wk, as well as the BW gains for 0-1, 2-3 and 16- 18 wk. The AST treatment showed more variation in BW uniformity at wk 1 (CV of 10.21%) than CON treatment (CV of 9.16%). Overall, AST and CON birds had similar BW uniformity throughout the rearing period. Whereas Oasis treatment did not affect pullet BW uniformity beyond 1 wk of age, it may contribute to enhanced BW and BW gains during the first 4 wk of the rearing period.

Key Words: Broiler breeders , Body weight uniformity, Chick quality

532 Physical traits and reproductive success in male primary broiler breeders. S. McGary*[1], I. Estevez[1], M. R. Bakst[2], and D. L. Pollock[3], [1]*Univ of MD, College Park, MD 20742,* [2]*USDA-ARS, Beltsville, MD 20705,* [3]*Perdue Inc, Salisbury, MD 21802.*

Genetic selection for high yield in primary broiler breeder males may result in skeletal modifications that impede sperm transfer upon mating. In addition, fluctuating asymmetry (FA) in bilateral traits has been shown to reliably indicate male reproductive potential in some avian species. The goal of this study was to determine if physical variation due to genetic selection and FA could explain and predict differential fertility and semen quality in male broiler breeders. Sixty males from two primary broiler breeder strains (A and B) were individually housed with an average of 10 females. Fertility was estimated by examining the germinal disc (GD), and semen quality by counting sperm penetration (SP) through the perivitelline layer. At 50 wks, body weight (BW) was taken and males euthanized. Posterior pelvic length and width (PPL and PPW), dorsal pelvic length and width (DPL and DPW), tarsometatarsal length and width (TL and TW), and wattle length and width (WL and WW) were measured with digital calipers. Strain differences included BW ($P<0.01$), WL ($P<0.0001$), WW ($P<0.0001$), PPL ($P<0.01$) and DPW ($P<0.001$). The degree of FA in TL ($P<0.05$) and WL ($P<0.05$) was greater in Strain A, however FA did not correlate with fertility or SP in either strain. Strain A WL correlated with SP ($r=0.295$; $P<0.05$). There was a negative relationship between Strain A fertility and DPW ($r=-0.298$; $P<0.05$). Strain A DPW alteration may affect sperm transfer upon copulation, however, this correlation was weak and should be further investigated to validate the relationship between pelvic structure and copulatory success. Fertility and SP did not correlate with physical traits in Strain B. Strain differences demonstrate potential impact of selection on physical traits. A significant relationship between comb size and Strain A fertility has been previously shown, and the present study provides further evidence supporting evaluation of sexual traits as fertility indicators for Strain A.

Key Words: Broiler breeder, Fertility, Genetic selection

533 Effects of rearing feed intake on carcass characteristics of male broiler Breeders to 26 wk of age. R. H. McGovern*[1], J. L. Wilson[1], F. E. Robinson[2], and L. F. Bouvier[2], [1]*The University of Georgia,* [2]*University of Alberta.*

Male broiler breeders require adequate fleshing to attain sexual maturity, while at the same time must remain lean enough to prevent them from becoming too large to mate naturally during the breeding period. Knowledge of the skeletal and carcass characteristics of male broiler breeders has been proposed as a management technique. Four hundred and eighty commercial male broiler breeders were reared in 12 floor pens. Birds were assigned to one of four rearing feed level treatments: standard (SF) (recommended BW profile), plus 15% (P15) (BW approximately 15% heavier that the SF), plus 30% (P30), and full fed (FF) at 1 d of age. Starting at 21 wk of age, male BW was restricted to attain the recommended breeder BW at 24 wk of age. Shank length, keel length, chest width, head width, and comb height were recorded for all birds. Forty birds (10 birds per treatment) were dissected at 6, 12, 18, 20, 22, 23, 24, 25, and 26 wk of age. Shank color and a visual shank color score of all males were assessed from 12 wk of age. The FF treatment males had the greatest gain from 5 to 6 wk of age (334 g) and maintained the greatest BW at 18 and 20 wk of age (3395g and 3747g, respectively). At 6 wk, the FF and P30 treatment males had the greatest fatpad weight compared to the SF bird (17.3g and 18.2g, respectively compared to 7.5g). The FF males had a greater BW and greater breast muscle development than the other BW treatments at 12, 18, and 20 wk. There were no differences in testes weight among the treatments prior to photostimulation at 22 wk. Head width, comb height, chest width, keel length, and shank length were increased in early rearing with feeding level. From 22 to 24 weeks of age, the FF males are in a period of BW weight loss. Testes of birds in the FF treatment were smaller compared to the P30, P15, and SF treatment males at 24 wk (11.7 g, 26.6 g, 29.2 g, and 25.5 g respectively).

