



***Salmonella* Enteritidis Response Plan**

An Approach to *Salmonella* Enteritidis Detection

**Developed on behalf of the Australian Egg
Corporation Limited**

by Dr Peter C. Scott

Version 1

June 2017

© 2017 Australian Egg Corporation Limited.
All rights reserved.

The views expressed and the conclusions reached in this publication are those of the author and not necessarily those of persons consulted. AECL shall not be responsible in any way whatsoever to any person who relies in whole or in part on the contents of this report.

This publication is copyright. However, AECL encourages wide dissemination of its outputs, providing the Corporation is clearly acknowledged. For any other enquiries concerning reproduction, contact the R&D Program Manager on 02 9409 6999.

AECL Contact Details:

Australian Egg Corporation Limited
A.B.N: 6610 2859 585
Suite 4.02, Level 4, 107 Mount St
North Sydney NSW 2060

Phone: 02 9409 6999
Fax: 02 9954 3133
Email: research@aecl.org
Website: www.aecl.org/r-and-d/

Published in June 2017

Table of Contents

Table of Contents	3
1. <i>Salmonella</i> Enteritidis (SE)	4
1.1 Background of SE in Commercial Layers.....	6
1.2 Industry SE Monitoring Program	7
1.3 Industry Response Plan to SE	7

1. **Salmonella Enteritidis (SE)**

In a report for AECL (formally EIRDC) in 2003 titled Salmonella Enteritidis surveillance and options for the Australia egg industry (RIRDC Project No AUV-1A) the lead statement was - *“The Australian egg industry is currently considered to be free of Salmonella Enteritidis (SE), a significant cause of human food poisoning in many countries. However, the potential cost to the community and to the egg industry, should it become established in Australia, is very high. This project was undertaken to assist the egg industry to develop a national policy on SE, including options for surveillance to ensure early detection and recommendations on the appropriate response to contain and eradicate infections should they occur. This project was undertaken to assist the egg industry to develop a national policy on SE, including options for surveillance to ensure early detection and recommendations on the appropriate response to contain and eradicate infections should they occur. --- Full implementation of the recommendations in this report will depend on extensive consultation between the AEIA (now Australian Eggs), layer-breeder companies, egg producer representatives, Animal Health Australia and Governments to develop a truly national approach to SE preparedness and response in Australia”*.

At the time of writing this current Salmonella Enteritidis Response Plan, the SE status of Australia has not changed. The importance of this today is not just for the domestic market but also for the developing export market where Australia is seen to be a safe food country.

The Australian egg industry still does not have a national policy on SE and neither do the various government jurisdictions have a formalised response program. Attempts to have SE covered under the Government and Livestock Industry Cost Sharing Deed in Respect of Emergency Animal Disease (also known as the Emergency Animal Disease Response Agreement or EADRA), like Newcastle Disease (NDV) and Avian Influenza (AI), which was recommended in the 2003 report and by others (Victorian Salmonella Action Group), has never occurred and while SE is a notifiable disease in Australia there is no formal response plan (like an AUSVETPLAN) in the event of its incursion into a commercial poultry flock. In addition, not being part of the EADRA means that while quarantine can be imposed there is no nationally agreed formal mandated response for depopulation and eradication funded through the EADRA cost-sharing arrangement. This does not preclude the consideration of compensation within an affected jurisdiction however.

The report in 2003 concluded, *“Despite the potential impact of SE if it became established in egg-laying flocks, it is not included in the new cost-sharing arrangements for emergency animal diseases in Australia. Without inclusion of SE in this agreement, any costs of control or eradication of SE in infected poultry flocks remains the responsibility of the industry or State/Territory Government initiating the response. In addition, there is no national agreement or structure under which to manage the response to the detection of SE in poultry, adding to uncertainty for egg producers”*.

Australia does have a voluntary SE accreditation program for NSW and Victoria that is coordinated through the NSW DPI with the take up of this program being by some of the chicken meat and egg industry to assist them in meeting export requirements into some countries and particularly Singapore where poultry imports are only allowed where there is evidence of a government based SE Accreditation program. This program has never been formally funded and has survived because of the

endeavours of particular individuals. An SE accreditation program was developed in Queensland several years ago but it has no active members. The success of the NSW / Vic program has been very much dependent on its confidentiality of information and the understanding while all results are copied to the CVO's of those states the identification of non-SE salmonella does not evoke a departmental response. "I". By default, this SE Accreditation program has through the isolation of other paratyphoid salmonella allowed a good generic understanding of the level of salmonella in the layer industry.

