poultry focus
business news for the poultry industry
intervet

The history of the salmonella in eggs story may be a dim and distant memory to most of us, but for some the reminder of the course of events back in the mid eighties may evoke some emotion. The following table shows the progression of events over the last 22 years.

"Salenvac T - protects eggs, protects people."

PROGRESSION OF EVENTS OVER THE LAST 22 YEARS	
1984:	The first appearance of Salmonella enteritidis phage type (PT) 4 in the UK.
1985:	Disease in broiler chickens from egg-transmitted S. enteritidis.
1985-1988:	Increasing infections in broiler parent flocks (around 10%).
1988 (Dec):	The Junior Health Minister and South Derbyshire MP speaks out!
1989 (Mar):	Legislation introduced which saw compulsory testing and slaughter of infected flocks. Egg consumption drops by 20 eggs per person.
1989-1994:	Attempts to eradicate the disease were not totally effective. Repeatedly positive farms identified and hatcheries repeatedly contaminated.
1994 (Mar):	Flock vaccination started in broiler breeders with new vaccine - Salenvac.
1994-1996: infection.	Reduction of positive farms. However, feed still a potential source of Salmonella
1997:	Cases of salmonellosis in humans at an all-time high. Consumption 50 eggs per person lower than in 1988.
1997:	Vaccination of commercial egg layers with Salenvac.
1998:	Lion Code introduced by BEIC, requiring vaccination against S. enteritidis.
1999:	"Lion flock" fully vaccinated.
2001:	Salmonellosis in humans falls by 63% between 1999 and 2001. The Advisory Committee on the Microbiological Safety of Food (ACMSF) states that "There are reasons for believing that these improvements flow from the widespread vaccination of egg laying flocks against Salmonella enteritidis".
2001:	First live vaccine introduced onto the UK market.
2002:	Intervet introduced Salenvac T to provide added protection against typhimurium.
2002 (Oct) - 2003 (Jan):	Public health investigation shows 100% S. enteritidis free Lion Quality eggs.
2004:	European Zoonoses Directive introduced.
2006:	Where are we now?

Live or inactivated salmonella vaccination?

The salmonella vaccines currently on the market can be categorised as either live or inactivated, and their use will be determined by their individual features and benefits, and end market requirements such as Lion Code or ACP compliance.

Live salmonella vaccines, as the name suggests, contain living attenuated strains of salmonella serotypes. Individual products are available that protect against either S. enteritidis (SE) or S. typhimurium (ST) so the immediate choice is against which serotype protection is required. While Lion Code compliance requires compulsory vaccination against only SE, it is worth remembering that the code encourages vaccination against ST too.

One significant factor that favours the use of live vaccines is their administration route. Typically, live vaccines are given orally in drinking water making them convenient for the producer to use, particularly for caged layers where Lion Code compliance is required.

Live vaccines generate their immunity within the gut. This tends to reduce the shedding of salmonella in the flock's environment. This is extremely valid when wanting to reduce the threat to the food chain. However, such immunity is only likely to be local, and thus no passive immunity is transferred to the progeny, and consequently the food chain.

For producers looking to increase the level of protection beyond just the bird itself, particularly relevant to broiler breeders wanting to transfer passive immunity to broiler chicks and layers in high challenge or high risk (eg free range) environments, the use of an inactivated vaccine (such as Salenvac T) could provide the required solution.

Salenvac T is administered into the body via injection, rather than into the gut as with live drinking water vaccines, so it generates humoral antibodies that are distributed in the whole body and transferred into the eggs as well, in the form of maternally-derived antibodies (MDA). New research data demonstrated clearly that these antibodies are present in eggs (see following article - antibodies in eggs). Also, chicks hatched from eggs of Salenvac T vaccinated birds contain these maternally-derived antibodies (MDA) which are able to provide them with a significant level of immunity.

Antibodies in eggs

Brian Sheehan graduated PhD from Trinity College Dublin 1992. He has worked at a number of leading research centres, including Pasteur Institute, Paris, and Imperial College School of Medicine, London. Brian joined Intervet in 2001 and has been responsible for the development of new salmonella vaccines for poultry. He has overseen a number of groundbreaking projects, including a trial to assess whether the circulating antibodies in birds vaccinated with Salenvac T are present in eggs, and what effect this has on the growth of subsequent S. enteritidis and S. typhimurium infections. His findings are summarised here.