Key Words: Male broiler breeders, Carcass characteristics , Testes

PSA Immunology

534 Major histocompatibility (B) complex gene dose effects on Rous sarcoma virus tumor growth. T. A. Tupick[1] and R. L. Taylor, Jr.*[1], [1]*Dept. of Animal and Nutritional Sciences, University of New Hampshire, Durham, NH 03824.*

This study's objective was to examine major histocompatibility (B) complex (MHC) gene dosage effects on the outcome of Rous sarcomas. Matings between Line UNH 193 ($B^{19}B^{19}B^{19}$) trisomic sires and dams produced progeny having $B^{19}B^{19}$ (disomic), $B^{19}B^{19}B^{19}$ (trisomic) or $B^{19}B^{19}B^{19}B^{19}$ (tetrasomic) MHC chromosome doses. The MHC and the nucleolus organizer region (NOR) are both located on a medium size mirochromosome, designated 16. Nucleoli from feather pulp cells were enumerated using phase-contrast microscopy to determine chromosome dose. Six-week-old chickens were inoculated in the wing-web with 30 pock forming units (pfu) of subgroup A Rous sarcoma virus (RSV). Tumors were scored for size six times over a 10-wk period. The six tumor size scores were used to assign a tumor profile index (TPI), which indicates the degree of tumor growth. The TPI values, based on the general regressive nature of the B^{19} haplotype in these chickens, were 1 = complete regression by 28 days, or earlier; 2 = complete regression by 42 or 56 days; 3 = complete regression by 70 days, or a decreasing slope, or complete regression by 56 days followed by recurrence; 4 = general upward trend, or plateau or slight regression after 56 days; 5 = terminal tumor prior to 70 days. Mean tumor size scores were evaluated by repeated measures analysis of variance. The TPI values were rank transformed and analyzed by ANOVA. Fisher's Protected LSD at $P<0.05$ separated significant means. The 88 chickens that developed tumors were 28 disomic, 47 trisomic and 13 tetrasomic types. No difference in tumor growth over time was detected among the three MHC gene doses with most chickens regressing their tumors. Disomic chickens had a significantly lower TPI than trisomic but not tetrasomic chickens. The TPI of trisomic and tetrasomic chickens did not differ significantly. These data indicated that MHC dose alterations, at least to the trisomic level, have a negative impact on Rous sarcomas tumor outcome.

Key Words: Oncogene, Tumor, Aneuploid

535 Wattle swelling and antibody titers in BSA hypersensitive and naive hens. Paul Cotter*[1] and Swami Halidi[2], [1]*Framingham State College,* [2]*Department of Animal and Poultry Sciences, University of Guelph, Canada.*

Wattle swelling was measured at 4, 24, 48, and 72 h in hens challenged with BSA. The swelling responses in those hens previously sensitized to BSA were greater at measurements up to 48 h compared to naive hens. Extraordinary swelling was observed in 10, 6 and 3 of 13 sensitized hens and in none of the naive hens at 4, 24 and 48 h respectively. Thus 19 of 39 (49%) of the presensitized group responses were not considered salutary versus none in the naive group. There was a slight tendency for the sensitized hens to show weight loss at one wk after the challenge but some loss occurred in certain naive hens as well. The log2 antibody titers to BSA were detected by passive hemagglutination. These were 2.8 in naive hens and 8.0 in the sensitized hens at the time of the wattle challenge. Titers rose to 8.0 in naive hens but fell slightly to 7.2 in sensitized hens one wk after the wattle challenge. Natural antibodies to mouse and rabbit erythrocytes were also affected by the wattle challenge. Anti-mouse titers rose from a prechallenge average log2 of 1.9 to 3.4. Anti-rabbit titers also rose from 4.8 to 6.7 during the same period. The net change in both types of natural antibody was about the same (1.7) for the two groups. Overall it appears as if total antibody output is balanced so that increasing one type is offset by decreasing or not changing another type. Thus changes in humoral immune output (natural and acquired antibody levels) accompanied the

