

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

Food Standards Agency surveillance programme on *Salmonella* contamination in eggs available to the UK consumer

Background

1. *Salmonella* continues to be one of the top causative agents of infectious intestinal disease. Between 1981-1991, the incidence of salmonellosis rose by approximately 170% remaining high throughout the 1990's.
2. In 1991 the ACMSF agreed to set up a working group to consider the extent to which eggs were responsible for the rise in human salmonellosis. The report was published in 1993 concluding that much of the increase was due to *Salmonella* Enteritidis mostly phage type 4 (PT4).
3. The ACMSF set up the second *Salmonella* in eggs working group in 1998 to look at initiatives such as vaccination and biosecurity, instigated in order to reduce the incidence of *Salmonella* in eggs produced by commercial laying flocks. The working group also examined why *Salmonella* prevalence of UK eggs failed to drop between the 1991 and 1995/96 egg surveys.
4. The Second Report on *Salmonella* in Eggs was published in 2001. The Report concluded that based on data supplied by the egg industry, the prevalence of *Salmonella* in eggs had dropped since the 1995/96 survey and recommended that this should be confirmed through an official survey in order to quantify the impact of the interventions put in place.
5. The Agency responded to this and to a subsequent increase in cases of *Salmonella* Enteritidis non-PT4, associated with non-UK eggs, by commissioning a series of egg research projects and surveys to understand *Salmonella* infection in laying hens, mechanisms of contamination in eggs, use of eggs and kitchen practices, and to measure the prevalence of *Salmonella* in eggs available to the UK consumer¹

¹ Advisory Committee on the Microbiological Safety of Food (2004) Annual Report, p16-17

6. The egg surveys commissioned by the Agency were:
 - 2003 UK wide survey of *Salmonella* contamination in UK produced eggs sold at retail (FSA project - B18007)²
 - 2005/6 Survey of *Salmonella* in non-UK produced shell eggs on retail in the North West of England and London (FSA project - B18012)³
 - 2005/7 UK wide survey of *Salmonella* contamination in eggs used in catering premises (FSA project -B18017)⁴

Table 1: Overview of *Salmonella* prevalence reported in FSA egg surveys

	2003 UK (n=4,753)	2005/06 non-UK retail (n=1,890)	2005/07 catering (n=1,588)
Prevalence	0.34% (95% CI: 0.17- 0.62%)	3.3% (95% CI: 2.5- 4.3%)	0.38% (95% CI: 0.14- 0.82%)
Box of 6 eggs prevalence	1 in 290	1 in 30	n/a*

*not applicable as eggs are not usually purchased in boxes of 6 for use in catering

7. The 2003 and 2005/07 surveys confirm that the *Salmonella* prevalence in UK produced eggs available for use in catering and on retail sale is lower than the prevalence found in the 1991 and 1995/6 surveys. It has remained at the same level (less than 0.4%) between 2003 and 2005/6. The non-UK egg survey (2005/06) shows that, depending on the country of origin, the consumer was up to ten times more likely to purchase eggs with *Salmonella* on them if they were of non-UK origin.
8. Of the positive samples from the 2003 UK retail survey *Salmonella* was detected on the shell for UK produced eggs indicating a possible environmental contamination event; none of the eggs were contents positive.
9. In the catering egg survey, one of the six positive samples was shell and contents positive, the others were shell positive. The shell and contents positive egg sample was UK produced and *S. Enteritidis* PT4 was found on the shell and in the contents.

² Food Standards Agency (2004). Survey of *Salmonella* contamination of UK-produced eggs on retail sale. <http://www.food.gov.uk/multimedia/pdfs/fsis5005report.pdf>

³ Advisory Committee on the Microbiological Safety of Food Meeting ACM/822 (December 2006) Survey of *Salmonella* contamination of non-UK produced shell eggs on retail sale in the north west of England and London

⁴ Advisory Committee on the Microbiological Safety of Food Meeting ACM/866 (September 2007) UK wide survey of *Salmonella* contamination in eggs used in catering premises.

10. In the 2005/06 non-UK egg survey, 10 of the 157 *Salmonella* positive samples were found to be contents positive indicating that some laying flocks were likely to have systemic infection with *Salmonella*.

