

Salmonella enteritidis monitoring and certification program, Queensland



VERSION

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1. Purpose

This document outlines the Queensland Government's *Salmonella enteritidis* (SE) monitoring and certification program for Queensland table egg producers exporting eggs to overseas markets.

2. Scope

This document focuses on table egg producer testing requirements and certification processes for SE freedom. It does not explicitly cover other critical elements of a SE control program such as hazard analysis critical control point (HACCP) systems or biosecurity requirements. Producers are encouraged to consult other references such as existing company biosecurity programs and the *Code of Practice for Biosecurity in the Egg Industry*, Safe Food Production Queensland, as well as the national egg quality assurance program and codes of practice available from the Australian Egg Corporation Limited (AECL) (see section 17 – Information/Resources).

The document is intended for staff of Biosecurity Queensland, Safe Food Production Queensland (SFPQ) and Queensland Health. The Australian and Queensland egg industry have been consulted and industry leaders are aware of the requirements of this program. The Australian egg export sector is encouraged to implement systems compatible with this program to ensure compliance and ongoing market access.

3. Definitions and functions

Term / acronym	Definition	Function
AQIS	Australian Quarantine and Inspection Service	AQIS is the central competent authority for the export of eggs and egg products. Further information is available via www.aqis.gov.au
Biosecure unit / epidemiological group	A flock/production unit that is independently biosecure from other parts of a flock or farm	Biosecurity measures are in place to prevent disease spread or introduction to the unit/group. From a biosecurity perspective the unit/group functions independent of other activities on a farm.
HACCP	Hazard Analysis Critical Control Point	A systematic approach to identifying and assessing hazards and risks associated with a food operation and defining the means of their control.
NATA	National Association of Testing Authority	NATA is Australia's Government-endorsed provider of accreditation for laboratories and similar testing facilities conducting tests, calibrations and measurements in a wide spectrum of technical fields.
NEPSS	National Enteric Pathogen Surveillance System	NEPSS is operated by the Microbiological Diagnostic Unit – Public Health Laboratory, Department of Microbiology and Immunology, The University of Melbourne and is overseen by a Steering Committee of State, Territory and Commonwealth stakeholders. It is supported by State and Territory Health Departments and the Australian Government Department of Health and Ageing.
SFPQ	Safe Food Production Queensland	Safe Food Queensland ensures that Queensland's food supply remains safe through regulation, thereby managing food safety risk along the food chain from production to consumption—with the cooperation of Queensland Health, the Biosecurity Queensland and the Australian Quarantine and Inspection Service.
SE	<i>Salmonella enteritidis</i>	<ul style="list-style-type: none">Notifiable disease under the <i>Stock Regulation 1988</i> (Subordinate legislation of the <i>Stock Act 1915</i>).

Term / acronym	Definition	Function
		<ul style="list-style-type: none"> • Notification to the Biosecurity Queensland of an isolation of <i>Salmonella enteritidis</i> in stock is required. • A disease of poultry that may manifest clinically as depression, poor growth, weakness, diarrhoea, and dehydration, although these clinical signs are not distinctive. • This disease has significant public health implications as a leading food-borne disease throughout the world. • Possible sources of infection in commercial laying poultry include transmission from breeders, contaminated environments, infected rodents and contaminated feed. Transmission to progeny from breeders is mainly through eggshell contamination, although transovarial transmission may also occur. • Prescribed contaminant under the <i>Food Regulation 2006</i> (Subordinate legislation of the <i>Food Act 2006</i>). • Notification to Queensland Health of an isolation of <i>Salmonella enteritidis</i> in food is required. • Salmonellosis in humans is a “notifiable condition” under the <i>Public Health Act 2005</i>.

4. Background

4.1 Human health implications

SE is a notifiable disease of poultry with public health significance. *Salmonella* outbreaks can have particularly severe consequences in highly vulnerable human populations such as the young, old and immunocompromised.

The estimated annual incidence of salmonellosis in people in Australia according to FAO/WHO data from 2000 is 38 per 100 000 population (1). Information from a 2002 Queensland report indicates that *S. enteritidis* human cases tend to occur at a rate of 4-6 per month with most cases traced to overseas travel (2). This is roughly half that reported by OzFoodNet’s 2004 annual report where 112 human cases were reported in the calendar year (3). In that same OzFoodNet report, 36% (40/112) of SE infections in Queensland were locally acquired with the majority of locally acquired infections in Queensland due to phage type 26 (3). Detections and subsequent epidemiological investigations in Australians frequently determine that infection is acquired while overseas. Many of the SE serotypes/phage types that occur overseas are not endemic in Australia.

4.2 Controlling SE

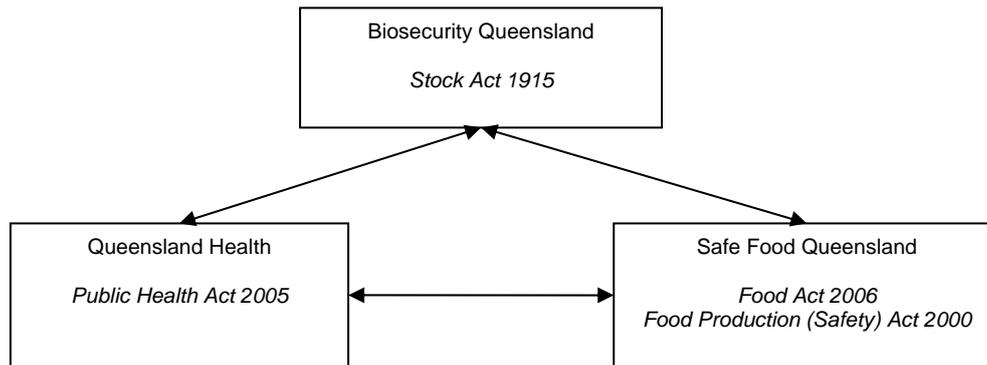
In a response to curb *Salmonella* food-borne related illness, a number of countries have implemented egg quality assurance programs. These egg quality assurance programs vary from country to country but contain similar elements of biosecurity, HACCP programs and SE sampling and testing.

Australia does not currently have a Commonwealth government operated SE program but New South Wales and Victoria have a *Joint NSW/Victoria Salmonella enteritidis Monitoring and Accreditation Program – JNSW/VIC SEMAP* (4).

