

ABSTRACTS
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347 Effect of selected feed or water acidifiers on enteric pH of chicks.

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There is some commercial use of feed/drinking water (DW) acidifiers for putative modification of gut flora. We evaluated the effect of commercially-available DW (PerformaxTM), DW (PWTr) and/or feed (BiotronicrUSACID) acidifiers, according to label directions, on the lower ileal and cecal pH of chicks in 5 Exps. For each Exp, chicks received balanced feed/water ad libitum, age-appropriate temp., in 1.8 m² pens, with clean shavings. In Exp 1, each DW acidifier, or untreated control, were individually administered on day 8 (n=55/pen). After 8 h treatment (TRT), the cecal pH of PerformaxTM (5.6) or PWTr (5.8) groups were lower (p<.05) than controls (6.2). After 25 h, the cecal pH of the PerformaxTM (5.6) group was lower (p<.05) than controls (6.5) or PWTr-TRT chicks (6.2). After 48 h, no TRT-associated changes in pH were observed. TRT-associated ileal pH changes were not observed (p>.05) at 8, 25, or 48 h. In Exp 2, control, PerformaxTM, neomycin(.4g/l) +penicillin (2.5g/l) , or PerformaxTM + neomycin+penicillin were evaluated beginning on day 8 (n=60/pen). No difference (p>.05) in ileal (range: 6.1-7.2) or cecal (range: 5.7-6.7) pH was observed at 6, 25 or 48 h. In Exp 3, one pen received PerformaxTM in DW for 48 h, with 4 doses PerformaxTM(0.25 ml) by oral gavage each h during the last 4 h. Controls received water alone by sham gavage and DW. At 48 h, no difference (p>.05) in ileal (range: 6.6-6.7) or cecal (range: 5.6-5.8) pH was observed between TRTs. In Exp 4, control, PerformaxTM, BiotronicrUSACID, or PerformaxTM+BiotronicrUSACID were compared (n=15 per pen). TRTs were initiated on day 1, and PerformaxTM was additionally administered by gavage 4x as per Exp. 3 during the last 4 h of the 72h TRT. Ileal pH was reduced (p<.05) by PerformaxTM (5.3) and BiotronicrUSACID (5.2) alone, but not in combination, as compared to controls (5.9). No TRT-associated change (p>.05) in cecal pH was observed. In Exp 5, TRTs described in Exp 4 were repeated and no TRT-associated change in ileal or cecal pH was observed at 6, 12, 24, 36,

52, 74, or 120 h. These Exps indicate that these water or feed acidifiers do not consistently alter lower ileal or cecal pH in young chicks.

Key Words: Intestinal pH, Acidifiers, Chicks

ABSTRACTS
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S203 Effect of a commercially-available drinking water acidifier on *Salmonella enteritidis* growth and water consumption in broilers. A.

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A specific combination of organic acids and flavorings was previously shown to kill *Salmonella enteritidis* (SE) using a simulated *in vitro* broiler crop assay and within the crop of broilers *in vivo*. Moreover, this formulation did not reduce water consumption during feed withdrawal in market-age broilers. Presently, we evaluated the original acid mix (OAM) as compared to the commercially-available resulting product (Perform-Max Optimizer II; PMO). Using a previously published simulated *in vitro* chicken crop assay, with 7 replicates per treatment, we compared OAM and PMO at normal and high label-recommended concentrations to tubes containing saline alone. Tubes containing acids and sterile chick starter were individually vortexed for 2 sec. and incubated for 2.5h at 40C. At 2.5h, SE cfu/mL was determined for each tube. The OAM and each concentration of PMO significantly ($p < 0.05$) reduced recoverable SE in this assay. The low label-recommended concentration of POM reduced recoverable SE by 0.71 Log₁₀ cfu while the high concentration, recommended for feed withdrawal, reduced recoverable SE by 1.39 Log₁₀ cfu as compared to controls. In two separate experiments, using market-age broilers (n=30/pen, 4 replicates per treatment), water consumption was determined over 4h on feed or during a 7h simulated pre-slaughter feed withdrawal. Administration of PMO at either label-recommended dosage rate did not negatively affect ($p > 0.05$) water consumption as compared to controls regardless of the presence or absence of feed. These data suggest that this product may be useful as a substitute for lactic acid administration during pre-slaughter feed withdrawal for reduction of crop-borne salmonellae. A potential advantage of this approach may be increased water consumption and reduced carcass shrinkage associated with lactic acid administration.

Key Words: Salmonella, Organic acids, Feed withdrawal

ABSTRACTS
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M33 Effect of organic acids and probiotics on *Salmonella enteritidis* (SE) infection in broiler chicks. A. D. Wolfenden*¹, R. L. Andreatti Filho², J. P. Higgins¹, S. E. Higgins¹, G. Goana¹, G. Tellez¹, and B. M. Hargis¹, ¹*University of Arkansas, Fayetteville*, ²*Sao Paulo State University, Botucatu, SP, Brazil*.