SE under the O antigen classification belongs to salmonella Group D, unlike S. Typhimurium which belongs to Group B. While there are other salmonella belonging to Group D other than SE, the rapid O antigen grouping test allows an early indication of a possible SE isolation until the more detailed typing excludes or confirms its presence. There is also available a ELISA Group D test that can act as a rapid flock screen. The ELISA test is not specific for SE but all Group D salmonella and thus confirmation would require microbiological isolation and characterisation.

1.1 Background of SE in Commercial Layers

Among the greater than 2,500 known serotypes, *S. enterica* serotype Enteritidis is one of the most commonly reported causes of human salmonellosis in most industrialised countries. Shelled eggs were a major vehicle for transmission (Deng et. al, 2014). The observations today are still consistent with those of Hogue et. al in 1997 who reported that more effort is needed to control SE at every stage of the egg continuum, from production through to consumption. A risk-reduction approach, with barriers to the introduction and multiplication of the pathogen throughout the farm-to-table continuum, is the most practical method for reducing human illness from SE in shell eggs at present. An effective long-term solution will require interdisciplinary efforts involving government, industry, consumers, and academics.

Australia has an advantage that it just must not allow SE to establish in its commercial layers. Thus, the salience of the recommendations in the AECL 2003 report:

It is recommended that the objectives of surveillance for SE in Australia should be:

- To ensure early detection of SE so that an appropriate response can be implemented to contain and eradicate the infection; and*
- To provide ongoing demonstration of freedom from SE in the Australian egg industry.*

Like the all paratyphoid salmonella, SE can contaminate the egg through faecal contamination of the shell, but SE can also contaminate the internals of the egg via the ovum or a vertical route. Thus, the control of dirty eggs alone will not provide the mitigation against eggs being contaminated with SE. Thus, the status of the layer bird is more critical than that that currently occurs in Australia with salmonella like *S. typhimurium*.

Much of the international literature and that referred to by our regulatory authorities is based on SE and this is not entirely relevant to the Australian egg industry. As indicated SE has a vertical transmission component and because of its more systemic residency in the host is more amenable to control by vaccination.

For more information on SE the readers of this report can review the copious amount of material on the web.

1.2 Industry SE Monitoring Program

Already a significant percentage of the Australian layer industry is involved in the regular monitoring of salmonella either through the SE Accreditation program, independently or because of the compliance requirements of food safety authorities. Based on bird numbers it is estimated about 75% of Australian layers are currently undertaking salmonella monitoring. All results under the SE accreditation program are viewed by the CVO of NSW or Victoria and all positive results are referred to the salmonella reference laboratories and thus by default are available to government. All monitoring is not selective for SE but identify and isolate all salmonella types.

The type of housing and bird type covered by this monitoring includes cage, barn, layer, caravan and organic and in all states. It does not capture the nonaligned producers. This monitoring over a decade or more now has not identified any of the SE types typically associated with food safety issues. While this testing in individual flocks would not meet a 95% confidence level of a flock infection rate of 0.5% it does still though provide a confidence of Australia's freedom from SE.

Any testing above this level is unlikely to occur in Australia unless made mandatory or incentive driven by the market both domestically and internationally. This is no different to for example avian influenza where Australia does not undertake active surveillance.

The Salmonella Enteritidis Monitoring and Accreditation Program has been supervised by the NSW Department of Agriculture and has covered Victorian and NSW producers but is now in the process of being extended to all states. The details can be viewed at:

<http://www.dpi.nsw.gov.au/content/agriculture/livestock/poultry/health-disease/joint-nsw-vic-salmonella-enteritidis-monitoring-and-accreditation-program>

1.3 Industry Response Plan to SE

It is recognised that while SE is a notifiable disease, the various government It is recognised that while SE is a notifiable disease that the various government jurisdictions do not have a SE response plan. It is the aim of this document is to produce a response plan that can be used by industry and government. This response plan will be implemented independent of the finding being as a consequence of passive surveillance or because of a food safety outbreak. It is recognised that this response plan has no formal or legal jurisdiction unless implemented and enforced by the responsible government authority.

The foundation of this plan is consistent with the recommendations of the RIRDC report in 2003, and its objectives are as follows;

- *To rapidly contain the infection on infected farms;*
- *To recall and destroy or divert to processing any potentially contaminated eggs;*
- *To rapidly determine the extent of infection in the industry; and*
- *To eliminate the infection from infected farms.*

1.3.1 SE Response Plan

There will be no specific response to the isolation of a Group D salmonella other than the precautionary actions for any salmonella of a high-risk consideration. The enhanced traceability of the eggs from the suspect donor flock would be advised noting this would depend at this stage on the direction and recommendations of the technical services in the company involved. All such findings of Group D salmonella should be expedited through the reference laboratories for confirmatory characterisation.

