### Coccidiosis Posters


AAAP abstract†

430 Comparison of probiotic, prebiotic, vaccine and coccidiostat in prevention and control of coccidiosis in broilers. H. Fayazi1, S. Rahimi*1, and M. M. Kiaei2, 1Department of Poultry Science, Faculty of Agriculture, Tarbiat Modares University, Tehran, Tehran, Iran, 2Department of Animal & Poultry Health & Nutrition, Faculty of Veterinary Medicine, University of Tehran, Tehran, Tehran, Iran.

The aim of this study was to compare the effects of coccidiostat, vaccine and probiotic on fecal oocyst shedding and performance of coccidia-infected broiler chickens. A total of 300 one d-old male chicks (Arbor Acres) were randomly assigned to 5 treatments with 3 replicates in a completely randomized design. Treatments 1 and 2 were designated as negative and positive control, and treatments 3, 4 and 5 received probiotic (Primalac), Salinomycin and vaccine (Livax T) respectively. At d 28 of experiment, all groups (except negative control) were challenged orally with a suspension (100 µL) of sporulated oocysts-infected broiler chickens. A total of 300 one d-old male chicks compared with media controls. In in vivo infection.

432 Effects of *Bacillus subtilis*-based direct-fed microbials on growth performance, immune characteristics and resistance against experimental coccidiosis in broiler chickens. K. W. Lee*1, H. S. Lillehoj1, S. H. Lee1, S. Jang1, U. S. Babu2, M. S. Park1, D. K. Kim1, A. P. Neumann3, and G. R. Siragusa1, 1Agricultural Research Service, Beltsville, MD, 2US Food and Drug Administration, Laurel, MD, 3Danisco, Waukesha, WI.

The present experiment was conducted to study the effects of dietary *Bacillus*-based direct-fed microbials (DFMs) on cytokine expression patterns, intestinal intraepithelial lymphocyte (IEL) subpopulation, splenocyte proliferation, macrophage functions and resistance against experimental coccidiosis in broiler chickens. Birds were fed diets containing one of 8 *Bacillus subtilis* strains (designated Bs2084, LSSAO1, 3AP4, Bs18, 15AP4, 22CP1, Bs27, and Bs278) or one multiple-strain DFM product (AVICORR) for 21 d, and then the chickens were uninfected or orally infected with 5000 *Eimeria maxima* (EM) oocysts. DFMs did not significantly modify body weight gain, but altered intestinal morphometric measurements. At d 21 (before EM challenge), strong phagocytosis ability using BSA-coated fluorescent latex beads and GFP-labeled salmonella was seen in birds given Bs18, 15AP4, Bs27, or Bs278 compared with the no DFM control group. In addition, splenic lymphocyte proliferation, intestine IEL subpopulations, and cytokine mRNA levels in IELs were increased, decreased, or unchanged compared with controls depending on the DFM used. At d 27 (6 d post infection), EM-induced reduction of body weight gain and intestinal lesions were significantly decreased by adding 15AP4 or Bs27 into broiler diets compared with no DFM/EM inoculated control. All experimental diets increased concanavalin A-induced splenocyte mitogenesis in infected broilers compared with the no DFM/EM inoculated control. The present study provides the scientific evidence that *Bacillus*-based DFMs can modulate the host immunity and thus provide the protective immunity against enteric pathogens in broiler chickens.

**Key Words:** anethol, chicken, coccidiosis, immunity, cytokines

431 Anethol enhances in vitro parameters of immunity and augments in vivo protection against avian coccidiosis. S.-H. Lee*1, H. Lillehoj1, S. Jang1, K.-W. Lee1, M.-S. Park1, D. Kim1, and D. Bravo2, 1Animal Parasitic Diseases Laboratory, Animal and Natural Resources Institute, Agricultural Research Service-USDA, Beltsville, MD, 2Pancosma S.A., Geneva, Switzerland.

This study examined the effects of anethol on in vitro parameters of immunity and evaluated its ability to provide in vivo protection against avian coccidiosis. In vitro stimulation of chicken spleen lymphocytes with anethol induced greater cell proliferation compared with the media control. Anethol significantly reduced the viability of *Eimeria acervulina* sporozoites compared with media controls. In in vivo experiments, one-day-old broiler chickens were fed with a standard diet either without anethol (uninfected control and infected control groups) or supplemented with anethol at 15 mg/kg of the diet from the time of hatch. Chickens in the infected control and anethol groups were orally challenged with 5,000 sporulated oocysts of *E. acervulina* at d 10 post-hatch, while control animals were uninfected. Anethol-fed chickens showed 12% increased body weight gain and 42% reduced oocysts shedding following challenge infection with live parasites of *E. acervulina* compared with birds fed a standard diet alone. Anethol-fed chickens produced higher levels of IgY serum antibodies against coccidia parasites compared with the control group. Finally, the percentage of spleen T lymphocytes expressing the γδ-T cell receptor (γδ-TCR) cell surface marker significantly increased in anethol-fed chickens compared with controls. This study provides the first evidence that anethol enhances immunity and protects chickens against experimental coccidiosis.