Biosecurity Queensland evaluated the *JNSW/VIC SEMAP* but considered it sensible to develop and implement food safety management measures other than that of the joint NSW/Victoria scheme because of the following:

- Queensland's public health situation is monitored by Queensland Health which prescribes salmonellosis in humans as a "notifiable condition" under the *Public Health Act 2005*.
- Under the requirements of the *Food Act 2006*, all species of *Salmonella* are prescribed contaminants in food. All detections must be notified to Queensland Health.
- Laboratories, laboratory technicians and food businesses for whom laboratories are conducting food analysis all have legal obligations under the *Food Act 2006* to notify Queensland Health of detections of prescribed contaminants.
- Queensland has a state based regulatory system in place for managing the primary production and processing of eggs and egg products, namely the Food Safety Scheme for Egg and Egg Products (the egg scheme). The egg scheme is regulated by the statutory authority, SFPQ. It is noted that other states do not currently have such a regulatory scheme in place.
 - The egg scheme includes requirements for businesses to develop and implement food safety programs and once approved by SFPQ, become accredited. The egg scheme underpins some of the requirements of Queensland's SE monitoring and certification program including requirements that breeding stock and birds to be used for egg production are free of disease. Vendor declarations are also used declaring disease freedom when a purchaser acquires poultry from a vendor. Vendor declarations are audited by SFPQ as part of the accredited food safety program.
 - To ensure businesses meet the requirements of the egg scheme, SFPQ has produced the egg food safety workbook. The document outlines the legal requirements for compliance with the egg scheme, provides an industry guide to producing and supplying safe and quality eggs and assists commercial egg suppliers develop a food safety program.
 - If at any stage Biosecurity Queensland or SFPQ becomes concerned that SE becomes a more significant risk, SFPQ has the authority to issue a Notice under Section 51 of the *Food Production (Safety) Act 2000* to amend their food safety program to require producers to implement:
 - new critical control points (e.g. mandate a sanitizer to be used in cleaning); or
 - a monitoring/surveillance program to increase surveillance on property; or
 - a mandatory reporting requirement for significant changes that occur on the property (e.g. increased mortalities etc.). With respect to this point, the *Food Production (Safety) Act 2000* works in tandem with the *Stock Act 1915* to improve notification of notifiable diseases.
- Queensland Health has the authority to investigate food borne illness and trace back investigations of human SE pathogen isolations. These are reported in weekly communicable diseases surveillance reports and in OzFoodNet (National network of food borne illness epidemiologists) fortnightly cluster reports. A close working relationship between Queensland Health, SFPQ and Biosecurity Queensland (the *Queensland Food Incident Response Protocol* outlines food incident response mechanisms and communication arrangements) ensures that any human *Salmonella* outbreaks where a reasonable association can be made with animals or animal products, including egg products, are fully investigated.

Food production safety regulations are designed to interact amongst the three regulatory agencies. Where SE is detected and notified, all three agencies may work together to investigate and control the incident through the integrated existing controls. The interaction of the 3 regulatory agencies and the legislation mandated is illustrated as follows:



5. Risk analysis

5.1 Historical data

Ongoing general surveillance through Biosecurity Queensland's three animal health laboratories has not indicated that SE is a problem in Queensland's poultry industries. Over 5,250 tests for salmonella were conducted on samples from birds from 1987 (when data was first recorded on the LOIS laboratory database system) to 2001 (inclusive) and all were negative for SE. Of these over 4,950 were diagnostic samples from sick birds and the remainder were for health testing, export or surveillance purposes. From 2002 to 2010 (March), 848 samples from birds have been tested for salmonella, 824 for diagnostic purposes and 24 for health testing. None have been positive for SE although 31 were positive for other salmonellas (*S. hessarek*, *S. montevideo*, *S. saint paul*, *S. typhimurium* and *Salmonella* Group B). During this time, SE was isolated from the intestines and kidney of one cow (in 2007), faeces of a calf (in 2008) and intestines of a freshwater crocodile (in 2002). All of these positive SE findings were in north Queensland on the Atherton Tableland. In Queensland the majority of commercial egg producers are located in the southern half of the state, south of Rockhampton which is nearly 1000 kilometres south of where these findings occurred. This data indicates that analysis of a considerable number of bird samples for salmonella over more than 20 years has not resulted in SE detection of commercial layer flocks and that the BQ laboratories have the capacity to detect SE if it were present. The BQ laboratories are currently NATA accredited for salmonella testing.

Two on-farm studies were conducted by the Townsville laboratory as part of an investigation of SE being isolated from a vat of illegally pulped eggs. Extensive testing of live birds, dead birds, manure samples, dust samples, cage swabs, litter samples, egg belt samples, manure scraper samples, feed samples and eggs yielded only one SE isolate from the caecum of one bird. It was determined through further epidemiological and biosecurity investigations that the vat had been contaminated with rodent faeces (2). (Note that this was undertaken prior to 1987 when laboratory records were not computerised.)

During 1986, 360 eggs from wholesale and retail markets in Cairns and Townsville were all tested negative for Salmonella. A 1989 survey involving 199 eggs was also completely negative for Salmonella (2).

During 2005 a commercial meat chicken operation on the Atherton tableland reported SE isolation following routine carcass monitoring where the tests were done at a private laboratory. SFPQ implemented a stringent on-farm control program consisting of quarantining animals or final product, test and release arrangements, de-population of birds in the infected sheds, increased sampling regimes and changes to critical control points. Additionally, a more rigorous testing regime was implemented, the disease status of breeder flocks was checked, some flocks and / or some sheds on some farms were culled, sheds were environmental sampled prior to population and de-population and acidified feed was used. No evidence of vertical transmission of disease was found during that investigation. These actions appear to have resolved the issue.

This information demonstrates that the prevalence of SE is very low in Queensland commercial layer poultry flocks. Biosecurity Queensland investigates or assists with investigation of all reports of suspect SE associated with poultry received from BQ laboratories, SFPQ or QHealth.

In view of the numbers of samples from poultry analysed through BQ laboratories, the proven capacity of BQ laboratories to diagnose SE and the range of sources of notification of potential SE infections affecting poultry, the risk that SE would cause a food safety issue and not be detected is very low. However, Queensland recognises international concerns regarding public health and SE and is managing the very low human illness risk by managing a SE monitoring and certification program for egg producers.

5.2 Risk assessment

The implementation of egg quality assurance programs has been recognised as a positive step towards reducing the incidence of SE related food borne illness. The World Health Organisation (WHO) and Food and Agriculture Organisation of the United Nations (FAO) jointly indicated in 2002 that the risk of illness per serving of eggs to humans increases as flock prevalence increases and that reducing flock prevalence results in a directly proportional reduction in human health risk (1). They identified that both egg storage time and temperature profiles for eggs from production to consumption are associated with large effects on the predicted risk of human illness. By restricting shelf life to 7 days, risk per serving is reduced by about 60% whereas keeping retail storage temperature less than 7.7°C reduces the risk of illness per serving by about 60% (1).

Reducing flock prevalence results in a directly proportional reduction in human health risk (5). Mumma *et al.* conducted a study in the United States by examining a number of different programs across 15 states where exact practices undertaken under each program was variable, ranging from self-certification programs to a structured, regulated, rigorous program (6). All states that required microbiologic testing (11/15) except one, involved their state government in setting up and monitoring their program (6). This study demonstrated that a 1% increase in the number of eggs produced under an egg quality assurance program was associated with a 0.14% decrease in the incidence of human SE cases (6).

The Queensland SE monitoring and certification program recognises risk reduction principles of implementing effective biosecurity and HACCP programs on farm together with sampling and testing for SE.

