



Break the *Salmonella* cycle on your operation.



POULTRY ACCOUNTED FOR 40% OF TRACKED SALMONELLA OUTBREAKS

HUNDREDS OF TRACKED SALMONELLOSIS CASES ARE LINKED TO POULTRY EACH YEAR.

In a survey of food disease outbreaks over nearly a decade, poultry accounted for a higher percentage of *Salmonella* outbreaks than any other food commodity, with approximately 40% of tracked outbreaks linked to live poultry, shell eggs or processed poultry products.¹

YOUR BIRDS ARE CONSTANTLY AT RISK.

- Vertical transmission of bacterial pathogens like *Salmonella* remains a critical issue throughout all stages of production, with reinfection promoting a cycle of disease on operations just like yours.
- In recent years, newer serovars of *Salmonella* have been reported in disease outbreaks highlighting the need for a more broad-spectrum pre-harvest food safety mitigation strategy.

WHAT IF YOU COULD CONTROL SALMONELLA IN YOUR FLOCK TO PRODUCE SAFER FOOD PRODUCTS?



COMBAT PATHOGENS.

What if you could block lateral transmission of *Salmonella* in your birds?



REDUCE LOADS.

What if you could reduce *Salmonella* loads entering your processing plant?



BUILD PEACE OF MIND.

What if you could rely on a research-backed solution proven effective throughout the poultry production system?

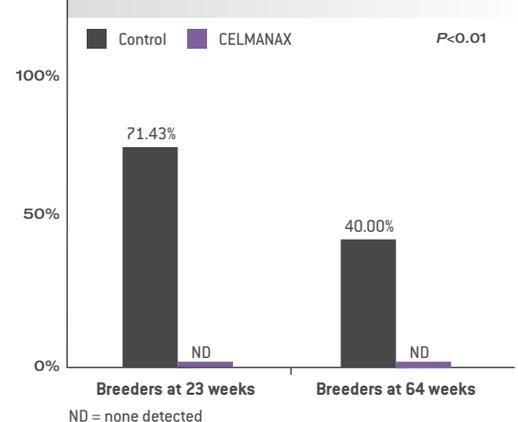
CELMANAX DELIVERS RESEARCH-PROVEN PROTECTION AGAINST FOOD SAFETY THREATS.

CELMANAX™ has been shown to inhibit *Salmonella* adhesion to chicken epithelial cell line *in vitro*², and to reduce the degree of *Salmonella* infection and colonization³⁻¹² in numerous studies across all stages of poultry production.

Salmonella reduction in breeders: In an independent study⁴ conducted to evaluate the effects of CELMANAX on *Salmonella* prevalence in broiler breeders, CELMANAX proved to be a beneficial component of a multifactorial *Salmonella* mitigation strategy in poultry production.

Broiler breeder hens fed CELMANAX had non-detectable levels of *Salmonella* ($P < 0.01$) in the ceca, compared to 71.43% and 40.00% in control hens.

TREATMENT EFFECTS ON % PREVALENCE OF SALMONELLA IN BREEDER HEN CECA.



Salmonella reduction in broilers:

CELMANAX™ supplementation in broiler diets under controlled research^{4,5} and commercial^{8,9} conditions reduced cecal *Salmonella* prevalence compared to control fed broilers. In three of those commercial farms, the load of *Salmonella* in the ceca was reduced by up to 3.5 logs⁸.

Salmonella reduction in layers: In a *S. enteritidis* challenge in layers³, CELMANAX supplementation reduced *S. enteritidis* by 1.2 logs compared to control.

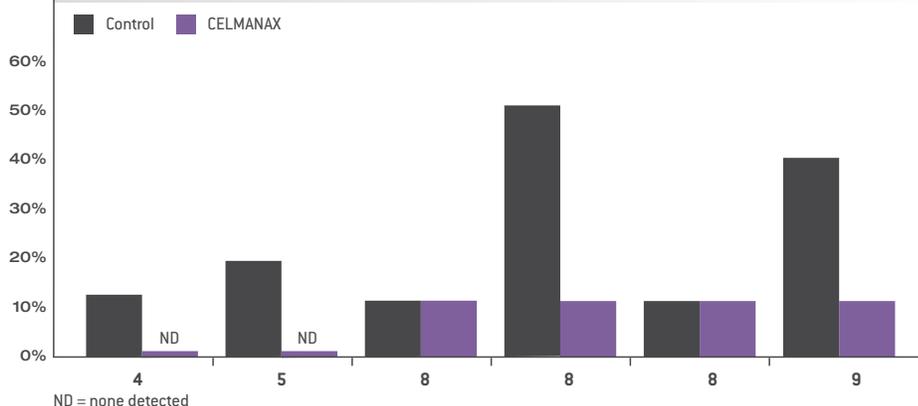
In a commercial trial⁶, CELMANAX supplementation in pullet and layer diets reduced environmental *Salmonella* prevalence at the end of the pullet phase (4.2 percentage points lower than control birds) and in mid-lay (13.75 percentage points lower than the control).