1. Following regular SE surveillance or notification by the health department of a suspected / confirmed human case(s) from a salmonella reference laboratory of SE.
 - At this stage, the reference laboratory has confirmed the isolation of SE to the state CVO concurrently with the notification of the diagnostic laboratory and the laying farm.
 2. Impose a quarantine on the farm restricting the movement of all livestock, eggs, manure and disposables for a period as determined by the CVO.
 - Traceability commences on all eggs on the site with enhanced traceability of eggs from the positive shed.
 - Voluntary recall of all eggs from the positive shed.
 - If required this recall can be enforced by the responsible food authority, health department or CVO as per the legislation in each particular jurisdiction
 - It is noted that the positive status of the birds does not mean positive egg status.
 - If the husbandry and egg handling on the farm is not best practice the CVO can request all eggs from the farm site are recalled
 - Eggs from the all sheds on the site sent for pulping and pasteurisation.
 - Any birds leaving the site to be killed by mass destruction and rendered or buried under a secure transportation protocol as determined by the responsible authority.
 - Only bio secure vehicular movements are permitted.
 - Washing and disinfection of all in contact equipment and vehicles.
 - Secure waste removal of disposable material
 - Undertake an epidemiological investigation.
 - This may involve the microbiological testing of staff.
-

- Farm history including source of any livestock onto the farm.
- Assessment of biosecurity procedures.

3. Monitoring Program.

- All sheds on the site are bled and subject to Group D Salmonella ELISA test weekly. The testing level is to achieve a 99% confidence of detection of a 5% prevalence of disease. It is assumed that after infection that positive seroconversion would occur in 21 days. This can provide an answer of the status of the sheds in less than 24 hours. This provides an indication of past exposure but not the window of recent exposure
- All sheds drag swabbed for salmonella weekly until otherwise directed by the CVO. This should include rat bait stations and all drinking and cooling water storage.
- Cracked and dirty eggs from all sheds sample and tested for salmonella.
 - Sixty (60) eggs from each flock weekly until otherwise directed by the CVO. This period being determined by the outcome of the epidemiological investigations and monitoring outcomes.
- Enhanced environmental swabbing of grading floor.
 - Where the grading floor is external to the egg farm in question, the quarantine should only apply to eggs from the suspect farm. Any existing eggs from the suspect farm should be isolated and securely discarded or pulped and pasteurised under the approval and authority of the CVO.
 - Where the CVO lacks confidence in the traceability then all eggs to be treated as potentially infected.

4. Actions after confirmatory testing.

- Affected shed(s) continue to have all eggs diverted to pulping and pasteurisation.
 - In contact sheds on the farm site, positive for ELISA group D all eggs diverted to pulping and pasteurisation.
 - When in contact sheds confirmed positive on microbiology to be treated like the primary infected shed.
 - In contact sheds negative on Group D, eggs stored – minimum of 28 days (*3 weeks of testing plus 7 days for return of laboratory results*)
- Affected shed all birds depopulated.

- 
- Where the producer refuses to depopulate birds then.
 - All eggs from affected shed(s) must continue to go for pulping and pasteurisation.
 - The quarantine stays indefinitely on site.
 - The enhanced testing regime remains for all sheds.
 - No eggs are released from any in contact sheds until 28 days after they have been laid and only after the last shed test being clear.
 - In contact sheds negative on culture eggs released for sale after 28 days storage.
 - Testing of all in contact sheds to be weekly by both ELISA and culture. Period to be determined by the CVO but a minimum of 3 weekly tests.

5. Depopulation and proof of freedom

- Affected birds depopulated.
 - Enhanced wash down, cleaning and disinfection of shed using a protocol approved by the CVO.
 - Review of hygiene program including vermin (rats, mice, flies, etc.) control.
 - Post disinfection environmental testing of shed twice 7 days apart.
- In contact sheds maintain testing program and egg storage for 28 days until 2 months after the affected shed depopulation.

6. Return to normal operation

- Replacement pullets in depopulated shed after two clear environmental tests.
 - Birds are not to be vaccinated with a Group D vaccine as this would interfere with the extended surveillance program.
- Eggs from in contact sheds for normal sale without 28-day storage 2 months after affected shed depopulation.
- Monitoring by both ELISA and culture reduced to monthly.
 - After 6 months, this changed to quarterly
- Review future control program with consideration of the epidemiological investigation outcomes.