Definitions used in this risk assessment are set as follows (adapted from the AS/NZ Standard 4360:2004).

Likelihood ¹	Almost certain	Infection in humans almost certainly likely to occur
	Likely	Infection in humans likely to occur
	Possible	Infection in humans possible but not likely to occur
	Unlikely/Rare	Infection in humans rare/unlikely to occur
Consequence	Insignificant	No effect on human health – no infection
	Minor	Confirmed human infection but not illness (asymptomatic)
	Moderate	Confirmed single human infection and illness; medical treatment required
	Major	Single human death despite treatment
	Catastrophic	Multiple human deaths resulting from single exposure

		Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost certain	Medium	Medium	High	Extreme	Extreme
	Likely	Low	Medium	Medium	High	Extreme
	Possible	Low	Low	Medium	High	High
	Unlikely	Neg	Low	Medium	Medium	High
	Rare	Neg	Neg	Low	Medium	High

Combined rating

Extreme	Urgent attention required
High	Intervention required
Medium	Active management required
Low	Ongoing monitoring required
Negligible	Acceptable risk – no monitoring or management required

The following is a risk assessment of human infection with SE where humans may consume eggs infected or contaminated with SE.

Risk	Before risk treatment			Risk treatment	After risk treatment		
	Likelihood of human infection / detection ¹	Consequence	Risk ranking		Likelihood of human infection	Consequence	Risk ranking
Not cooling eggs to <7°C	Possible	Moderate to Major	High	Cool eggs to <7°C	Unlikely	Moderate to Major	Medium ²
Shelf life of eggs to restricted to <7 days	Possible	Moderate to Major	High	Restrict shelf life to < 7 days	Unlikely	Moderate to Major	Medium
SE goes undetected because of lack of SE sampling and testing	Possible	Moderate to Major	High	Implement SE sampling and testing	Unlikely	Moderate to Major	Medium

However, surveillance of poultry flocks over the past 20 years indicates that the risk of the poultry on Queensland farms being affected with SE is very low, hence the overall risk of human infection is also very low and the monitoring and certification program addressing the risks outlined in the assessment above will further reduce the risk of human infection with SE.

6. Finance

All costs associated with property inspections, sampling, testing and certification requirements are to be borne by the producer. Appropriate fees will apply.

A non-refundable application fee for each biosecure unit considered for SE certification shall be paid to Biosecurity Queensland. This application fee covers costs associated with reviewing the application only. Additional fees for the initial property inspection and travel will be billed to the applicant at the nominated Departmental amount.

An annual enrolment fee for each biosecure unit will apply. Failure to pay the enrolment fee by the nominated date will result in cancellation of the biosecure unit's SE certification.

Sampling and testing costs as part of the obtaining and maintaining certification are to be borne by the producer. In the event of a positive environmental test result, the Chief Inspector of Stock can apply discretion as to who pays for additional diagnostic testing costs and on-property disease investigation.

7. Biosecurity

As part of the certification process, owners of the flocks need to first demonstrate that adequate biosecurity precautions are in place.

- Eggs and chicks or poults must be sourced from breeding flocks where evidence is available to show that SE infection is not present. Hatching eggs should be disinfected properly and hatched under strict sanitation standards.
- A documented biosecurity program that monitors and prevents the spread of SE from one poultry shed to another, or if not possible, from outside farms to the farm applying for certification. Where the whole farm is considered one biosecure unit, a detection of SE in any shed shall be deemed as failure in biosecurity for the entire unit.
- Ensure hygienic manufacture, transport and storage of feed to prevent access and contamination by any animals, including rodents and feral animals.
- Ensure hygienic disposal of dead birds and bird products.
- A pest and rodent control program that controls rodents, flies and other pests. Baiting and trapping may need to be implemented. The shed should prevent entry by rodents and pests and the system should have a means of verification.
- Drinking water for poultry birds must be potable. If using non-potable water, it should be treated to remove sediment and contaminants, then effectively sanitized to make it potable.
- Procedures must be in place for cleaning and disinfection of a poultry shed and disposal of waste. A SE positive poultry shed must be cleaned and disinfected prior to the addition of new laying hens to prevent SE from being perpetuated in the replacement flock. See further

¹ "Likelihood of human **detection**" including trace back mechanisms with reference to risk of "Not maintaining relationship with QHealth and OzFoodNet networks"

² A medium risk ranking indicates that active management is required. The SE monitoring and certification program serves this purpose.

sections regarding testing requirements for certification or recertification following a SE detection.

- A person responsible for SE prevention shall be identified and advised on the procedure for swab collection in SE preventive strategies and monitoring. Farm personnel should understand the principles of biosecurity and their responsibility in upholding the biosecurity guidelines in place on the property.
- A HACCP type program could be implemented at 'farm level' with elements of biosecurity included.

8. Egg hygiene and collection practices

- Egg washing may reduce shell contaminants. Eggs must be clean and free of cracks.
- Eggs should be stored and transported at or below 7°C. Cooling of eggs should be undertaken as quickly as possible after collection.

9. Sampling

9.1 Number of samples

The sampling strategy must be representative of the population of birds being sampled for export purposes. Queensland has adopted the recommendations of the RIRDC (7) regarding sample sizes to detect infection in targeted flocks.

Queensland's monitoring for SE is designed to provide at least 95% confidence of detecting infection in layer flocks if 1% of flocks are infected at a prevalence of culture positive birds of 0.5%, thereby indicating that 12 samples per biosecure unit will be required annually to maintain certification.

Sample sizes for 10 000 bird flocks at varying flock prevalence are as follows. These figures change very little except for flocks of <5 000 birds.

	Within flock prevalence	Confidence of detecting infection	Number of samples per biosecure unit required annually to maintain certification	Number of tests required annually ³
Drag swab	0.5%	95%	12	3
Drag swab	1%	95%	6	2
Drag swab	2%	95%	3	1

9.2 Method

Culturing of environmental samples collected by drag-swabs is regarded as a highly sensitive method of detecting SE in laying sheds (7). Environmental sampling is based on the assumption that if SE is found in the environment, there is a high probability that the laying hens in the house are infected. Results reflect the bacteriological status of the flock over the previous several months which have the advantage of detecting the organism in a group of birds that may otherwise not be detected because of individual bird transient infections.

Since drag swabs sample the environment rather than the birds themselves, they are subject to potential contamination from outside factors such as rodents which may carry SE. Hence, biosecurity arrangements will need to be in place to reduce the likelihood of extrinsic contaminants.

Drag-swab samples can be obtained by dragging sterile gauze (10cm²) or sterile tampons that have been dipped in buffered peptone across manure. Swabs dragged through wet areas of manure appear to increase the sensitivity of detection of SE than swabs from dry areas (8). Moistened canned evaporated milk has also been described as a wetting agent, though its use should be discussed with the Chief Inspector of Stock prior to sampling.