cell mediated wattle reaction. Based on the combined observations a theory called "immunologic homeostasis" is advanced. Accordingly net immunological work does not change in a well-balanced system. Temporary immunologic needs are met by drawing from available reserves so that momentary perturbations in this system may be accommodated. Implications of this theory may extend to both infectious diseases and vaccination.

Key Words: wattle swelling, antibody, immunologic homeostasis

536 High-Throughput Gene Expression Profiling To Study Host-Parasite Interactions In Avian Coccidiosis. H Lillehoj*[1], W Min[1], J Zhu[1], C Ashwell[2], C Van Tassel[3], T Sonstegard[3], J Burnside[4], and B Matthew[5], [1,2,3]*U.S.Department of Agriculture-ARS, Beltsville, MD,* [5]*U.S.Department of Agriculture-ARS, Beltsville, MD,* [4]*University of Delaware, Newark, DE.*

Coccidiosis is an intestinal infection caused by intracellular protozoan parasites, Eimeria. Understanding the interaction between host and parasites is crucial in designing new approaches. Documented evidence that T cells are the primary effectors of immunity to Eimeria has led to further interest in understanding the role of T cells in coccidiosis. Coccidia induces local and systemic changes in many cytokines including IL-2, IL-15, IFN-gamma and TGF-beta4. To better characterize host-parasite interactions, high-throughput gene profiling DNA arrays were used to identify genes with altered expression following infection with E. acervulina. Over 1000 expressed sequence tag (EST) genes from an activated T cell library, including those for several cytokines, were arrayed on DNA chips and hybridized with mRNAs from E. acervulina infected intestinal cells. Over 200 genes showed significant changes following infection. The success of this DNA microarray approach prompted us to construct a normalized cDNA library from intestinal cells after infection Eimeria to identify specific genes regulating protective immunity. This library contains 1.87 times 107 transformants/ml with an average insert size of 1.56 kb. Presently, single pass sequence was obtained on over 6000 EST clones of which 80% contain high quality inserts and 50% are unique based on a BLAST search. DNA microarray analysis of this library will allow better characterization of chicken genes involved in local host-parasite interactions in avian coccidiosis (Supported by Fund for Rural America, Grant No 9704985 and partially by ARS CRIS).

Key Words: DNA microarray, intestinal genes, coccidiosis

537 Seroepidemiology of Newcastle disease virus in wild pigeons in Shahre-Kord in Iran. Majid Bouzari*[1] and Khodarahm Argang[2], [1]*Department of Biological Sciences, Faculty of Sciences, Isfahan University, Isfahan, Iran,* [2]*Private Veterinary Practioner, Shahre-Kord.*