**Key Words:** anethol, chicken, coccidiosis, immunity, cytokines

433 Ileal and cecal fungal communities in broilers given probiotics, specific essential oil blends, and *Eimeria* infection. M. E. Hume*1, C. A. Henandez1, N. A. Barbosa2,3, S. E. Dowd4, N. K. Sako-
Fungal communities occupying the poultry digestive tract have gained far less scrutiny than corresponding bacterial communities. Attention given poultry-associated fungi have focused almost entirely on feed-associated toxin-producers, yeast, and yeast products. The objectives of the current project were to identify and monitor broiler digestive fungal communities following *Eimeria* infection and treatment with probiotics and essential oil blends. Eight treatments included 4 controls: Uninfected Unmedicated, Unmedicated-Infected, the antibiotic BMD plus the ionophore monensin as positive control, and the ionophore as a negative control. Four treatments included: 2 probiotics, BC-30 and Calsporin; and 2 specific essential oil blends. All chicks except the Unmedicated Uninfected were exposed at 15 d of age to a standard oral *Eimeria* inoculum of sporulated oocysts. Ileal and cecal digesta were collected at pre-*Eimeria*-infection at 14 d of age and post-infection at 22 d of age. Extracted DNA was analyzed by pyrosequencing to examine the impact of feed additives and *Eimeria* infection on individual fungal constituents, while denaturing gradient gel electrophoresis (DGGE) was used to compare more gross changes in the communities. Pyrosequencing identified 3 phyla, 7 classes, 8 orders, 13 families, 17 genera, and 23 fungal species. Ileal and cecal DGGE patterns showed fungal communities were clustered mainly into pre- and post-infection patterns. Post-infection Unmedicated patterns were clustered with pre-infection groups demonstrating a strong effect of *Eimeria* infection on digestive fungal populations. These combined techniques offered added versatility toward unraveling the effects of enteropathogen infection and performance enhancing feed additives on broiler digestive microflora.

**Key Words:** probiotic, essential oils, *Eimeria*, pyrosequencing, DGGE

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**434 Effects of novel nanoparticle adjuvant Montanide IMS 1313 N VG on mucosal vaccination of poultry against *Eimeria acervulina*.** H. S. Lillehoj*1, S. I. Jang1, S. H. Lee1, K. W. Lee1, F. Bertrand2, L. Dupuis2, and S. Deville2, *1Animal Parasitic Diseases Laboratory, Agricultural Research Service-U.S. Department of Agriculture, Beltsville, 2Seppic, Puteaux, France.

The current study was conducted to investigate the immunoenhancing effects of Montanide adjuvants on protein subunit vaccination against avian coccidiosis. Broiler chickens were immunized subcutaneously with a purified *Eimeria acervulina* recombinant profilin protein, either alone or mixed with one of 4 adjuvants (ISA 70 VG, ISA 71 VG, ISA 201 VG or ISA 206 VG), and body weight gains, fecal oocyst shedding, and humoral and innate immune responses were evaluated following oral challenge infection with live *E. acervulina* oocysts. Immunization with profilin plus ISA 70 VG or ISA 71 VG increased body weight gains compared with vaccination with profilin alone. Profilin plus ISA 71 VG also reduced fecal oocyst shedding compared with vaccination in the absence of adjuvant. All adjuvants enhanced profilin serum antibody titers. Increased levels of gene transcripts encoding IL-2, IL-10, IL-17A, and IFN-γ, but decreased levels of IL-15 mRNAs, were seen in intestinal intraepithelial lymphocytes of chickens immunized with profilin plus adjuvants compared with immunization with profilin alone. Finally, increased infiltration of lymphocytes, especially CD8+ lymphocytes at the site of immunization was observed in birds given profilin plus ISA 71 VG compared with profilin alone. These results demonstrate that vaccination with the *E. acervulina* profilin subunit vaccine in combination with Montanide adjuvants enhances protective immunity against avian coccidiosis.

**Key Words:** coccidiosis, vaccine, adjuvant, chickens

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