There are many differences in the types of poultry sheds and the best method of sampling the sheds will have some discretion. However, in principle, the following should apply:

- All sheds on the property to be certified must be sampled at the appropriate time frame.
- Pooling of a maximum of 4 swabs per culture is permitted. Pooled samples must only contain swabs from the same biosecure unit.

³ Based on testing of pooled samples of up to 4.

- On farm sampling can be performed by the person been advised on the procedure for swab collection.
- In cage layer sheds where there are discrete manure rows under cages rather than manure belts, such as in some **A-frame housing**, use two drag-swabs per row of manure.
 - Each side of a row is dragged with a fresh swab until all the rows have been sampled.
 - Drag the swab the full length of the row over the manure pile, concentrating on the areas of the pile with moist manure.
 - For every 2 rows, pool 4 swabs to make 1 pooled sample.
 - If there are insufficient rows to obtain 3 pooled samples per biosecure unit, either submit samples as not-pooled, or take additional samples to obtain 3 pooled samples. The number of swabs to use and number of pooled samples is indicated in the table below.

# of rows in shed	# of swabs to use	# of pooled samples
2	4	1
3	6	2
4	8	2
5	10	3
6	12	3
7 ⁴	14	4
8 ²	16	4

- In cage layer sheds where cages are **stacked** row upon row, each with individual manure belts, use one drag swab per manure belt⁵.
 - Sampling may be undertaken by activating manure belts and using a drag swab to sample discharging manure.
 - Concentrate on dragging the swab over moist manure.
 - For every 4 manure belts, pool 4 swabs to make 1 pooled sample.
 - The number of swabs to use and number of pooled samples is indicated in the table below.

# of belts per row in shed	# of swabs to use per row (1 per belt)	# of pooled samples per row
6	6	2
8	8	2
10	10	3
12	12	3
14	14	4
16	16	4

- In barn/free range type sheds, swabs must be dragged across at least half of the litter area in the shed, concentrating on those areas where there is moist litter. An additional swab must be taken from the nests/belt areas. The 3 swabs may then be submitted as the 3 samples for the biosecure unit.
- For the best chance of detecting the bacteria, samples should be placed in transport media and kept cool.
- Each sample submitted to Biosecurity Queensland laboratories must be properly packaged, transported and marked including date of sampling, farm name, flock or shed description and collectors name. A completed Specimen Advice Sheet must accompany the samples. Samples received in an unsuitable condition (e.g. temperature exceeding 32°C; prolonged transport time without adequate cooling, damaged) will not be tested – additional samples will be requested.
- All samples should arrive at the testing laboratory in chilled condition.

⁴ Where shed size exceeds 6 rows, ensure that the entire biosecure unit is represented in the pooled samples,

⁵ Using the same swab for multiple belts will result in drying of the swab, thereby making it a less effective sampling tool.

9.3 Frequency of sampling and testing

Sampling and testing frequency depends on whether the flock is seeking to become certified, whether the flock is maintaining certification, or whether there is a positive test result. This is further illustrated in Flowchart 1.

9.3.1 Becoming certified

Farms wanting to become certified will make an application to the Biosecurity Queensland. An initial biosecurity assessment will be undertaken and any deficiencies will need to be corrected prior to full certification.

Once the biosecurity SE program is deemed to be acceptable, farms will be required to undertake monthly environmental testing of all biosecure units that house birds. After 3 consecutive negative tests, environmental sampling frequency will reduce to sampling only biosecure units with 40-45 week old birds (see 9.3.2).

If negative results are obtained, SFPQ is notified by Biosecurity Queensland that the farm/biosecure unit meets the requirements of this program to export eggs and SFPQ will amend the farm's food safety program to reflect this, thereby mandating any requirements negotiated between SFPQ and the producer.

9.3.2 Maintaining certification through monitoring

Note that participation in the program requires that biosecurity precautions outlined in Section 7 remain in place. Hence laying stock will be sourced from flocks not affected by SE.

A USA egg quality assurance program indicated that highest numbers of positive environmental samples are found when laying hens are 40 to 45 weeks of age (9). Another study conducted in the USA (10) found that flocks less than 60 weeks of age were 5 times more likely to test positive for SE than older flocks.

Risk reduction principles outlined above (5.2) coupled with the known low to negligible prevalence of SE in Queensland's commercial poultry facilities and known increased likelihood of detection of SE when specific age groups are targeted, subjectively indicates that targeted sampling of poultry at 40-45 weeks of age should be equivalent or more sensitive to the sampling protocol indicated in the joint NSW/Victorian program.

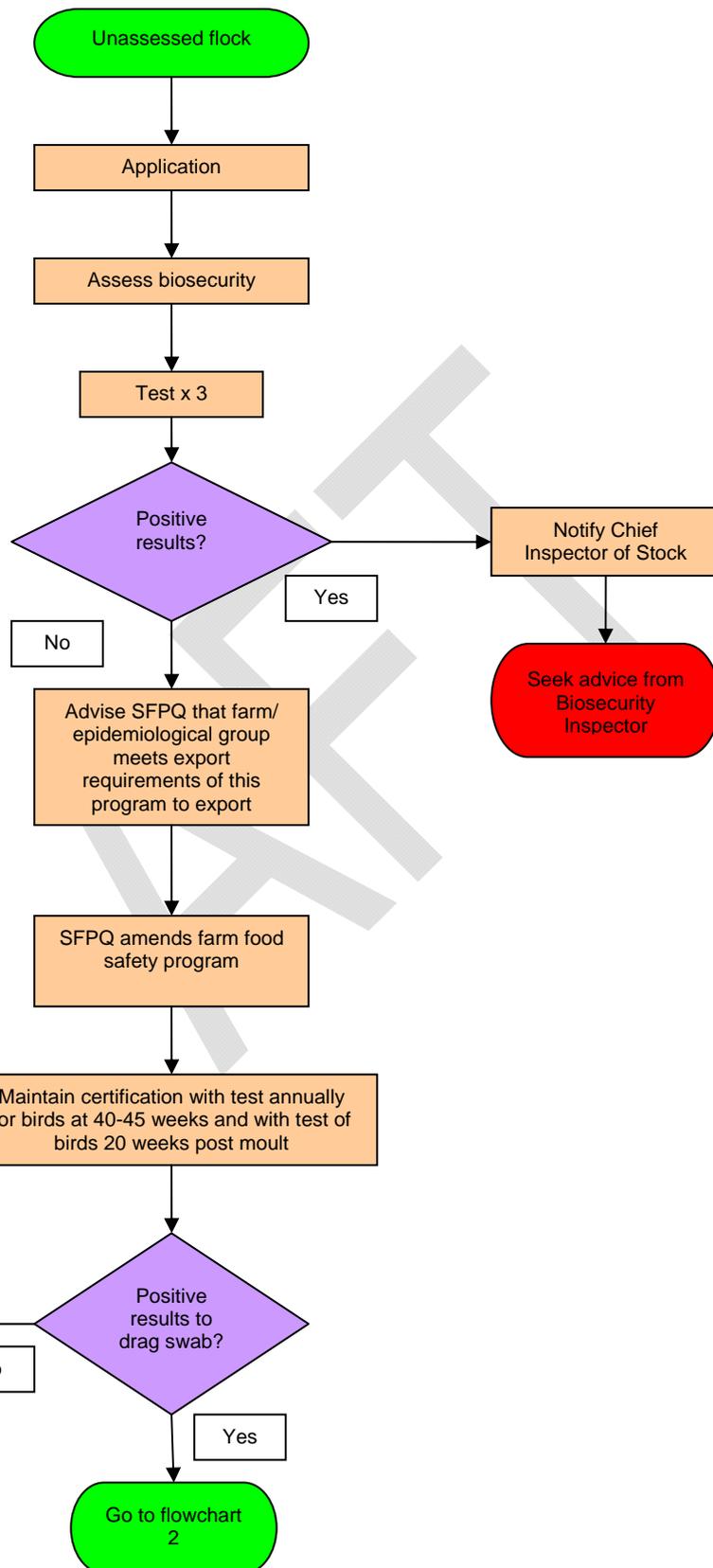
As such, environmental testing will be in accordance with these studies and will require sampling of each biosecure unit of birds of a similar age when birds are 40-45 weeks of age, essentially limiting sampling to once per year. If the flock contains multi-aged laying hens, environmental testing of the poultry shed when each group of hens in the flock is 40 to 45 weeks of age must be undertaken.

