

The Epidemiology of a Food Scare: Lessons from Fipronil

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The supply chains of many food ingredients are international and complex. Food safety incidents can have a surprisingly wide impact. The 2017 contamination of eggs with fipronil illustrates how incidents that were initially believed to be isolated can expand in effect. There were interesting differences in the speed, proportionality and effectiveness of response in different countries, and some lessons that can be learned.

Fipronil is an insecticide. Although approved as an agricultural pesticide and for flea control in pets, it has no approved use as a veterinary drug for food-producing animals. Concentrations of the fipronil sulphone metabolite typically found as residues in food are of low risk, but there is evidence of neurotoxicity of fipronil at higher concentrations and of liver, kidney or thyroid damage.

In July 2017 it emerged that a Dutch company, ChickenFriend, had been illegally using fipronil and amitraz (another insecticide) as disinfectants to treat red lice in hen houses. It is reported that the Dutch authorities had been tipped off in late 2016, but with no indications that residues could contaminate eggs. The first warning of fipronil residues in eggs was published as a RASFF¹ notification by the Belgian authorities on 20 July (there has been no evidence of amitraz residues in eggs).



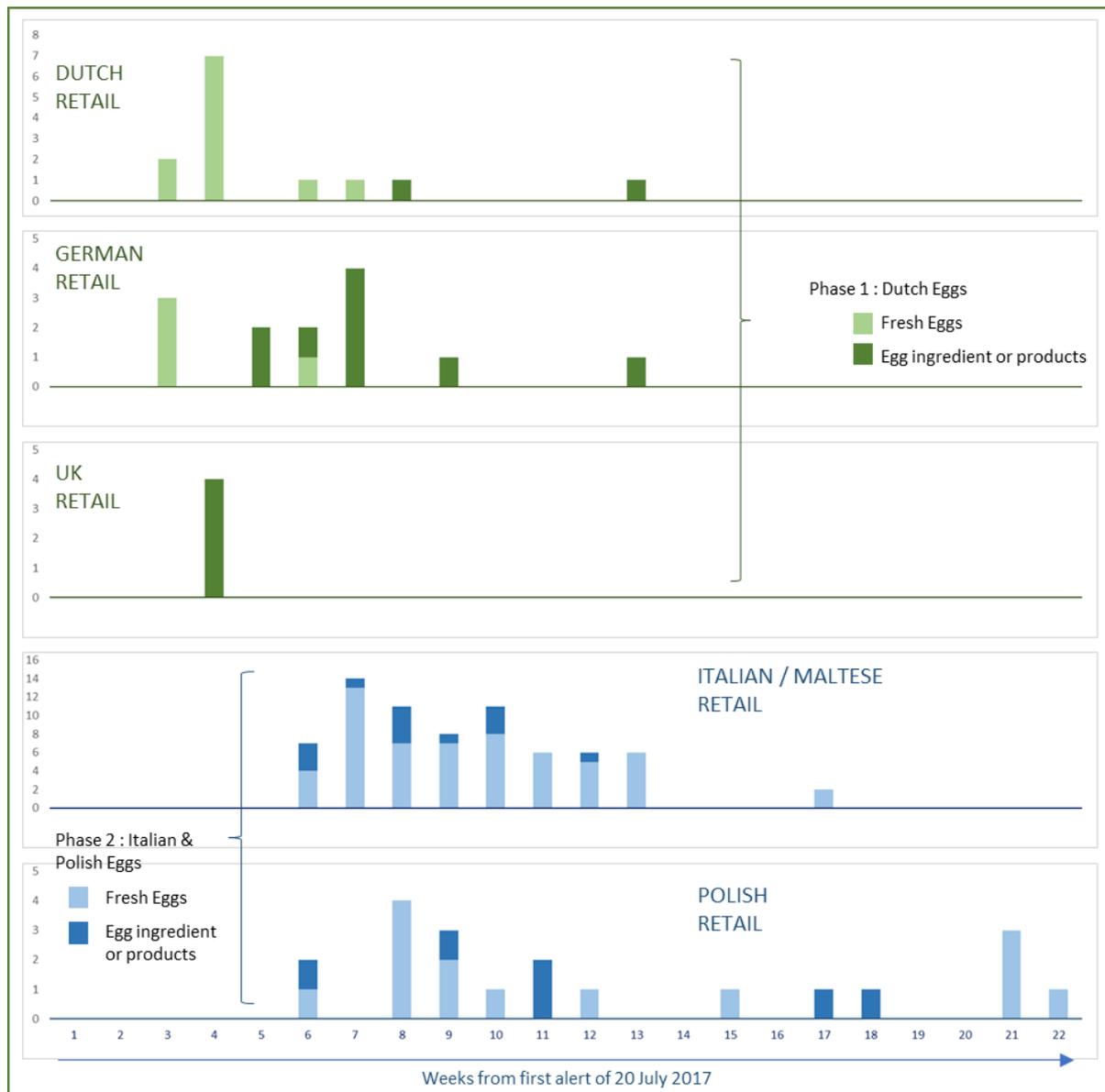
Most farms known to be ChickenFriend customers were in The Netherlands. Following the Belgian RASFF notification, many of these farms were closed as a precaution or required to put health warnings on their eggs. Dutch eggs are exported to neighbouring countries, particularly Germany. Outside of this immediate region, many food manufacturers and retailers assumed they were unaffected. The scale of the contamination only became apparent with awareness of the breadth of international trade in powdered egg and liquid egg, plus the subsequent discovery that farms in Italy, Eastern Europe, and even Taiwan had also been treated with fipronil. By the end of 2017 there had been recalls and alerts from 16 European countries², and the destruction of thousands of tonnes of product.

