



Salmonella
Solutions

360°

Comprehensive *Salmonella* Prevention

Elanco

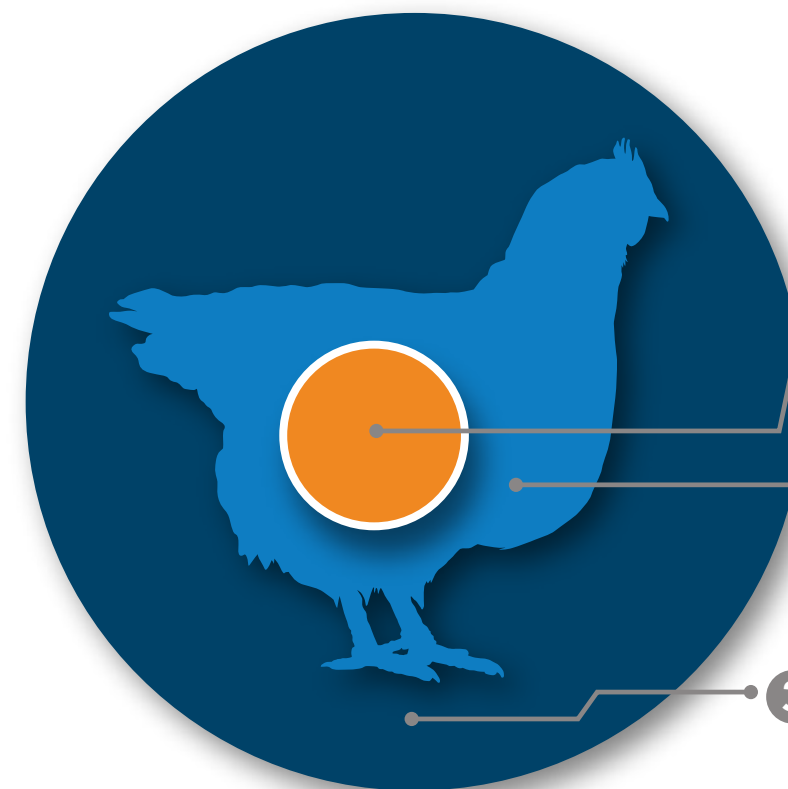


Salmonella **360°** Solutions

A comprehensive suite of products and programs to prevent *Salmonella* infection and improve food safety

Addressing *Salmonella* in broiler, breeder and laying operations requires an integrated, comprehensive approach to food safety. **Salmonella 360°** treats every stage of bird development – from egg to plate – as the last line of defense against *Salmonella*.

Salmonella 360° prevents *Salmonella* in three ways:



1 Building active immunity with vaccines that offer protection across the lifecycle.

2 Supporting bird immunity with nutritional products that promote intestinal health and reduce opportunities for *Salmonella* to colonize.

3 Protecting bird immunity three ways:

- 1 Bioprotection** to combat infestations that serve as vectors for *Salmonella*
- 2 Detection** to ensure vaccine uptake and identify field strains of *Salmonella*
- 3 Programs** to assess *Salmonella* risk factors and develop active measures to reduce them

▶ There are many reasons why **Salmonella** is getting more attention on poultry operations like yours.



Regulations are changing.

Regulatory agencies are looking at *Salmonella* reduction as a way to improve overall food chain safety. In some markets, regulations are fully established, while in others, codes of practice are being introduced. In this environment, producers must meet current standards, demonstrate a commitment to best practices and prepare for new regulations. The U.S., U.K., Canada and the E.U. have all adopted food safety laws, with requirements becoming even more rigorous over the past few decades in response to foodborne illness outbreaks. Codes of practice are emerging in growing markets such as Latin America, Asia Pacific nations and the Middle East.



Outbreaks are costly and damaging.

Even if your own operation has never faced a *Salmonella* outbreak or recall, you're probably all too familiar with what these events can do to a poultry brand. Profit losses can be significant, not to mention the long-term damage to a company's reputation. In the E.U., for example, costs related to *Salmonella* outbreaks have been estimated to average over €1,000 per human case¹ and in the U.S., outbreaks have an estimated annual cost of €2.8bn.²



Salmonella is a prevalent threat to the food chain.

