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Salmonella control:
A global perspective

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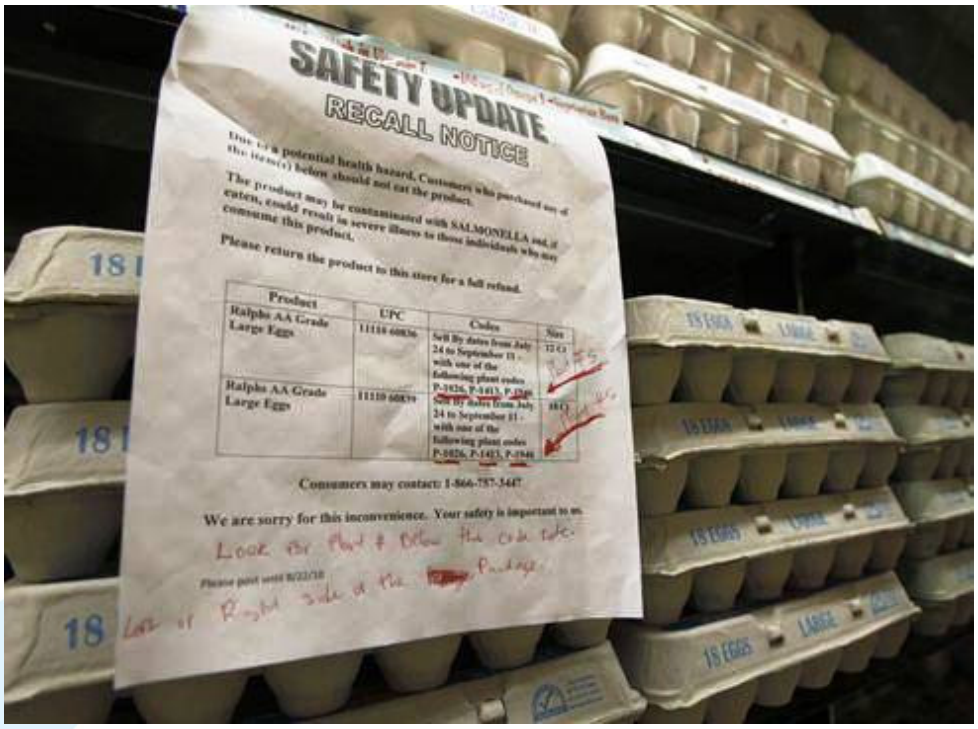
Salmonella: agent of an important zoonotic disease

Salmonellosis remains one of the most prevalent zoonotic diseases in humans; over 100,000 cases are reported each year in Europe. Approximately 40,000 cases of salmonellosis are reported annually in the United States. Because many milder cases are not diagnosed or reported, the actual number of infections may be over thirty times higher.

The most important serovars found are *Salmonella* Enteritidis (SE) and *Salmonella* Typhimurium (ST), both of which are often linked back to poultry products.

Examples include the 2010 massive egg recall in the US due to SE-contaminated eggs, and more recently, the *Salmonella* Heidelberg contamination of ground turkey meat in the US. These incidents prove that salmonella control in poultry remains important to guarantee safer food production for consumers.



Picture 1:
Supermarkets in the US alert consumers about the recall of SE-contaminated eggs in 2010.

Control of Salmonella in poultry

Control of Salmonella in poultry is not easy; there are many variables to be controlled:

- **Bio-security:** It is imperative to control farm hygiene, feed, water, and especially rodents, as they can be main sources of infection. Good bio-security starts with a simple list of all subjects (feed, water, personnel, insects, rodents, etc.) moving in or out the house, followed by a list of actions to disinfect or control these subjects.
- **Monitoring & sampling:** Layer and broiler flocks must be free of at least SE & ST; for breeders, other Salmonella serotypes also require control. Increased sampling of the environment – boot swaps and throughout the farm environment – easily indicates if flocks are positive for Salmonella. Further sampling is required to discover the source of infection and initiate an intervention program.
- **Vaccination:** Inactivated or live vaccines to control Salmonella are increasingly used around the world as they are proven to be an important step in reducing shedding of Salmonella within a flock. Other intervention methods include feed additives, water treatments, etc.
- **Poultry carcass treatment:** While this practice is commonly used in the US and other countries, it is forbidden in the EU. In conjunction with other controls, it is an effective tool to reduce the risk of Salmonella contamination in poultry meat.