The timeline of incidents from five affected countries – Netherlands, Germany, UK, Italy and Poland – is shown in Figure 1.

¹ Rapid Alert Service in Food and Feed, European Commission

² Incidents and frequencies are as collated on Fera Horizonscan, <https://horizon-scan.fera.co.uk/>

Figure 1: Timeline of Incidents from Five Affected Countries



The Netherlands: Investigators concentrated on identifying and controlling the affected farms, using traceability data rather than analytical test results to identify eggs to be destroyed. The initial incident was therefore quickly stopped at source.

Germany: The authorities sampled and tested a selection of Dutch eggs. The results were returned quickly, and prompted a mass withdrawal of Dutch eggs on 1 August. But the withdrawal did not include products made with egg powder or liquid egg. There was a tail of incidents over the following two months, as testing revealed other contaminated manufactured food products.

United Kingdom: There are relatively few imports of Dutch eggs, and none are sold fresh. The Food Standards Agency (FSA) initially co-ordinated a single recall of products such as salads and mayonnaise that were known to be made with Dutch eggs; eleven products from four major retailers. Once the scale of the commercial egg powder trade was appreciated, all batch codes of ingredient egg were traced to check if they were implicated. This exercise took over five weeks to

complete. The FSA took a risk-based approach to product withdrawals, based upon batch traceability rather than testing; any product containing over 15% of an implicated ingredient batch should be withdrawn. Over fifty batch codes of commercial ingredient egg were identified and withdrawn over August and September, but no more UK-made products. This threshold-based approach has been vindicated by subsequent industry testing finding no evidence of fipronil contamination in final product. Separately, statutory surveillance testing has found no evidence of fipronil use in UK hen houses.

Italy: Fresh eggs on sale both on the domestic market and in Malta tested positive for fipronil. It was realised that fipronil had also been used on some Italian farms. Eggs from two implicated farms were destroyed at the end of August. Initial product withdrawals were based upon testing rather than traceability. Because some test results took over four weeks to return, there was a time lag and a prolonged tail; eggs were still being withdrawn in October based upon test results from samples collected in early September.

Poland: As with Italy, it was only the general increase in egg testing following the Dutch contamination that revealed that Polish hen houses were also treated with fipronil. There was a significant time lag. The Polish authorities have appeared less successful than the Dutch at controlling the problem, with fipronil still being found in fresh eggs on the domestic market in December 2017.

Lessons Learned

- Batch traceability is a faster and more effective way of identifying stock to withdraw than testing. To contain an incident, it needs to be done quickly. Many food manufacturers and brand owners still do not have the detailed information or systems needed to map their processed raw materials quickly enough.
- Comprehensive analytical surveillance is necessary as a follow-up, to check that an issue is not more widespread across an industry than first thought. The 4-week testing turnarounds acceptable for routine public-sector surveillance programmes are too slow for incident follow-up testing.
- If there is a rational purpose behind an illegal act, then do not assume it is a single rogue perpetrator and an isolated incident. Information will have been shared underground, or the same idea will have occurred to others.
- When the health risk is not urgent then a single, co-ordinated, public recall is preferable to a drip-feed of recalls from different retailers. It reassures consumers that an issue has been dealt with cleanly, maximises the impact of the notification, and minimises loss of confidence in the industry sector.
- The FSA's risk-based threshold approach proved effective and proportionate in managing UK withdrawals.

Fipronil is a relatively low-risk contaminant, but there is no reason to suspect that similar epidemiology would not apply to a higher-risk incident. Even though the original incident is now controlled, egg powder is still a moderate risk in terms of illegal trade due to fipronil residues. A Dutch egg sampled on 3rd January 2018 tested positive, and although there have been no incidents reported from Poland in the past month their sporadic frequency in late 2017 does not give confidence of no recurrence.