

Study demonstrates the efficacy of plant-derived antimicrobials for controlling
Salmonella Schwarzengrund on dry pet food

By Lindsay Pressman

Salmonella enterica is a major foodborne pathogen that annually causes approximately 1.2 million human illnesses, 23,000 hospitalizations and 450 deaths in the United States. In addition to consumption of contaminated food, Salmonellosis can also occur because of exposures to unconventional, non-food sources, including commercial contaminated dry dog foods. Several recent outbreaks have been linked to presence of contaminated pet food at home. This research paper, published in the *International Journal of Food Microbiology* by Chi-Hung Chen et al., entitled “Efficacy of plant-derived antimicrobials for controlling *Salmonella* Schwarzengrund on dry pet food”, explores the anti-Salmonella efficacy of plant-derived antimicrobials in soybean vegetable oil or one percent chitosan, a biodegradable, GRAS (Generally Recognized as Safe)-status polymer derived from the deacetylation of chitin. Plant-derived antimicrobials (PDAs), a group of natural plant compounds, were chosen in this study because of their non-toxic nature, and strong antimicrobial capacity. The five GRAS PDAs used were trans-cinnamaldehyde, carvacrol, thymol, eugenol and caprylic acid and were applied as a vegetable oil or chitosan-based antimicrobial spray on dry pet food to reduce *S. Schwarzengrund* on dry pet food.

Three hundred gram portions of commercial dry dog food was inoculated with two strains of *S. Schwarzengrund* that were pre-induced for resistance to nalidixic acid (NA) for selective enumeration. Each PDA was added to 5% vegetable oil or 1% chitosan solution to prepare 3 (0.5%, 1% and 2%) treatments that were sprayed onto pet food. The authors studied

how the PDA mixture in combination with vegetable oil or chitosan influenced the *S. Schwarzengrund* populations on dry dog food during stored for 28 days at room temperature.

The authors reported that in all samples of PDAs in combination with vegetable oil, *S. Schwarzengrund* populations gradually decreased over the 28-day storage period. Vegetable oil did not significantly affect the survival of *S. Schwarzengrund*, but all PDAs at 1% and 2% significantly reduced *S. Schwarzengrund* populations. *Trans*-Cinnamaldehyde and thymol had the greatest antimicrobial effect against *S. Schwarzengrund*. All samples of PDAs in combination with 1% chitosan on *S. Schwarzengrund* showed similar inhibitory effects as observed with vegetable oil. PDAs in combination with 1% chitosan decreased the bacterial population throughout the storage period. *Trans*-Cinnamaldehyde at 2% concentration was the most effective treatment and *S. Schwarzengrund* population were decreased the most on day 14. All PDA treatments in combination with 1% chitosan were found to be more effective than in combination with vegetable oil, in reducing *S. Schwarzengrund*. The authors suggest that all tested PDAs, especially 1% and 2% in combination with 5% vegetable oil or 1% chitosan, could potentially be used as an antimicrobial spray treatment to decrease *S. Schwarzengrund* on dry dog foods, but further studies on the palatability and toxicology of PDA-treated pet food, and large scale efficacy studies under commercial settings are justified.

“Overall, plant-derived compounds offer an effective and easy to adopt strategy for controlling *Salmonella* in pet food thereby improving food safety.” – Abhinav Upadhyay

To view the full article, Chi-Hung Chen, Hsin-Bai Yin, Abhinav Upadhyay, Stephanie Brown, Kumar Venkitanarayanan (2019). Efficacy of plant-derived antimicrobials for controlling *Salmonella* Schwarzengrund on dry pet food, visit: *International Journal of Food Microbiology* 296 (2019), Pages 1-7.