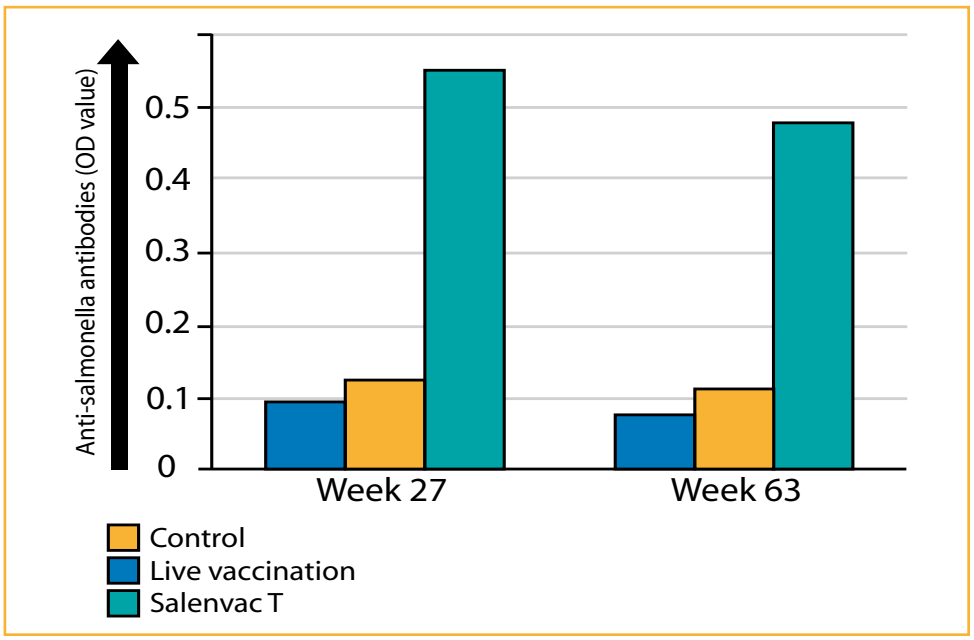
The trial compared eggs from non-vaccinated birds with those from birds vaccinated with either a commercially available live vaccine or an inactivated vaccine (Salenvac T).

Initially, the eggs were analysed to determine the presence of anti-salmonella antibodies. The results are shown in graph 1. It is noticable how high the Salenvac T antibodies remain at 63 weeks.

Subsequently, homogenised samples of eggs from each group of birds were inoculated with low numbers of either S. enteritidis (SE) or S. typhimurium (ST) cells and incubated. The number of viable salmonella was determined at intervals.

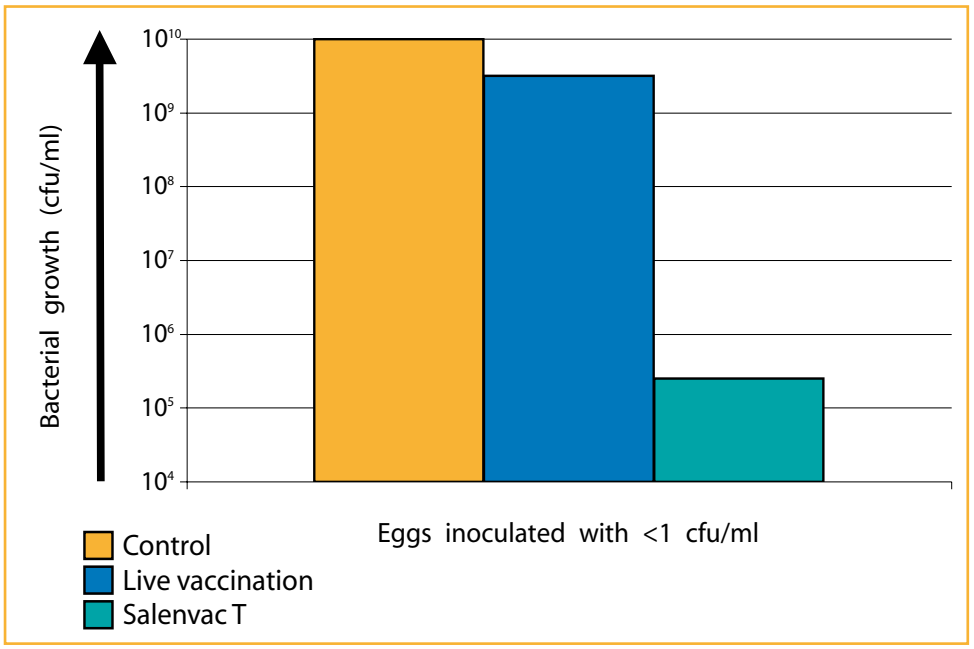
S. enteritidis (SE) and S. typhimurium (ST) bacteria grew readily in the control eggs and those from live vaccinated birds. However, the level of bacterial multiplication in eggs from Salenvac T vaccinated birds, was significantly reduced demonstrating that circulating antibodies in the eggs appear to provide a good level of protection. See graph 2.