Salmonella continues to be one of the most common sources of foodborne illness. Every year, *Salmonella* is estimated to cause 94 million human infections and 155,000 deaths globally.³ One in two foodborne disease outbreaks in Europe are attributed to *Salmonella*.⁴



Consumers want to know more about their food.

Around the world, consumers are increasingly interested in labeling that provides a clear story about their food contents, safety and environmental impact. More and more consumers are even willing to pay a premium for foods that offer extra assurances.⁵

Whatever reason makes *Salmonella* prevention a priority for you, **Salmonella 360°** from Elanco can help.

② Supporting Bird Immunity



Nutrition

A diet that promotes Intestinal Integrity can help birds develop resiliency against *Salmonella* while improving efficiency and productivity.



▶ LEVUCCELL® SB

An active, dry yeast probiotic, LEVUCCELL® SB reduces *Salmonella* carcass contamination and contributes to improved food safety, bird health and nutrition and production economics. LEVUCCELL® SB provides three lines of defense against *Salmonella* risk through microbiota balance, immune system modulation and maintaining Intestinal Integrity. Use of LEVUCCELL® SB has been shown to consistently reduce *Salmonella* prevalence at processing.⁸

Protexin®

▶ Protexin® Concentrate

Protexin® Concentrate contains probiotics that improve gut microbiota and help protect birds from *Salmonella* Typhimurium (ST). The beneficial microorganisms in Protexin® create natural competition among bacteria, reducing the ability for pathogenic bacteria to colonize the gut and helping to maintain Intestinal Integrity.



③ Protecting Bird Immunity



Bioprotection

Common pests such as beetles, mites, flies and rodents are vectors for *Salmonella* and other zoonotic pathogens for humans. An effective bioprotection program can address infestations, create a cleaner environment for your birds and reduce the potential for *Salmonella* to enter your operation.

► Elanco bioprotection products help producers control:



House flies (larvae and adults)



Darkling beetles (larvae and adults)



Red mites



Rodents



Microbes



Elanco bioprotection products should always be used as part of a rotational chemistry program. Rotation prevents the development of resistance and ensures products remain effective for the long-term.

For producers looking to improve their overall approach to bioprotection and food safety, the Elanco **Food Safety Program (FSP)** can help. Through FSP, Elanco partners with your operation to identify and quantify food safety risks, develop solutions and monitor continuous food safety improvement over time. See page 14 for more about FSP.

Elanco bioprotection product offerings vary by region. Speak to your Elanco representative to determine which products may be the best fit based on your operational needs.

③ Protecting Bird Immunity



Detection

Delivering proof and peace of mind. A suite of pre- and post-take detection offerings ensure you'll know your flocks are vaccinated against *Salmonella* and you're getting the value from your investment.

AviBlue

▶ **AviBlue®**

AviBlue® is a water stabilizer with dye used to visualize water flow in drinking lines and detect when vaccine-mixed water reaches the end of the drinking line. AviBlue® also lets vaccine crews observe vaccine uptake on birds themselves, through blue-stained tongues and/or crops, to help assure uniform vaccine distribution throughout the flock.

AviPro. PLATE

▶ **AviPro® PLATE**

This susceptibility microdilution testing system allows producers to determine the activity of antimicrobial agents against specific bacteria, including *Salmonella*, in poultry flocks and can be used to differentiate field strains of *Salmonella* from vaccine strains.



PVM PULLET VACCINATION MONITORING PROGRAM

▶ **PVM (Pullet Vaccination Monitoring)**

Pullet Vaccination Monitoring (PVM) builds producer confidence in vaccine schemes. PVM enables accurate control of oral vaccination procedures for AviPro® *Salmonella* Duo, AviPro® *Salmonella* Vac E and AviPro® *Salmonella* Vac T. This two-step process evaluates vaccine dilution in the pre-take stage, checking for presence of live vaccine in drinking water, then evaluates the vaccine “take” after every immunization via cloacal swabs obtained 4 days post-vaccination.