Newcastle disease is one of the most important viral diseases of poultry in Iran. It is an enzootic disease and sometimes epizootic. It causes a great loss in poultry industry. Wild birds may act as reservoirs and play an important role in the spread of the virus among poultry flocks. Among wild birds pigeons which have easy access to poultry houses and food stores may play a critical role in the spread of the disease. For determining their role, 390 wild pigeons from three different areas in Shahre-Kord province (Shahre-Kord, Saman and Kiar) were captured and their blood serums were examined for the presence of antibodies against Newcastle disease virus by hemagglutination inhibition (HI) test in autumn and winter of 1998 and spring and summer of 1999. HI antibody titers of 1, 2 and 3 and above were categorized as negative, suspected and positive respectively. Chi-square test was used for statistical analysis. HI titers of up to 7 (log base 2) were recorded. The percentage of the negative, suspected and positive HI antibodies in the whole area were 32.88, 19.18 and 47.94 in autumn, 9.62, 17.30 and 73.08 in winter, 50.45, 18.02 and 31.53 in spring and 63.64, 13.64 and 22.73 in summer respectively. Significant differences were observed between winter and other seasons ($P<0.05$). The differences between spring and summer, and spring and autumn were not significant ($P<0.05$). No significant differences were observed among different areas ($P < 0.05$). The rate of contamination in wild pigeons in areas studied was 31.88-41.45 percent with 95% confidence interval. The higher level of positive birds in winter could be correlated to overcrowding of the pigeons in places which is called Ghanat and the higher possibility of feeding in food stores of poultry farms due to lack of enough seeds during this season. The lower rate of positive birds in spring could be correlated to the introduction of new young birds to the whole population and more availability of food in nature and as a results less crowding and less contact with poultry farms. It was concluded that wild pigeons might act as reservoirs and play an important role in the spread of the Newcastle disease virus.

Key Words: Newcastle disease virus, Seroepidemiology, Wild pigeon

538 Comparison of PEMS-associated and classical astroviruses-mediated effects on performance and immune functions of turkey poults. M. A. Qureshi*[1], Y. M. Saif[2], R. A. Ali[1], F. W. Edens[1], C. L. Heggen-Peay[1], and G. B. Havenstein[1], [1]*NC State University, Raleigh, NC,* [2]*The Ohio State University, Wooster, OH.*

Poult enteritis and mortality syndrome (PEMS) is an acute, infectious, transmissible intestinal disease of young turkeys. A turkey astrovirus (TAst-OSU) of 30-32 ηm size was isolated from intestinal contents of poults exhibiting clinical signs of PEMS. While involvement of astroviruses in enteric disease is not new, they have achieved a renewed importance due to their involvement in PEMS. Experimental inoculation of turkey poults with purified TAst-OSU resulted in growth suppression, diarrhea, 100% morbidity with variable mortality, significant atrophy of thymus and bursa, and reduced lymphoblastogenesis. We have, therefore, compared the recent PEMS TAst-OSU isolate with the "Classic turkey astrovirus" (C-TAst)which was isolated and reported in 1986 (Avian Dis. 30:728). Specific-pathogen-free poults were housed in HEPA-filtered bubble-type isolation units and exposed to $10^3 EID_{50}$ TAst-OSU or C-TAst in 1 mL/poult at 7 d of age. Control poults received 1 mL of sterile PBS. Poults in both virus-challenge groups exhibited reduced ($P = 0.01$) wt gain (123 - 129 g) as compared with the control (141 g) poults at 7 dpi. While bursal development was not affected, poults in both TAst-OSU and C-TAst groups had significant reduction in thymic growth ($P = 0.0006$) and enlarged spleen ($P = 0.044$) vs. control poults at 7 dpi. Lymphoblastogenic response stimulation index against concanavalin-A was lowest in TAst-OSU (0.304), as compared with the C-TAst (0.542) and control (1.182) poults ($P < 0.05$). Poults in C-TAst group exhibited over a 1 log reduction ($P = 0.06$) in total and IgM anti-SRBC antibodies whereas TAst-OSU poults exhibited antibody levels comparable to the control poults. Therefore, this study indicates that the PEMS-associated (TAst-OSU) and the classic turkey astroviruses (C-TAst) are capable of inducing performance and immune function defects. However, these two astroviruses appear to differ in their effects on immune endpoints in young turkey poults.

Key Words: PEMS, astroviruses, immune functions

539 PEMS-associated reovirus: viral replication, effects on avian cell liviability, and cytokine expression. M. A. Qureshi*[1], C. L. Heggen-Peay[1], K. A. Schat[2], B. Sherry[1], M. A. Cheema[1], R. A. Ali[1], and P. H. O'Connell[2], [1]*NC State University, Raleigh, NC,* [2]*Cornell University, Ithaca, NY.*