A commercially-available (IVESCO LLC) water treatment PerforMax Optimizer II (PMO) and probiotic (FM-B11) have independently been reported to have anti-*Salmonella* effects. In exp. 1, 80 day-of-hatch chicks were challenged by oral gavage with 2.8×10^4 cfu SE, held in chick boxes for 2 h, and randomly assigned to either untreated control or continuous PMO treatment in the drinking water(dw; 1:128 product dilution for all exps.) in brooder batteries. Crop and cecal tonsils were cultured at 48 h and 5 d post-challenge for recovery of SE after enrichment. SE recovery in the crop and cecal tonsils at 48 h was significantly ($p < 0.05$) lower in the PMO treated group as compared to control (crop: 75% vs 100%; cecal tonsil: 55% vs 100%, respectively) but not different at 5 d. In exps.2 and 3, 160 day-of-hatch chicks were SE challenged (2.4×10^4 cfu), held in chick boxes for 2 h, and randomly assigned to either untreated control, FM-B11 (1.8×10^7 cfu by oral gavage 1 h prior to placement), PMO, or FM-B11+PMO (n=40 per group). After 24 or 48 h in the brooder battery, crop and cecal tonsils were cultured for the presence or absence of SE recovery after enrichment. After 24 h, FM-B11 or FM-B11+PMO significantly ($p < 0.05$) reduced SE recovery from the crop as compared to controls (75, 40 and 100%, respectively). All treatments reduced ($p < 0.05$) SE recovery from the cecal tonsils at 24 h (control: 60%, FM-B11: 25%, PMO: 45%, FM-B11+PMO: 13%). While no significant differences were observed in SE recovery from crop at 48 h, SE recovery from FM-B11 and FM-B11+PMO groups was significantly lower than the controls in the cecal tonsils (20, 20 and 100%, respectively). In exp. 3, FM-B11 or FM-B11+PMO caused reduced cecal tonsil SE recovery as compared to controls at 24 h (5, 15 and 75%, respectively), and at 48 h (40, 21 and 100%, respectively) and FM-B11+PMO again reduced SE recovery incidence in crops at 48 h as compared to controls (42% vs 100%, respectively). These data suggest that combination treatment with FM-B11 and PMO are more effective than individual treatment for *Salmonella* reduction in chicks.

Key Words: *Salmonella*, Organic acids, Probiotic

111 Evaluation of an organic acid mixture to reduce

***Salmonella enteritidis* in the chicken crop.** R. L. Jarquin*¹, A. D. Wolfenden¹, G. M. Nava¹, J. L. Vicente¹, C. D. Sartor¹, A. M. Donoghue², and B. M. Hargis¹, ¹*University of Arkansas, Fayetteville, 2PPPSRU, ARS, USDA, Fayetteville, AR.*

An organic acid mixture (OAM) consisting of tannic (.024%), lactic (.042%), butyric (.048%) and acetic (.048%) acids (final concentrations) were evaluated in 4 experiments. Each experiment utilized an *in vitro* simulated crop assay which has been described. Briefly, 1.25 grams of chick starter was measured into 13 x 100 mm borosilicate tubes (n=10/replicate) and autoclaved. Sterile saline (4.5mL) was added to each tube with 0.5mL of SE inoculum (1×10^5). In EXP 1 and 2, 0.5x OAM, 1x OAM, or 2x OAM significantly reduced SE recovery by at least one log₁₀ (p<0.05) during a 2 hr incubation at 37° C. However, no effect of higher or lower concentrations of the OAM were observed. Tannic acid alone (.024%) did not reduce SE recovery in these experiments. After *in vitro* testing, water consumption (WC) in the presence of feed or during feed withdrawal (FW) using the OAM or tannic acid alone were measured in market age broilers (4-8 weeks of age) in EXP 3 and 4. Two pens (40 birds/pen) were randomly assigned to each treatment, with treatments consisting of no treatment (control), 1x, 2x, or 3x OAM, or 0.02%, 0.1%, 0.25%, or 0.36% of tannic acid alone in the drinking water (DW). WC was measured at 8 hours. In the presence of feed, no differences in water consumption were observed between the control, 1x OAM, or tannic acid concentrations of 0.02% or 0.1%. However, WC apparently decreased when 2X or 3X OAM or 0.25% or 0.36% tannic acid were administered. During FW, water consumption was decreased (40-70%) in groups receiving either 1X, 2X, or 3X OAM. No effect of 0.02% tannic acid was observed, although 0.25% or 0.36% tannic acid decreased WC (27-52%). Ongoing studies are aimed at evaluation of the effect of DW treatments with selected OAM concentrations on *Salmonella* recovery from market-aged broilers.

Key Words: *Salmonella*, Crop, Organic Acids