3 Protecting Bird Immunity



Programs



A comprehensive approach to reduce Salmonella risk on your operation

The **Food Safety Program (FSP)** is an exclusive opportunity available to Elanco customers to optimize *Salmonella* prevention at the operational level in live poultry production. **FSP** assesses *Salmonella* risk across your operation and helps you develop and implement strategies to reduce it.

FSP comprises four steps which are completed in coordination with an expert team of advisors from Elanco:

- 1 Assessment**
Virtual and on-site visits are used to identify areas of *Salmonella* risk on your operation.
- 2 Benchmarking and Scoring**
Areas of risk are scored using the standardized **Food Safety Index (FSI)** from Elanco. FSI scores provide a benchmark for ongoing improvement in key areas.
- 3 Planning and Training**
Elanco advisors work with your operation to design training programs and support strategies to address areas of risk identified in step 2.
- 4 Implementation and Monitoring**
A monitoring system is developed for your organization, allowing you to track progress toward your food safety goals over time.

Speak to your Elanco representative to get started with FSP.

AviPro® SALMONELLA DUO: One dose contains live attenuated *S. Enteritidis* bacteria, min. 1×10^8 CFU and max. 6×10^8 CFU. Live attenuated *S. Typhimurium* bacteria, min. 1×10^8 CFU* and max. 6×10^8 CFU*. For immunization of healthy chickens to reduce fecal excretion and colonization of internal organs with S.E. and S.T. field strains and to reduce colonization of eggs with S.E. field strains. Onset of immunity: 15 days. Duration of immunity: 52 w. against virulent S.E. and 46 w. against virulent S.T. Vaccination scheme: (layers and breeders): A single dose from first day of life followed by a second vaccination at an age of 6 to 8 w. and a third vaccination around the 16th w. of life at least 3 w. before onset of lay. Oral use after resuspension in drinking water. Do not use in sick birds. Adverse reactions: None known. If you notice any serious effects or other effects not mentioned in this leaflet, inform your veterinary surgeon. Withdrawal period: meat, offal and eggs: 21 d. Keep out of the reach and sight of children. Store and transport refrigerated (2°C – 8°C). Do not freeze. Protect from direct sunlight. Do not use after the expiry date. Shelf-life after reconstitution according to directions: 4 h. Veterinary prescription. Lohmann Animal Health GmbH (an ELANCO company). Heinz-Lohmann-Str. 4, 27472 Cuxhaven, Germany.

AviPro® SALMONELLA VAC E: One dose contains live attenuated *S. Enteritidis* bacteria, min. 1×10^8 CFU and max. 6×10^8 CFU. For immunization of chickens to reduce fecal excretion and colonization of internal organs with S.E. field strains. Immunity develops within 14 d. of first vaccination: after 15 d. the fecal excretion is reduced up to 70%. The immunity lasts until week 60 of life. Vaccination scheme: Chickens (layers and breeders): a single dose at one day of age followed by a second vaccination at 6-8 w. of age and a third vaccination at 16-18 w. at least 3 w. before point of lay. Administration after resuspension via drinking water. Do not use in sick birds. Do not use in birds in lay and within 3 w. before onset of lay. Adverse reactions: None known. If you notice any serious effects or other effects not mentioned in this leaflet, inform your veterinary surgeon. Withdrawal period: meat and offal: 21 d. Veterinary prescription. Lohmann Animal Health GmbH (an ELANCO company). Heinz-Lohmann-Str. 4, 27472 Cuxhaven, Germany