Environmental testing for SE should also be conducted approximately 20 weeks after the end of an induced moulting process, which the USA layer industry considers equivalent to the time period when layers are 40-45 weeks of age in an initial laying cycle. It is estimated that 75% of environmental positives will be detected with one environmental test in a laying cycle (11).

If an environmental test at 40-45 weeks for SE is negative, and the producers laying hens do not undergo induced moulting, then it is not necessary to undertake additional environmental testing on the biosecure unit unless the flock in that unit contains multi-aged laying hens. If the unit contains multi-aged laying hens, then environmental testing of the unit must be undertaken when each group of hens in the unit is 40-45 weeks of age.

OIE Surveillance guidelines indicate that testing should also be conducted within four weeks of laying hens being moved to another poultry shed for production or before going into production if they remain in the same shed for the production period. This was considered, but it was decided that this testing was not necessary when the birds were sourced as birds or eggs from flocks not affected with SE, were introduced into a biosecure unit and remained in biosecure units for their production lives and the background prevalence of SE infection in the general poultry population in Queensland is very low.

Flowchart 1:



10. Sample storage and transport

SE environmental samples may be stored at a maximum temperature of 4°C for no longer than 4 days. Ideally they should be transported in a manner that does not compromise the integrity of the sample and received by the nominated laboratory within 24 hours of collection.

11. Testing

Microbiological culture of SE must only be undertaken at National Association of Testing Authority (NATA) accredited laboratories that have NATA certification for Salmonella testing. All testing procedures must comply with either the Australian Standard Diagnostic Techniques or Australian Standards AS1766.2.5-1991. Biosecurity Queensland has three laboratories identified below that are accredited for SE testing.

Biosecurity Sciences Laboratory (BSL)

Biosecurity Queensland
Locked Mail Bag 4
Moorooka, Qld 4105
Phone: (07) 3362 9471
Fax: (07) 3892 5374

Tropical and Aquatic Animal Health Laboratory (TAAHL)

Biosecurity Queensland
PO Box 1085
Townsville, Qld 4810
Phone: (07) 4722 2624
Fax: (07) 4778 4307

Animal Disease Surveillance Laboratory (ADSL)

Biosecurity Queensland
PO Box 102
Toowoomba, Qld, 4350
Phone: (07) 4688 1200
Fax: (07) 4688 1199

Queensland Health Scientific Services (QHSS) provides a broad range of services including typing of Salmonella and the microbiological examination of food samples. Detections of SE by QHSS are reported to the appropriate authority (SFPQ and/or Biosecurity Queensland) for investigation.

Queensland Health Scientific Services

Queensland Health
39 Kessels Road
Coopers Plains Qld 4108
PO Box 594
Archerfield QLD 4108
Phone: (07) 3274 9111
Fax: (07) 3274 9119

All salmonella isolates are forwarded to the Salmonella Reference Laboratory⁶ for further typing and inclusion in the National Enteric Pathogen Surveillance System (NEPSS).

Salmonella isolates identified at BSL may be transferred to Brisbane's Queensland Health and Scientific Services for further testing.

12. Interpreting results

12.1 Positive environmental swab results

Positive culture of environmental drag swabs necessitates confirmatory testing that may consist of serological tests, necropsy and bacteriological culture from animal tissues and further drag swabs. This is outlined in Flowchart 2.

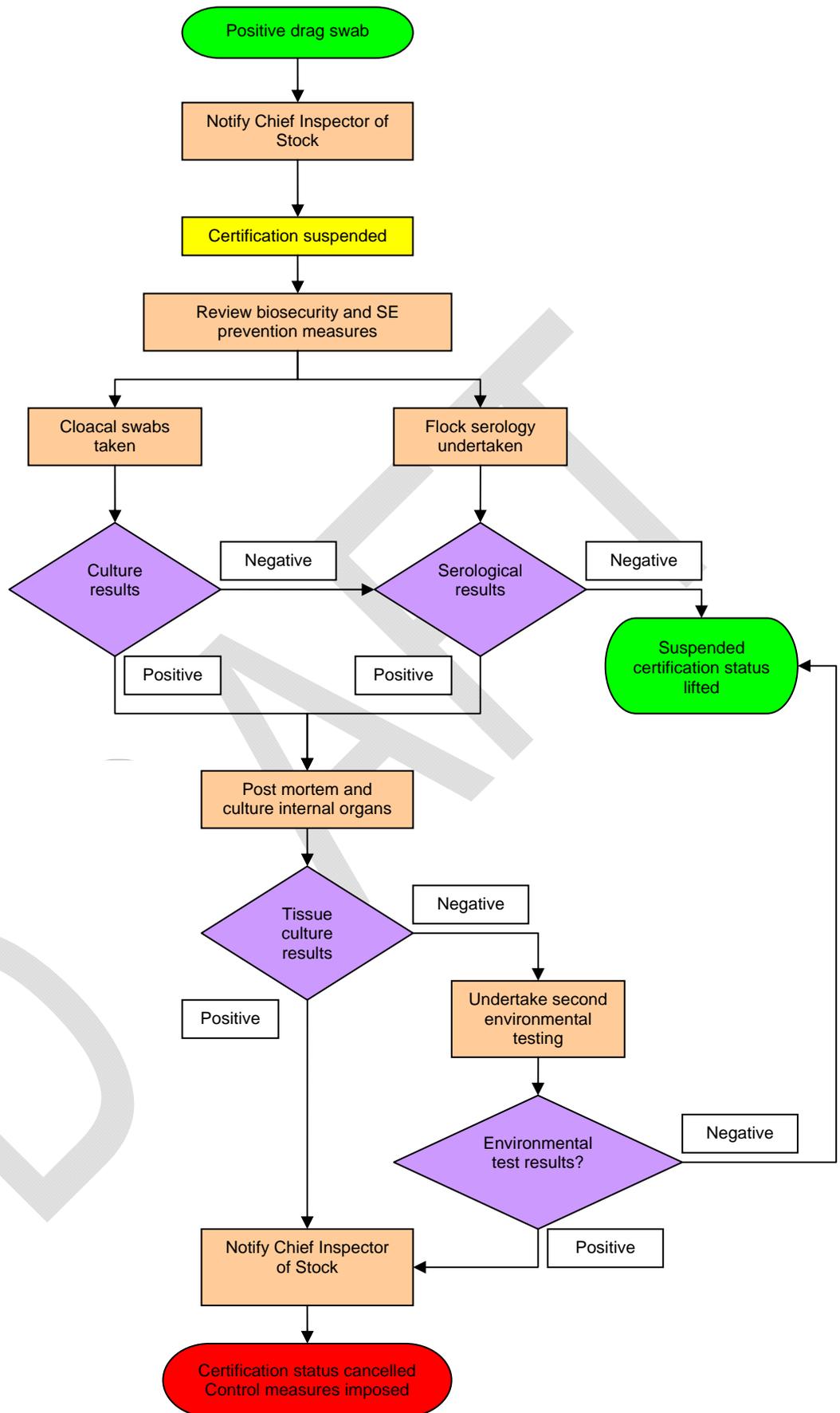
The biosecure unit shall have its certification suspended pending results of further investigation preventing export of eggs. Eggs collected must be stored under refrigeration (no greater than 7°C) and investigations must be undertaken to determine the true status of the unit and the potential sources and reasons for a positive drag swab result.