Graph 1: Anti-S. enteritidis antibodies in egg contents from Salenvac T vaccinated birds compared to unvaccinated and live vaccinated birds.



NB: Antibody levels in eggs from Salenvac T vaccinated birds were high and remained so even after 3 weeks storage at 4°C.

Graph 2: Bacterial growth over time in eggs from vaccinated layers compared to unvaccinated controls.



NB: This demonstrates that in eggs from Salenvac T vaccinated birds there is significantly less bacterial growth than in either unvaccinated controls or those vaccinated with a commercially available live vaccine. Please note that this is a logarithmic and not an arithmetic scale, which means that the growth of SE in the Salenvac T group was almost 100,000 times less than in the control group and 10,000 times less than in the live SE group.

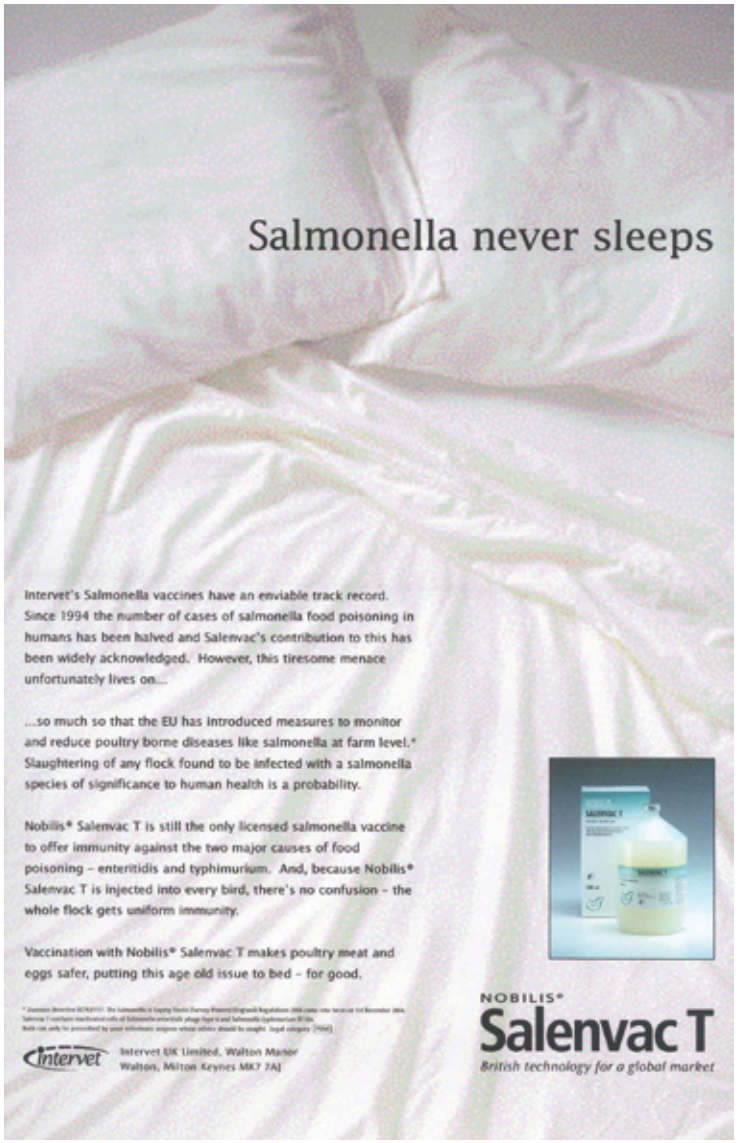
*Illustration of trial results taken from a series of experiments.

Commenting on the Intervet research Poultry Health Services veterinarian Paul McMullin says…

"We have known for some time that even when commercial layer flocks are exposed to Salmonella enteritidis, typically they produce very few infected eggs, and each infected egg contains very few organisms. For such eggs to be a human health issue requires multiplication to occur either in the egg or in products produced from the egg, due, for example, to inappropriate storage temperature.

Each of the salmonella vaccines approved for the control of salmonella in poultry in the UK has its own particular features and benefits. This recently reported trial work from Intervet highlights a specific benefit of Salenvac T. It is not surprising that the hen transfers antibody into the egg as we have long been aware that this product induces circulating antibodies, and their transfer to yolk is a natural mechanism for providing passive protection to the next generation.

This work demonstrates that when very small numbers of Salmonellae (similar to those occurring naturally) are inoculated into egg contents from Salenvac T vaccinated flocks, their growth was much reduced compared to unvaccinated flocks or those vaccinated with a live vaccine."



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