AviPro® SALMONELLA VAC T: One dose contains live attenuated *Salmonella* Typhimurium bacteria, strain Na2/Rif9/Rtt, min. 1×10^8 CFU* and max. 6×10^8 CFU*. *CFU = Colony Forming Units. Indications: For active immunisation of healthy and susceptible chickens to reduce fecal excretion and colonization of internal organs with *Salmonella* Typhimurium field strains. Onset of immunity: 15 days. Duration of immunity: protection for at least 50 weeks of life. Immunity for at least 6 weeks was shown in broilers after one vaccination. Vaccination scheme: Chickens (layers and breeders): A single dose from first day of life followed by a second vaccination at an age of 7 weeks and a third vaccination around the 16th week of life, at least 3 weeks before onset of lay. Chicken (Broilers): A single dose from first day of life. Contraindications: Do not vaccinate unhealthy birds. Adverse reactions: None known. If you notice any serious effects or other effects not mentioned in this leaflet, please inform your veterinary surgeon. Withdrawal period: Meat, offal and eggs: 21 days. Special storage precautions: Keep out of the reach and sight of children. Store and transport refrigerated (2 °C – 8 °C). Do not freeze. Protect from direct sunlight. Do not use after the expiry date stated on the label. Shelf-life after dilution or reconstitution according to directions: 4 hours. To be supplied only on veterinary prescription. Lohmann Animal Health GmbH (an ELANCO company). Heinz-Lohmann-Str. 4, D-27472 Cuxhaven, Germany

AviPro® 109 SE4: inactivated vaccine, containing four different phage types of *Salmonella* Enteritidis (8, 14B, 23, 24), suspended in a stable water-in-oil emulsion. Indications: For active immunization of healthy and susceptible chickens to reduce fecal excretion and colonization of internal organs (including the reproductive tract) with *Salmonella* Enteritidis. Vaccination scheme: First dose in chickens between 12 and 16 weeks of age. Second dose 4 weeks later. Revaccinate during molt. Do not vaccinate within 3 weeks of onset of egg production. Administration: Subcutaneous injection (Brazil the product has been licensed for IM injection as well). It is strongly recommended to inject all birds in the flock. Dosage: 0.25 mL per bird. Target species: Chickens (breeders and layers). Presentation: Bottles of 500 ml containing 2000 doses. Contraindications: Do not vaccinate unhealthy birds. Follow directions carefully. As with any oil emulsion bacterin, improper vaccination technique may result in a reaction at the site of injection. Do not administer intramuscularly. Warning: In case of accidental human injection seek immediate medical attention. Do not vaccinate within 42 days before slaughter. ELANCO US Winslow, Maine, U.S.A.

AviPro® 329 ND-IB2-SE4: Inactivated vaccine containing antigens of Newcastle Disease (LaSota Strain), Infectious Bronchitis (Massachusetts and Arkansas strains) and four different phage types of inactivated *Salmonella* Enteritidis (8, 14B, 23, 24), suspended in a stable water-in-oil emulsion. Indications: For active immunisation of healthy and susceptible chickens as an aid in the prevention of Newcastle Disease and Infectious Bronchitis (Mass. and Ark. Types) and as an aid to reduce the colonization of internal organs, including the reproductive tract, by *S. Enteritidis*. Vaccination scheme: to immunize against SE it requires a primer vaccination, with a live *S. Enteritidis* vaccine from day-of-age, or with an inactivated, from 6 to 8 weeks of age to protect pullets against the challenges of *Salmonella* Enteritidis in rearing facilities. AviPro® 329 ND-IB2-SE4 can be applied between 12 and 16 weeks of age. To immunize against viral diseases it is required to vaccinate with live viral vaccines for Newcastle Disease and Infectious Bronchitis at least 4 weeks prior to the use of AviPro® 329 ND-IB2-SE4. Administration: Subcutaneous injection. It is strongly recommended to inject all birds in the flock. Dosage: 0.25 mL per bird. Target species: Chickens (breeders and layers). Presentation: Bottles of 500 ml containing 2000 doses. ELANCO US Winslow, Maine, U.S.A.