- (a) A review of biosecurity and SE preventive measures will need to be undertaken along with cleaning and disinfection of sheds/sites considered to be the source of SE.
- (b) Cloacal swabs and serological testing must be undertaken of live birds that are demonstrating clinical signs consistent with SE, or in the absence of live birds displaying clinical signs, from 15 random cull or moribund birds.
- (c) Cloacal swab culture result
 - o Positive results shall be followed by postmortem of cloacal positive animals with necropsy and culture of internal organs. Results should be interpreted as per (e) below.
 - o Negative results will be interpreted together with serological results as per (d) below
- (d) Serology results by the ELISA test
 - o Reactors: All reactors should be necropsied and internal organs cultured.

⁶ Salmonella Reference Laboratory, IMVS, Frome Road, PO Box 14, Rundle Mall Post Office, Rundle Mall, Adelaide SA 5000. Phone (08) 8222 3365

- Non-reactors: If there are no reactors and cloacal culture results are negative, the suspended status of the unit will be lifted and stored eggs may be released. If there is a positive cloacal culture result with negative ELISA results, those animals with positive cloacal culture results shall be necropsied with culture of internal organs. Results should be interpreted as per (e) below.
- (e) Animal tissue culture
- Positive culture results shall be determined to be conclusive and will necessitate an in depth review of biosecurity and SE preventive measures. Certification status will be withdrawn. Following corrective action implementation, 3 consecutive drag swab samples one month apart will be required to re-establish the flock's status as per section 9.3.1.
 - If the animal tissue culture is negative and investigations fail to provide explanation of the SE positive result, the flock must undertake further environmental swab sampling of the unit.
 - Negative results to further environmental swab sampling of the biosecure unit will lift the suspended status of the unit and stored eggs may be released.
 - Positive results to further environmental swab sampling of the biosecure unit will necessitate an in depth review of biosecurity and SE preventive measures. Certification status will be withdrawn. Following corrective action implementation, 3 consecutive drag swab samples one month apart will be required to re-establish the flock's status (as per 9.3.1 above).

Flowchart 2:



12.2 Additional considerations when flocks are determined to be SE positive

Eggs stored at the time when conclusive evidence exists that SE is present on a property must be dealt with to minimize human health risk. Eggs may be processed in accordance with protocols/procedures that destroy or denature (e.g. pasteurization) the SE organism. Final products may be subject to SE testing to verify the efficacy of processing.

12.2.1 Regaining a certified free or SE free status

NOTE: CONCLUSIVE POSITIVE SE TESTING MAY HAVE SERIOUS IMPLICATIONS ON A PRODUCER'S TRADE IN TABLE EGGS

Losing certification may close a producer's access to egg export markets. As well, a producer may not be able to supply the domestic market or, if the domestic market can be supplied, there are likely to be strict guidelines put in place to ensure eggs do not carry SE into the community.

Regaining certification is outlined in the Flowchart 2 and regaining access to the domestic market will require the same process (i.e. proof that SE is no longer present on the farm).

To regain SE freedom a number of options will need to be considered; all of these options assume that eggs will be permitted into the domestic market via SFPQ guidelines.

- Further testing to determine the scope of the problem
- Antibiotic therapy: This has been used successfully to control SE infection in experimental and commercial contexts (11), though their efficacy in eliminating disease is variable (12, 13) due to failure of antibiotics to eliminate infection from internal organs and because their use may incite antimicrobial resistance (14). Use of antimicrobials for treatment is not considered a long term solution.
- Destocking and controlled restocking: This may be required as the only way to remove SE from a flock. No financial/compensation arrangements are in place to assist producers with destocking and financial losses associated with destocking. If destocking is to be undertaken, vaccination for SE may be considered in the interim to reduce the susceptibility of poultry to SE, thereby reducing morbidities and mortalities. This will allow the destocking to be completed over a period of time that suits farm management.

If eggs from infected flocks are not permitted into the domestic market, then a very rapid solution will be required. This may mean destocking as soon as possible with subsequent cleaning and disinfection and then controlled restocking undertaken according to veterinary advice. There is no compensation available for destocking, restocking or any other procedure required to control SE rapidly. As well, there is no compensation for any consequential losses incurred through loss of income, breaking of contracts or lack of egg supply.

13. Reporting

Salmonellosis (*Salmonella enteritidis*) is a notifiable disease under the *Stock Regulation 1988*.

Positive serology or culture results from environmental drag swabs or from animal tissues must be reported to Queensland's Chief Inspector of Stock within 24 hours of confirmation. The SE program coordinator should also be advised within 24 hours of confirmation. All other results of SE testing must be forwarded to the SE program coordinator within 10 working days of obtaining results. Biosecurity Queensland will notify SFPQ and AQIS of any positive SE diagnoses.

SE is also a prescribed contaminant under the *Food Regulation 2006* (Subordinate legislation of the *Food Act 2006*). Positive identification of SE requires Queensland Health to be notified.

14. Certification

Certification will only be provided in reference to the biosecure unit if requirements outlined in this document are met. SE certified free biosecure units will be identified on a register held by the Chief Inspector of Stock. The SE program coordinator will be responsible for maintaining this register.

