ranged from 0% to 60%. The UK recorded the lowest prevalence level of Member States with a major laying flock industry (over 40 million birds).

Targets have been agreed to reduce the level of these *Salmonella*s. The UK has a target of reducing the prevalence by 10% each year compared with the baseline figure starting in February 2008. Countries with higher baseline levels were set a proportionately higher reduction target. The aim is to reduce *Salmonella* of public health significance at farm level and in eggs across the Community for the benefit of public health.

The National Control Programme for *Salmonella* in layers defines a sampling programme starting from February 2008 for rearing flocks and layers in production to be tested for *Salmonella* as a minimum requirement. Operators should take additional samples for examination when the situation on the farm indicates a more intensive sampling protocol would be beneficial. Farm assurance schemes may also require additional samples to be taken.

The samples which have to be taken in the National Control Programme are summarized below.

Sampling requirements per flock:

Chicks

- One chick box liner (or hatchery tray liner) for every 500 chicks delivered up to maximum 10 for every batch of chicks delivered.
- Carcasses of all dead-on arrival chicks (maximum 60) from each hatchery delivery.

Pullet Rearing

- 2 pairs of boot swabs (floor rearing) or large composite faeces sample(cage rearing) 2 weeks before point of lay/move to layer unit.

During lay:

2 pairs boot swabs (non-cage) or 2 x 150g composite faeces sample (cage) taken at:

- 22-26 weeks of age
- Thereafter every 15 weeks during production

In addition to the regular sampling to be carried out by the flock operator as above, an official sample will be taken each year from one flock on all holdings with more than 1000 adult birds and may replace the routine sample that would have been necessary from the flock sampled. Operators of all flocks which produce eggs for human consumption must take samples and have them examined to monitor for the presence of *Salmonella* with the exception of those who produce eggs for private domestic use, or producers who only supply small quantities of eggs to the final consumer, or to a local retail outlet that supplies direct to the final consumer. Flocks with under 1000 birds will not have to undergo the official sampling but producers will still be required to carry out the routine sampling during the laying period.

The samples taken by the operator in the National Control Programme must be dispatched to the laboratory on the day the sample is taken. Samples must be submitted to a laboratory approved to test for *Salmonella*. All approved laboratories are listed on the website www.defra.gov.uk

A record should be kept of the date when each flock is sampled for *Salmonella*, the identity of the flock sampled, the age of the flock sampled, the laboratory which undertook the analysis, and the results.

These records should be kept up to date and made available to authorized government officials or their agent on request.

From January 2009, when a flock is confirmed to be infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium all flocks on the holding will be officially tested. Flocks that are placed in a previously contaminated house are officially tested at the beginning of lay.

From November 2007, eggs from a flock which has been confirmed as being the source of a specific food-borne outbreak of *Salmonella* in humans may only be used for human consumption if they have undergone a process to destroy *Salmonella* (e.g. heat treatment). The eggs are considered as Class B eggs. From January 2009, the same conditions will apply to eggs from any flock which is confirmed to be infected with *Salmonella* Enteritidis or *Salmonella* Typhimurium.

Annex 1: Visitors' Book

Date	Name of visitor	Signature	Company name/ address and contact telephone number	Purpose of visit	Date of last contact with poultry/ livestock (Give type of poultry if within 48hr and location if possible	Vehicle Registration	Time of arrival	Time of departure

Annex 2: *Salmonella* control – a summary

Control point	**Keeping *Salmonella* out**	**Controlling the spread**
Unit	For new units – locate well away from other farms and landfill sites. Keep clean and tidy. Perimeter fence/information signs. Clean parking for vehicles away from houses. Provide washing/disinfection facilities/footbaths. Clean and disinfect houses and surrounding areas regularly, according to a hygiene programme designed specifically for the unit.	Keep clean and tidy. Provide washing/disinfection facilities/footbaths/protective clothing. Clean and disinfect houses and surrounding areas regularly, according to a hygiene programme designed specifically for the unit. All in/all out system is the ideal for control of disease spread.
Staff	Educate, train and inform. Keep "work clothes" on site and clean and disinfect regularly. Provide written hygiene protocols and monitor for compliance. Clean rest room, washing and toilet facilities.	Keep "work clothes" on site and clean and disinfect regularly. Provide written hygiene protocols and monitor for compliance. Wash hands before handling birds or use disposable gloves.