AviPro® Megan® Egg: Lyophilisate for suspension. Double gene-modified ST-live attenuated strain χ 3985; one dose contains at least 1.0×10^8 CFU/dose. Indications: For active immunization of healthy and susceptible chickens to aid in the reduction of *Salmonella* Enteritidis colonization in the internal organs, including the ovaries and oviduct and the intestinal tract and ceca. Presentation: 2500 doses, 5000 doses in 30 ml vials. Directions for use: Breeders and Layers: Vaccinate pullets at 2 weeks of age by coarse spray application, followed by revaccinations at 4 and 16 weeks of age by coarse spray application. AviPro® Megan® Egg is a USDA-licensed vaccine recommended for the vaccination of pullet chickens as an aid in the reduction of SE colonization of the internal organs, including the ovaries and oviduct, and the intestinal tract and ceca. Dose: For a vaccine vial of 2,500 doses, mix the vial contents with the appropriate volume of cool, non-chlorinated, sterile water to vaccinate 2,500 birds. WARNING: Do not vaccinate within 21 days before slaughter. CAUTION: Store at 2° – 8°C (35° – 46°F). Do not freeze. ELANCO US Fort Dodge, Iowa, U.S.A.

AviPro® Megan® Vac 1: Lyophilisate for suspension. Double gene-modified ST-live attenuated strain χ 3985; one dose contains at least 2.0×10^7 CFU/dose. Indications: Recommended as an aid in the reduction of *Salmonella* Typhimurium, *Salmonella* Enteritidis and *Salmonella* Heidelberg colonization of the internal organs of young growing chickens (broilers) and as an aid in the reduction of *Salmonella* Enteritidis colonization of the crop and digestive tract, including the ceca. Presentation: 5000 doses, 10000 doses in 30 ml vials. Directions for use: AviPro® Megan® Vac 1 is a USDA-licensed vaccine recommended as an aid to reduce colonization of *S. Typhimurium*, *S. Enteritidis* and *S. Heidelberg*. Vaccinate chickens (broilers) at one day of age by coarse spray application. A second dose should be given at 14 days of age in the drinking water. Dose: For a vaccine vial of 5,000 doses, mix the vial contents with the appropriate volume of cool, non-chlorinated, sterile water to vaccinate 5,000 birds. CAUTION: Store at 2° – 8°C (35° – 46°F). Do not freeze. ELANCO US Fort Dodge, Iowa, U.S.A.

The labels contain complete use information, including cautions and warnings. Always read, understand, and follow the labels and directions for use.



Salmonella Solutions 360°

Talk to your Elanco technical consultant to identify the right **Salmonella** solutions for your operation.

¹Oxford Analytica. Oxford Analytica The Costs of Animal Disease 2012 https://www.bft-online.de/fileadmin/bft/publikationen/IFAH_Oxford-Analytica_The-Costs-of-Animal-Disease_October2012.pdf.

²Scharff RL. (2020) Food Attribution and Economic Cost Estimates for Meat- and Poultry-Related Illnesses. *Journal of Food Protection*;83[6]:959-67.

³Hendriksen RS, Vieira AR, et al. (2011) Global Monitoring of Salmonella Serovar Distribution from the World Health Organization Global Foodborne Infections Network Country Data Bank: Results of Quality Assured Laboratories from 2001 to 2007. *Foodborne Pathogens and Disease*; 8:887-900.

⁴EFSA Journal 2015. The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2013. *EFSA Journal*;13(1):3991.

⁵Cassidy J. (2018) State of Clean Label Around the World: Global Similarities, Geographic and Generational Differences. Kerry. <https://www.kerry.com/insights/kerrydigest/2018/state-of-clean-label-around-the-world>. 2018.

⁶Methner U. (2007) Vaccination of poultry against Salmonella: what is the ideal vaccine (strain)? In proceedings 18th European Symposium on the Quality of Poultry Meat and 12th European Symposium on the Quality of Eggs and Egg Products;1-6.

⁷Barrow PA, Methner U, editors. (2013) Vaccination against Salmonella infections in food animals: rationale, theoretical basis and practical application. Barrow & Methner's Salmonella in domestic animals. 2nd ed. Wallingford, UK: CAB International;455-75.

⁸Fanelli et al. (2015) Prevalence reduction of pathogens in poultry fed with *Saccharomyces cerevisiae*; *Biotechnol. Agron. Soc. Environ.*; 19(1): 3-10.

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