14.1 Suspension of certification

Certification will be suspended in the following circumstances:

- Following a positive culture result from environmental drag swab(s)
- Sampling is not undertaken at the specified time frames
- Inadequate samples are submitted while maintaining certification
- The Chief Inspector of Stock suspects that the biosecure unit is infected with SE. This may be determined based on clinical findings in the flock or other evidence suggesting infection.

14.2 Cancellation of certification

Certification will be cancelled in the following circumstances:

- Poultry tissue culture results are positive for SE
- Other samples deemed appropriate by the Chief Inspector of Stock are positive for SE
- Failure to pay the nominated annual enrolment fee
- Continued or significant breaches of the SE program.

14.3 Recertification

Recertification after suspension is subject to the Chief Inspector of Stock's discretion. The Chief Inspector of Stock may consider:

- Past compliance with the program
- Test results
- On-farm biosecurity
- Any other element of the program the Chief Inspector of Stock deems appropriate.

In cases where recertification is considered, the applicant must conform to the certification requirements as though applying for the first time.

15. Record keeping

Producers must keep records of biosecurity and HACCP arrangements in place and all sampling/testing undertaken. These records may be typed or handwritten logs, invoices, documents reporting laboratory results, or other appropriate records. These records must be made available to a Biosecurity Inspector on request. Biosecurity Queensland requires that records must be kept for at least 2 years.

Auditing of the food safety and SE monitoring and certification program is conducted biannually, or more frequently in the case of non-compliance, by SFPQ and, where needed, a Biosecurity Inspector. Anomalies or concerns detected by SFPQ are reported to the DPI&F SE program coordinator for further investigation or consultation.

15.1 SE monitoring and certification program requirements

When submitting an application for the program, the applicant must submit the following to Biosecurity Queensland:

- A copy of the application
- A copy of the current accreditation certificate for the business under the Food Safety Scheme for Egg and Egg Products, issued by SFPQ
- Application fee.

Additional records may be required for review in the initial assessment and may include some/all of the records below:

(a) Biosecurity

- HACCP plan or equivalent
- Evidence that eggs and chicks or poults are sourced from SE free breeding flocks, or if hatching eggs, that they are disinfected and hatched under strict sanitation standards.
- A biosecurity program that prevents the spread of SE from one poultry shed to another, or if not possible, from outside farms to the farm applying for certification. Where the whole farm is considered one biosecure unit, a detection of SE in any shed shall be deemed as a failure in biosecurity for the entire unit.
- Feed is manufactured, transported, and stored in a hygienic manner

- If eggs are washed, they are washed in an appropriate manner (time, temperature)
- Pest and rodent control program
- Water is free from contaminants. If using surface water, it must be treated to remove sediment and pathogens (water treatment records, or chlorine reading – daily/weekly, etc)
- Eggs are appropriately stored after collection (location, temperature, time stored etc.)

- Cleaning and disinfection of poultry sheds is effective (cleaning records, detergent/disinfectant used, amount, dilution, etc.)
- A person responsible for SE prevention is appropriately trained (training records)

(b) Health and welfare

- Health and welfare of birds at time of sampling
- Health and welfare of birds over past year (include significant events, illnesses, treatment, vaccination)

(c) Environmental sampling and testing

- Date and time of sampling
- Biosecure units sampled
- Person undertaking the sampling
- Identification of rows sampled
- Number of samples taken
- Condition of manure
- Sample test results
- Any actions taken as a result of positive results

(d) Serological sampling and testing

- Date and time of sampling
- Biosecure units sampled
- Person undertaking the sampling
- Identification of poultry sampled
- Sample test results and actions taken

(e) Animal tissue sampling and testing

- Date and time of sampling
- Biosecure units sampled
- Person undertaking the sampling
- Identification of poultry sampled
- Sample test results and actions taken

If certification is granted, a copy of the certification certificate must be held on record by the producer and the Biosecurity Queensland SE program coordinator.

16. References

1. World Health Organisation, Food and Agriculture Organisation of the United Nations. Risk assessments of Salmonella in eggs and broiler chickens, interpretative summary, 2002.
2. Douglas, I. *Salmonella enteritidis* – situation in Queensland. Department of Primary Industries and Fisheries, 2004.
3. OzFoodNet Working Group, Australian Government Department of Health and Ageing, Canberra, ACT. Reported foodborne illness and gastroenteritis in Australia: Annual report of the OzFoodNet network, 2004. Vol 29, No 2, 2005.
4. Arzey, G. Joint NSW/Victoria Salmonella enteritidis Monitoring and Accreditation Program (JNSW/VIC SEMAP). Department of Primary Industries, NSW, 2005.
5. Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards in Foods – Risk characterisation of *Salmonella* spp. in eggs and broiler chickens and *Listeria monocytogenes* in ready-to-eat-foods. FAO headquarters, Rome, Italy, 30 April to 4 May 2001.
6. Mumma, GA, Griffin, PM, Meltzer, MI, Braden, CR, Tauxe, RV. 2004. Egg quality assurance programs and egg-associated *Salmonella enteritidis* infections, United States. *Emerging Infectious Diseases*, Vol 10, No 10.
7. Rural Industries Research and Development Corporation. *Salmonella enteritidis* surveillance and response options for the Australian egg industry. January 2003.
8. Rolfe, DL, Riemann, HP, Farver, TB, and Himathongkham, S. 2000. Drag swab efficiency factors when sampling chicken manure. *Avian Dis* 44:668-675.
9. Memorandum from Richard Wood, Food Animal Concerns Trust, to Lou Carson, Food and Drug Administration, USA, August 25, 2000.
10. National Animal Health Monitoring System, Animal and Plant Health Inspection Service, United States Department of Agriculture, "Layers 99: *Salmonella enterica* serotype Enteritidis in Table Egg Layers in the U.S." October 2000.
11. United States Department of Agriculture, Transcript: "Public Meeting on Current Thinking Egg Safety Standards," Washington, DC, July 31, 2000, online at www.foodsafety.gov.
12. Glisson, JR. 1998. Use of antibiotics to control Salmonella in poultry. In Proceedings of the International Symposium on Food-borne Salmonella in Poultry. R.K. Gast and C.L. Hofacre (eds.). American Association of Avian Pathologists. Kennett Square: PA, 173-175.
13. Humbert, FJ, Carramiñana J, Lalande, F, Salvat, G. 1997. Bacteriological monitoring of *Salmonella enteritidis* carrier birds after decontamination using enrofloxacin, competitive exclusion and movements of birds. *Vet Rec* 141:297-299.
14. Barrow, PA, Lovell, MA, Szmolleny, G, and Murphy, CK. 1998. Effect of enrofloxacin administration on excretion of *Salmonella enteritidis* by experimentally infected chickens and on quinolone resistance of the *Escherichia coli* flora. *Avian Pathol* 27:586-590.