Table 2: Overview of *Salmonella* Enteritidis and non-Enteritidis isolates found in FSA egg surveys

	1995/96* (n=13,970)	2003 UK (n=4,753)	2005/06 non-UK retail** (n=1,890)	2005/07 catering (n=1,588)
S. Enteritidis	115	7	147	6
PT1	0	0	122	0
PT4	82	3	1	4
Other PT's	37	4	24	2
Non- S. Enteritidis	23	2	26	1
No. of samples positive	138	9	157	6
Total <i>Salmonella</i> isolates found	144	9	173	7

*survey sampled eggs from England only

** survey sampled eggs in London and north west of England only

11. The UK retail egg and catering egg surveys show that very few samples were *Salmonella* positive; with *S. Enteritidis* PT4 still the prevalent phage type in UK produced eggs when compared to other phage types. However, in non-UK eggs other phage types of *S. Enteritidis* appear to be more prevalent such as PT1.

Key findings

UK egg survey (2003)

12. All the *Salmonella* positive samples were obtained from egg shells which may have occurred as a result of random contamination from the production environment.

13. On an England only comparison, there has been a 3-fold reduction of *Salmonella* contamination since the 1995/96 survey. This drop is likely to reflect the measures introduced by the UK egg industry to control *Salmonella* in laying flocks and hen houses.

14. When comparing data from England, the prevalence of *S. Enteritidis* has fallen sharply since the 1995/96 egg survey (from 0.82% to 0.28%).

Non-UK egg survey (2005/6)

15. The survey provided a measured estimate of *Salmonella* prevalence in non-UK eggs available at the retail level. The majority of the eggs sampled were from Spain therefore this survey did not provide an accurate picture of non-UK eggs in general.
16. Of the 157 *Salmonella* shell positive samples found, 10 were shell and contents positive. The estimated prevalence of *Salmonella* was measured at 3.3% from eggs sold at retail in London and the north west of England. *S. Enteritidis* was only recovered from Spanish eggs with nine different serotypes reported. The majority of the *S. Enteritidis* isolated showed resistance to nalidixic acid with decreased susceptibility to ciprofloxacin (NxCp_L) or resistance to ampicillin (A).
17. The levels of *Salmonella* found in layer flocks are to be reduced according to set targets at the EU level by 2009⁵. Through this, it is hoped that the *Salmonella* prevalence in all EU produced eggs should decrease as interventions and controls are put into place.

Catering egg survey (2005/7)

18. The majority of the eggs sampled were of UK origin and the prevalence reported was similar to the UK egg survey (less than 0.4%). Six samples of eggs were found to be shell positive for *Salmonella* of which one was shell and contents positive.
19. Several risk areas were highlighted in the kitchen practices element of this survey. These included egg storage at ambient temperature, poor stock rotation, potential for cross-contamination from mixing bulked eggs and the pooling of eggs not intended for immediate service. In June 2007, ACMSF considered that further food hygiene training and advice to food handlers and caterers might reduce egg-associated *S. Enteritidis* infections.

Outcomes

20. Following the presentation to ACMSF of the findings from the UK egg survey in 2004, the Committee requested more information on non-UK eggs and confirmation that egg stamping was being widely used, to support its work to consider the risks of raw or undercooked eggs¹.
21. The Agency has now provided information on eggs available to the UK consumer. The surveys have shown that *Salmonella* in UK produced eggs remain low; however *Salmonella* contamination in non-UK

⁵ European Commission (EC) (2006a) Commission Regulation (EC) No. 1668/2006 of 31 July 2006 implementing Regulation (EC) 2160/2003 as regards a Community target for the reduction of the prevalence of certain *Salmonella* serotypes in laying hens of *Gallus gallus* and amending Regulation (EC) No 1003/2005. Official Journal European Union L211, 4-8

produced eggs can be high albeit this will depend on the country of origin.

22. Egg stamping was made compulsory in 2005. This provides information on the production type, country of origin and the producer identification code. On-shell egg stamping has helped the consumer to make an informed choice when purchasing eggs. It also enabled the Agency to effectively perform a survey of non-UK eggs and eggs used in catering premises.

Issues for consideration



The Agency's current advice on eggs

23. The Agency advises that people in risk groups should only consume eggs that have been cooked until white and yolk are solid. When preparing dishes containing eggs, the dish should be cooked until piping hot or until it has reached 70°C for 2 minutes. In relation to people outside the risk groups, the Agency recognises that many people like to eat eggs with runny yolks and does not discourage them from doing so.
24. Attached for information at Annex A is the advice which has been previously provided to caterers. This leaflet was first issued in 2002 and requires updating to be in line with current legislation.
25. Attached for information in Annex B is the UK egg production, import and consumption figures for 2006.
26. In light of the evidence provided in this review paper, and at the recommendation of the ACMSF Working Group on Surveillance, the FSA seeks the Committees' view on whether the Agency's egg advice remains appropriate or whether it requires revision.