Experiences on Salmonella control

Europe

Based on 2004-2005 EU Salmonella contamination baseline studies in breeders, layers, broilers and turkeys, strong regulation in Europe was implemented to reduce Salmonella contamination in poultry and poultry products.

The EU has implemented specific regulations to reduce levels of Salmonella in broilers, layers, breeders and turkeys. The regulations are based on increased sampling in production and rearing periods by using environmental samples (boot swaps, manure and dust) as the reference.

EU directive 2160/2003 aims to reduce Salmonella levels in poultry, and prescribes a target for maximum Salmonella levels in broilers, layers, breeders and turkeys. Within this directive other instructions detail sampling protocols and timing for each of the poultry species, setting clear goals for annual reduction of Salmonella levels according to the base line study. Each member state in Europe has established specific National Control Plans (NCP) to address compliance with EU directives.

The EU directive focuses on the reduction of *Salmonella* Enteritidis and *Salmonella* Typhimurium in broilers, layers and turkeys. Breeders must also reduce the levels of *Salmonella* Hadar, *Salmonella* Infantis and *Salmonella* Virchow.

The implementation of these regulations resulted in a great reduction of flock contamination with Salmonella, for example, SE and ST positive cases in broilers decreased from 11% to 0.7% over a 5-year period. Fresh broiler meat contamination has decreased from 9.4% to 5.4%. In layers, SE and ST levels dropped from 20.4% to 3.2%, while recently table eggs showed only 0.5% positive cases for SE and ST.

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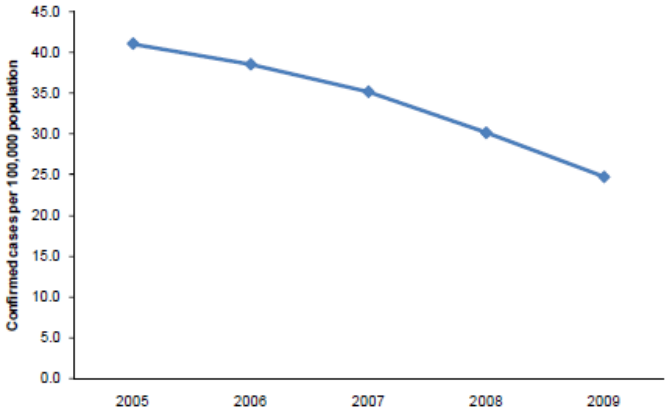


Figure 2: *Notification rate of reported cases of human salmonellosis in EU (2005-2009). Source : EFSA Zoonotic Trend report 2010*