Control point	**Keeping *Salmonella* out**	**Controlling the spread**
Laying and rearing flocks	Obtain day old chicks from breeding flocks or hatcheries complying with relevant legislation for the monitoring of *Salmonella* Enteritidis and *Salmonella* Typhimurium (Poultry Breeding Flocks and Hatcheries Order, 2007). Introduce an effective *Salmonella* monitoring programme. Ensure adequate empty time between flocks. Check pullets are from a reliable source. From February 2008, ensure full compliance with mandatory testing protocols laid down in the National Control Programme.	Use separate protective clothing and/or disinfectant footbaths for each house. Control wild birds and rodents. Step-over barriers. Review positive results with veterinary surgeon. Develop and maintain a site or company specific *Salmonella* control plan.
Pest control	Effective control programme. Tidiness/avoid feed spills.	Check controls are effective and seek specialist advice if not working. Increase controls at depopulation.
Visitors	Restrict entry. Visitors' book. Provide clean protective clothing.	Provide clean protective clothing. Inform visitors of hygiene rules.

Control point	**Keeping *Salmonella* out**	**Controlling the spread**
Feed	Ensure adequate procedures in place at feedmill to detect and control *Salmonella*. 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/ manure away from site.	Clean up spillages of litter/ manure around houses after mucking out and do not allow wash water to flow into adjacent occupied houses or stores. Dispose of dead birds safely.
Equipment	Do not share equipment. Clean and disinfect regularly.	Clean and disinfect equipment when shared between different houses on the farm. Clean and disinfect regularly.
Depopulation/ Repopulation	Clean personnel. Clean vehicles. Clean crates.	Implement cleaning and disinfection programme. Plan ahead. All in/all out.
Vaccination	Consult your veterinary advisor on appropriate vaccination schedules and other aids to *Salmonella* control.	

Annex 3: Checklist for preparation of a detailed plan for cleaning and disinfection of layer or pullet rearing units at depopulation

Preparation:

- Note depopulation date and prepare a plan
- Conduct COSHH assessments
- Ensure rodent controls are effective
- List items for repair and maintenance and order replacements
- Ensure cleaning equipment, disinfectant (Defra approved) available
- Ensure competent staff available
- Ensure other animals in occupied houses 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
- Apply control measures for insects, mites, beetles etc. as necessary
- Remove and dispose of all carcasses –this requires a very careful check in cage houses
- Remove residual feed

- Check rodent control effective/intensify 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
- Completely inspect for cleanliness and rodents/arthropods using a powerful torch

Apply disinfectant:

- Ensure the building is dry
- Follow label instructions and COSHH

- Apply Defra approved disinfectants at General Orders rates or formaldehyde at 2% – 5% 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
- Completely inspect for recontamination by rodent faeces or arthropods using a powerful torch

Fogging:

- Apply 30 – 40% formaldehyde solution (neat formalin) or other suitable disinfectant at fogging concentration through a thermal fogger to re-saturate surfaces after spray disinfectant has dried
- Ensure full compliance with recommended health and safety regulations

Before restocking:

- Replace rodent bait as early as possible after disinfection
- 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
- Check with on farm biosecurity procedures to avoid spreading infection from older flocks to new birds

Annex 4: Other sources of 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*)

Guidelines for farmers in NVZs (*Defra publication PB 5505*)

Codes of Recommendations for the welfare of livestock – Domestic Fowls (*Defra publication PB 0076*)

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

The Transport of Animals (Cleansing and Disinfection) (England) (No3) Order 2005

Guidance note to the Transport of Animals (Cleansing and Disinfection) (England) (No3) Order 2005 (*available from Defra*)

List of Defra approved disinfectants (*available from Defra*)

Code of Practice for the Prevention and Control of *Salmonella* in Commercial Egg Laying Flocks

Available from:

Defra Publications, Admail 6000, London SW1A 2XX
Stationery Office, Publications Carre, PO Box 276, London SW8 5DT
Animal Disease Control Division, 1A Page Street, London SW1P 4PQ

www.defra.gov.uk

Published by the Department for Environment, Food and Rural Affairs.

© Crown Copyright 2007.

Printed on material that contains a minimum of 100% recycled fibre for uncoated paper and 75% recycled fibre for coated paper.

www.defra.gov.uk

PB 2205