

## Natural compounds and strategies to control enteric pathogens in organic poultry

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The goal of this project is to provide organic poultry producers with natural, safe and effective control strategies to control important bacterial health problems and foodborne pathogens in organic poultry and poultry products (*Salmonella*, *Campylobacter* and necrotic enteritis). We have developed a holistic approach to address these problems by evaluating the conditions in which the birds are raised to make appropriate recommendations and then testing different natural compounds to control infections in the flocks. We are investigating the effects of various management practices (outdoor access, housing systems and environmental enrichment on the pasture) on the birds, the pasture and on the presence of pathogenic bacteria. These studies are being replicated during different times of the year to account for seasonality changes. Also, we evaluated the therapeutic effects of natural plant compounds (such as trans-cinnamaldehyde (TC) from cinnamon and eugenol (EG), from clove on the colonization of specific enteric bacteria in birds. For examples, to evaluate the effect of treatments on *Salmonella Enteritidis* (SE) colonization, 84 day-old broiler chicks were placed into 6 treatment groups (n=14/group): a negative control (no SE, no TC or EG), EG control (no SE, 1% EG), TC control (no SE, 0.75% TC), a positive control (SE, no TC or EG), an EG challenge group (SE, 1% EG) and a TC challenge group (SE, 0.75% TC). Before each experiment, the flock was screened for any inherent *Salmonella*. Birds were given ad-libitum access to *Salmonella*-free feed and water. On d 30, birds were challenged with a four-strain SE mixture (8 log<sub>10</sub> CFU/bird). Two birds from each group were sacrificed after 24 h (d 31) to check for colonization of SE in the cecum. Birds were given feed supplemented with TC (0.75%) or EG (1%) for 5 days before slaughter on d 42 for determination of SE populations in cecum and cloaca. The experiment was repeated twice. Trans-cinnamaldehyde and EG consistently reduced SE in the samples in both experiments (P<0.05). Body weights and feed consumption did not differ among groups. Results suggest that TC and EG supplemented through feed could reduce SE colonization in market-age chickens and may provide a strategy for organic poultry producers to improve the safety of poultry products. This program is funded by USDA-NIFA-OREI 2011-01955.