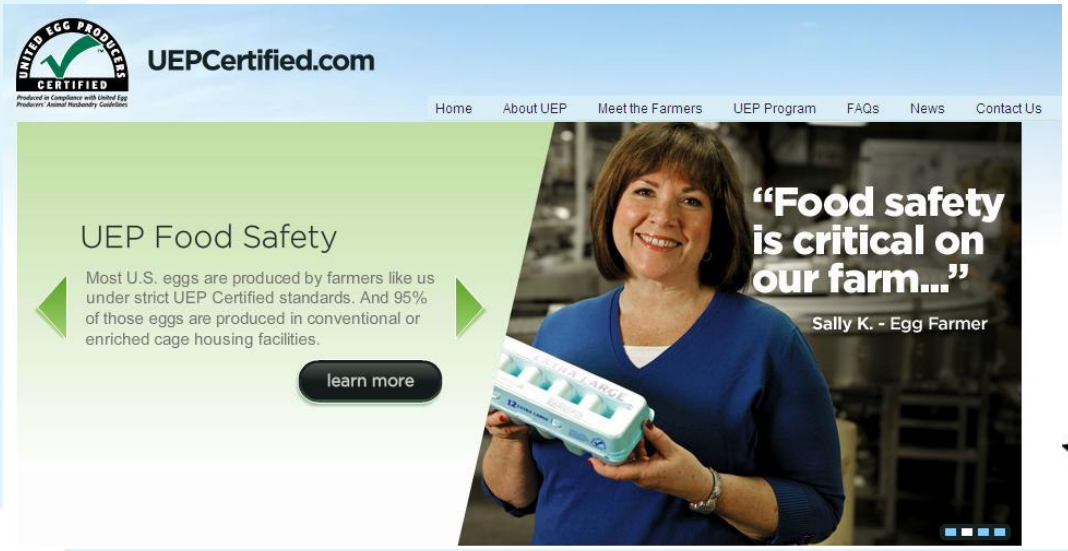
United States

Last year, the Food & Drug Administration (FDA) in the US launched a new set of regulations to reduce *Salmonella* Enteritidis levels in eggs. The US Department of Agriculture (USDA) also launched regulation to control all Salmonellas in poultry meat

In the layer industry the new regulations focus on taking environmental samples in the rearing (14 weeks) and production (40-50 weeks) period, and post-molt. A positive environmental sample leads to extensive egg testing. If the sample is positive, eggs from the flock must be diverted for pasteurization, resulting in lower income for the producer.

Just after the introduction of these new regulations, the US egg industry was confronted with an egg recall due to SE-contaminated eggs. The recall was widely covered by the media, resulting in a loss of consumer confidence in eggs and egg products and a subsequent decrease in egg price.

The event triggered the United Egg Producers (UEP) 5 Star program, which specifically advises vaccine types and prevention tools for control of Salmonella.



The broiler meat industry also increased regulation, implementing 51 bird sample sets with a maximum 5 out of 51 positive for Salmonella serotypes known to cause disease to humans. The processing plants are then rated according to the positive carcass count from sample sets in categories. When processing plants have more than the 5-in-51 positive sample set, the plant names are published on-line and more samples are taken. While the majority of processing plants are currently below the 5-in-51 positive carcass threshold, large broiler integrators are operating conservatively by relying on more vaccines to reduce the salmonella contamination before the broilers enter the processing plant.

Latin America

Brazil: The Brazilian poultry meat industry depends largely on export, so the majority of breeders are vaccinated against *Salmonella* Enteritidis to reduce broiler contamination levels.

Other large integrators in Latin America are also, to a large extent, using vaccines in breeders and other control tools to reduce Salmonella levels in broiler meat.

The control of Salmonella in layers is gaining interest as egg producers move to brand their products in stores; one recall can destroy the egg producer brand. Some producers also see the control of Salmonella in eggs as a tool for premium branding. The use of vaccines to control *Salmonella* Gallinarum is practiced in many countries in Latin America.

Asia-Pacific

As in Latin America, exporting broiler meat integrators in countries such as **Thailand** are using Salmonella vaccines in breeders and other measurements to safeguard poultry meat.

Salmonella control continues to be an important topic in Japan, as the country ranks as one of the highest consumers of eggs in the world. Japanese consumers eat a large portion of their eggs raw, making Salmonella control even more important. The use of vaccines is more common in the Pacific region.

Russia, Ukraine and Commonwealth of Independent States (CIS)

In Russia, Ukraine and other CIS states, new Salmonella reduction regulations closely resemble the testing protocols and measurements used in the EU. As Russia increases the production of poultry meat to reach higher levels of self-sufficiency and Ukraine is preparing to export more products into Europe and surrounding countries, Salmonella control of poultry products will become vital for export.

Africa & Middle East

In Africa and the Middle East, Salmonella control is slowly, growing despite big development in some parts like South Africa. Breeders in the MAGHREB area and Egypt are becoming more interested in Salmonella control programs, while layer integrators in many countries remain focused on *Salmonella* Gallinarum/Pullorum control. Currently, local systems in many countries don't consider Salmonella's risk to public health, and integrators face regulatory roadblocks regarding the use of vaccines.

Conclusion

The importance of controlling Salmonella in poultry is gaining more interest and is mainly driven by:

- *Increased regulation for the control of Salmonella such as in the EU and US*
- *Increased export regulations and barriers, making control of Salmonella vital for broiler integrators exporting broiler meat*
- *Increased branding of poultry meat and eggs; Salmonella contamination can do great damage to a brand and its company, affecting future sales*
- *Human Salmonellosis outbreaks that trigger strong regulation and control measurement.*