Salmonella reduction in turkeys:

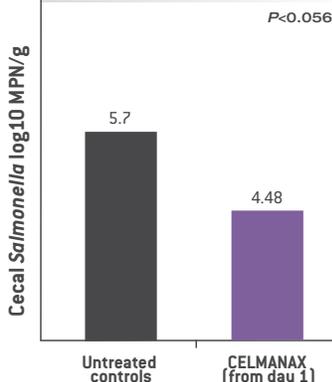
CELMANAX supplementation in turkey diets under controlled research^{10,11} and commercial⁹ conditions reduced cecal *Salmonella* prevalence compared to control fed birds. In the *S. reading* challenge¹⁰, CELMANAX fed turkeys had *S. reading* load 1.77 logs lower compared to control fed turkeys ($P < 0.001$). In the commercial trial, levels were 4.5 logs lower compared to control fed turkeys⁷.

In addition to proven ability to effectively combat *Salmonella* challenges across poultry production systems, a recent study¹² found that CELMANAX had no negative effects on the ability of live *Salmonella* vaccine AviPro® Megan® Vac 1 to reduce colonization, even suggesting a synergistic or additive effect between the two interventions.

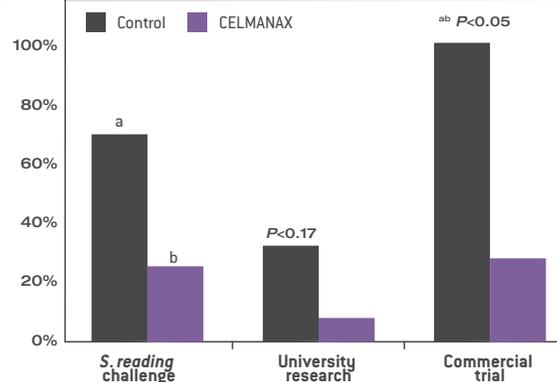
CELMANAX SUPPLEMENTATION REDUCED *SALMONELLA* PREVALENCE IN BROILERS IN MULTIPLE STUDIES.



SALMONELLA LOG₁₀ MPN PER GRAM IN CECA OF 17 WEEK-OLD LAYERS.



CELMANAX SUPPLEMENTATION REDUCED *SALMONELLA* PREVALENCE IN TURKEYS IN MULTIPLE STUDIES.



To learn more about the role that CELMANAX can play in minimizing food safety concerns in your facility, contact your veterinarian, nutritionist or ARM & HAMMER™ representative, or visit AHfoodchain.com.

1 Cosby DE, Cox NA, Harrison MA, Wilson JL, Buhr RJ, Fedorka-Cray PJ. *Salmonella* and antimicrobial resistance in broilers: A review, *The Journal of Applied Poultry Research* 2015;24(3):408-426. <https://doi.org/10.3382/japr/pfv038>.

2 Froebel LE, Froebel LK, Duong Tri. Department of Poultry Science, Texas A&M University. Abstract #216. Presented at IPSF, Atlanta, 2020.

3 Hofacre, et al. Effect of a Yeast Cell Wall Preparation on Cecal and Ovarian Colonization With *Salmonella enteritidis* in Commercial Layers. *J Appl Poult Res* 2018;27(4):453-460.

4 Walker GK, et al. Effect of refined functional carbohydrates from enzymatically hydrolyzed yeast on the presence of *Salmonella* spp. in the ceca of broiler breeder females. *Poultry Science* 2017;96:2684-2690.

5 Walker, et al. The effect of refined functional carbohydrates from enzymatically hydrolyzed yeast on the transmission of environmental *Salmonella* Senftenberg among broilers and proliferation in broiler housing. *Poult Science* 2018;97(4):1412-1419.

6 Nezworski J, Karunakaran D, Jalukar S. The effects of Refined Functional Carbohydrates™ (RFCs™) supplied to laying hens on egg production and mortality under commercial conditions. Presented at 2019 International Poultry Scientific Forum; B311.

7 Data from commercial turkey farm. Data on file. 2019.

8 Composite data from three commercial farms. Data on file. 2019.

9 Lavergne, et al. PSA Abstract #204. 2019.

10 Jalukar, et al. IPSF Poster #P289. 2020.

11 Huff, et al. The effects of yeast feed supplementation on turkey performance and pathogen colonization in a transport stress/*Escherichia coli* challenge. *Poultry Science* 2013;92:655-662.

12 Adapted from a study done at a private Poultry Research Center. Data on file, 2020.