17. Information/Resource – government agencies

Biosecurity Queensland

Telephone 07 3239 6952

Email callweb@deedi.qld.gov.au

Internet <http://www.dpi.qld.gov.au> (General information)

Safe Food Production Queensland

Telephone 1800 300 815

Email eggs@safefood.qld.gov.au

Internet <http://www.safefood.qld.gov.au> (General information)

Australian Quarantine and Inspection Service

Telephone 1800 020 504 or contact your nearest AQIS office

Email fish@aqis.gov.au

Internet www.aqis.gov.au (General information) or www.aqis.gov.au/eggs (Specific information)

17.1 Industry associations

Queensland Egg Farmers Association Incorporated

Telephone 07 4696 7645

Email iasmascot@bigpond.com

Internet <http://www.eggfarmers.org.au>

18. Appendixes

18.1 Appendix 1 Application to participate in the Salmonella enteritidis monitoring and certification program, Queensland

18.2 Appendix 2 Application fee and related charges

 <p>Queensland Government Department of Primary Industries and Fisheries</p>	<p>Application to participate in the <i>Salmonella enteritidis</i> monitoring and certification program, Queensland</p>
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Purpose of Application:

This application is to apply to the Chief Inspector of Stock or delegate to participate in the Salmonella enteritidis (SE) monitoring and certification program, Queensland.

NOTE: *This application is to apply for a certification. Annual re-certification is required.*

1. Applicant details:

Individual Corporation

Given name:

Family name:

Trading name of business:

Address:

Telephone:

Facsimile:

Mobile:

Email:

2. Biosecure unit / property details of poultry enterprise/s: (where SE program is to be undertaken)

Biosecure unit identifier _____ **/ property identifier** _____

Trading name of poultry enterprise

Address:

<input style="width: 100%; height: 100%;" type="text"/>	<input style="width: 100%; height: 100%;" type="text"/>
<input style="width: 100%; height: 100%;" type="text"/>	

Biosecure unit identifier _____ **/ property identifier** _____

Trading name of poultry enterprise

Address:

<input style="width: 100%; height: 100%;" type="text"/>	<input style="width: 100%; height: 100%;" type="text"/>
<input style="width: 100%; height: 100%;" type="text"/>	

Biosecure unit identifier _____ / **property identifier** _____

Trading name of poultry enterprise

Address:

<input type="text"/>	
<input type="text"/>	Property identification code (PIC):

Biosecure unit identifier _____ / **property identifier** _____

Trading name of poultry enterprise

Address:

<input type="text"/>	
<input type="text"/>	Property identification code (PIC):

Biosecure unit identifier _____ / **property identifier** _____

Trading name of poultry enterprise

Address:

<input type="text"/>	
<input type="text"/>	Property identification code (PIC):

3. Veterinary advisor details (if applicable):

Name of veterinary adviser:

Address:

<input type="text"/>
<input type="text"/>

Telephone:

Mobile:

4. Details of poultry biosecure units on the property or properties where SE program is to be applied: (specify number and type of birds on each property)

Biosecure unit	Property name / identifier	Egg breeders	Table egg layers	Other (specify)	TOTAL
1.					
2.					
3.					
4.					
5.					

5. Details of SE program (include additional sheets if necessary):

Biosecure unit	Class of poultry to be tested [egg breeders, , table egg layers, other (specify)]	Housing / enterprise type (only complete for table egg layers) [free range, cage layer, floor layer]	Dates of environmental sampling [note each biosecure unit should be tested when birds are 40-45 weeks of age or ~20 weeks after the end of an induced moulting process]
1			
2			
3			
4			
5			

6. Documents/fees to be submitted with this application:

Please enclose the following when applying to participate in the *Salmonella enteritidis* monitoring and certification program, Queensland:

- This application
- A copy of the current accreditation certificate for the business under the Food Safety Scheme for Egg and Egg Products, issued by SFPQ
- Evidence that eggs and chicks or poults are sourced from SE free breeding flocks, or if hatching eggs, that they are disinfected and hatched under strict sanitation standards
- Statement as to the health and welfare:
 - of birds at time of sampling
 - of birds over past year (include significant events, illnesses, treatment, vaccination)
- Details of environmental sampling and testing, including:
 - Date and time of sampling
 - Biosecure units sampled
 - Person undertaking the sampling
 - Identification of rows sampled
 - Number of samples taken
 - Condition of manure
 - Sample test results
- Any details of positive SE environmental sampling/testing, serological sampling/testing or animal tissue sampling/testing
- Application fee

Records should be kept in accordance with the *Salmonella enteritidis* monitoring and certification program, Queensland.

8. Applicant's declaration:

I hereby declare that if participation in the *Salmonella enteritidis* monitoring and certification program, Queensland is granted by the Chief Inspector of Stock or delegate:

- I will advise the Chief Inspector of Stock or an Inspector within 24 hours of confirmation of *Salmonella enteritidis* within the flock
- I agree for Biosecurity Queensland to notify Safe Food Production Queensland and the Australian Quarantine Inspection Service of any positive *Salmonella enteritidis* results
- the relevant records specified in the *Salmonella enteritidis* monitoring and certification program, Queensland will be kept for at least two years
- the relevant records specified in the *Salmonella enteritidis* monitoring and certification program, Queensland will be made available on request to an inspector appointed under the *Stock Act 1915* for audit, compliance monitoring or disease tracing purposes
- the particulars provided on this form and any information associated with this application are true and correct.

Name of applicant (please print):

Signature of applicant:

Date:

9. Mail or fax this application to:

SE Program Coordinator (*Salmonella enteritidis* monitoring and certification program, Queensland)
Biosecurity Queensland
Locked Mail Bag 4
Moorooka QLD 4105
Telephone: (07) 3362 9478 **Facsimile:** (07) 3362 9609

10. Office use only:

This application to participate in the *Salmonella enteritidis* monitoring and certification program is:

GRANTED

REFUSED *

- If this application is refused, the decision maker must give the applicant an information notice about the decision.

Name of Chief Inspector of Stock or delegate (please print):

Signature of Chief Inspector of Stock or delegate:

Date:

11. Privacy Statement:

The information provided in this “Application to participate in the *Salmonella enteritidis* (SE) monitoring and certification program, Queensland” is required for the purposes of the Chief Inspector of Stock or delegate in deciding the application. This information will only be used for this purpose and stored as archives for record-keeping and back-up purposes. It will not be released to a third party unless with prior written permission of the applicant or if authorised by law. You have a right of access to your personal Information concerning yourself. You may also request information about our privacy practices from our Privacy Contact Officer.

Application fees and related charges for the *Salmonella enteritidis* monitoring and certification program, Queensland (2009/10)

Item	Fee/charge
Non-refundable application fee	\$40.09 + GST
Annual enrolment/recertification fee	\$27.36 + GST
Hourly inspection fee (including travel time) (per hour)	\$92.18 + GST (minimum 1 hour)
Auditing (including travel time) (per hour)	\$189.09 + GST (charged in increments of ¼ hour)