Microbiological Safety Division
December 2007

ANNEX A

2002 FSA advice to caterers: “Eggs – what caterers need to know”



How can I reduce the dangers if I use large numbers of eggs?

If you use lots of eggs, you should be especially careful to avoid cross-contamination.

Ideally, you should do all your work with raw eggs at one time. Remember that drips of egg and broken shells could spread bacteria. So you should dispose of the shells carefully, and thoroughly clean surfaces, sinks, dishes and utensils before starting a different type of work. All staff should wash their hands with warm water and soap, and dry them thoroughly, after working with eggs.

Where can I get more information?


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Eggs – what caterers need to know



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Eggs

Some eggs can contain salmonella bacteria inside or on their shells, so it's important to be careful how you handle them and how you use them. This is because salmonella can cause very serious illness, especially among more vulnerable people. Occasionally it can even cause death.

Remember

- Keep eggs away from other foods, when they are still in the shell and when you have cracked them open.
- Don't use damaged or dirty eggs.
- Be careful not to splash raw egg onto other foods, surfaces or dishes.
- Cook eggs and foods containing eggs thoroughly.
- Use pasteurised egg for raw or lightly cooked foods.
- Always wash and dry your hands thoroughly after touching eggs or working with them.
- Clean food areas, dishes and utensils thoroughly, using warm soapy water, after working with eggs.
- Serve egg dishes straight away, or cool them quickly and keep chilled.

What are the dangers?

There are two main things you need to avoid:

- bacteria spreading from eggs onto other foods, hands, work surfaces or utensils (cross-contamination)
 - bacteria surviving because eggs aren't properly cooked
- Remember, salmonella bacteria can be on the shell as well as inside the egg so, to help stop bacteria spreading, you need to be very careful how you handle eggs, both when they are still in the shell and after you have cracked them open.

Keep eggs away from other foods. And always wash and dry your hands, and clean surfaces, sinks, dishes and utensils thoroughly, after working with eggs.

Cooking eggs properly kills bacteria, but bacteria will survive in foods that aren't cooked thoroughly. This is why you shouldn't use raw eggs in food that won't be cooked – use pasteurised egg instead.

Which foods should I use pasteurised egg for?

You should use pasteurised egg in any food that won't be cooked (or will be only lightly cooked), for example home-made mayonnaise, Bearnaise and hollandaise sauces, some salad dressings, ice cream, icing, mousse, tiramisu and other desserts containing eggs. Pasteurised egg can be bought frozen, or in liquid or powder form.

If you buy commercially produced mayonnaise or sauces in jars, or ready-made icing, these will almost always have been made using pasteurised egg. Check the label and if you're not sure, ask the retailer or manufacturer.

Who is most vulnerable?

Elderly people, babies, toddlers, pregnant women and people who are already unwell are most likely to become seriously ill from food poisoning.

If you are catering for any of the people mentioned above, it's especially important to use pasteurised egg for foods that won't be cooked (or will be only lightly cooked). And the safest option is to use pasteurised egg for all dishes, even those that are cooked.

If you do use raw eggs, use them only in dishes that are thoroughly cooked, or cook them until the white and the yolk are solid. This means you should avoid serving eggs with runny yolks to these people.

Can I be sure that an egg is salmonella-free?

It isn't possible to guarantee that any egg will be free from salmonella, whatever the source or brand. So you need to be careful how you handle all eggs. There is a smaller chance that eggs from vaccinated flocks will contain salmonella, but you should still take care. Remember, it's always better to buy your eggs from a reputable supplier.

How should I store eggs?

- Store eggs in a cool, dry place, ideally in the fridge.
- Keep eggs apart from other foods.
- Clean the storage area regularly.
- Don't use eggs after the 'Best before' date.

ANNEX B

UK Egg market figures for 2006

Egg market size	Total (Millions of eggs)
UK production	8,646
Imports	2,001
Exports	221
Total UK consumption	10,426
- Eggs consumed per day	29

Source: British Egg Information Services