We have recently isolated a reovirus from intestinal contents of poults suffering from poult enteritis and mortality syndrome (PEMS). This PEMS-reovirus (CU-98) is approximately 80 ηm in size and consists of 10 dsRNA segments clustered in three size classes, designated large, medium and small, based on electrophoretic mobility. Experimental challenge of poults with CU-98 resulted in decreased liver and bursal weights suggesting contributory role of reovirus in PEMS. In the current study we examined the interaction of CU-98 with LMH, a liver hepatocyte cell line; MQ-NCSU, a macrophage cell line; and RP-9 and DT-40 (B lymphocyte cell lines) by exposing the cells to 10-fold dilutions of the CU-98 stock. CU-98 produced CPEs (e.g., syncytia, rounding, sloughing) only in LMH cells with $10^6 TCID_{50}$. CU-98 was found in abundance in cytoplasm of LMH cells via TEM. In contrast, CU-98 particles were detected bound to the MQ-NCSU cell surface but not within the cytoplasm. When CU-98 infected and noninfected LMH and MQ-NCSU cells were examined electrophoretically after metabolic labeling with ^{35}S-methionine, viral protein bands of 145 and 43 kD were found in infected LMH cell lysates but not in MQ-NCSU lysates. Single oral challenge of poults with CU-98 resulted in low-titer (1:4) neutralization antibodies at 10 dpi. CU-98 was plaque-purified and exposed to MQ-NCSU. IL-1 mRNA was examined at 2 h time points by RT-PCR. While no IL-1 mRNA was detected in sham-exposed macrophages, IL-1 was upregulated in macrophages after 2 h of virus exposure and seemed to decrease in a time-dependent manner up to 10 h of exposure. In contrast, IL-1 mRNA was present in both sham and virus exposed LMH cells and appeared to decrease after 8-10 h suggesting a possible down-regulation of IL-1 by CU-98 in liver cells and signaling the beginning of

CPE. These findings imply that PEMS-reovirus may be a key contributory agent in the overall PEMS etiology. Furthermore, some immunological and metabolic alterations observed in PEMS poults may also be attributable to exposure to reovirus.

Key Words: PEMS-Reovirus, CPE, Cytokines

540 Non-covalent modification of protein antigens can direct them to scavenger receptors and induce inflammatory immune responses. S.S. Vandaveer*, G.F. Erf, and J.M. Durdik, *University of Arkansas*.

After pathogen invasion, an organism's survival depends on choices the immune system makes. For intracellular infections, the body can choose one of two pathways mediated by T helper type 1 (Th1) or 2 (Th2) cells. Th1 cells produce inflammation, and Th2 cells, antibody-production. Choosing Th1 over Th2 can prevent host mortality and promote recovery. One way to induce a Th1 response in chickens is to target antigens to scavenger receptors (SR), expressed on B cells and macrophages. Conjugating maleic anhydride to an antigen confers a negative charge to it, allowing it to effectively bind to SR. This binding can be specifically reduced by preincubation with other known SR ligands, evidenced by flow cytometry and immunohistochemistry. We have shown that Th1 responses can be induced by direct covalent modification of protein antigens with maleic anhydride as evidenced by functional biological tests (wattle swelling vs. antibody titers) and confirmed with molecular tests for interferon (IFN)g production. Our hypothesis is that maleyl-pLL will serve as a general linker to deliver protein antigens to SR. We show that the protein need not be directly modified with maleyl to generate Th1 responses. Instead, we covalently modify poly-L-lysine (pLL) with maleyl and then take advantage of protein binding to pLL to deliver the pLL:maleyl-protein complex to SR. The advantage with pathogenic proteins is that linkers may be a benefit because of the practical difficulty in obtaining large amounts of protein antigen needed for direct chemical modification. The pLL was tested as a linker for a model protein antigen, bovine serum albumin (BSA). Chickens were injected with pLL:BSA and maleyl-pLL:BSA to test for Th1 responses. As a result, maleyl-pLL:BSA produced significant wattle swelling and IFNg production, indicative of a Th1 response. This was in contrast to antibody titers produced against pLL:BSA immunization, indicative of a Th2 response. The data establish the likelihood that maleyl-pLL can be used as a linker to deliver many protein antigens to SR to induce Th1 responses in birds.

Key Words: Macrophages, T cell subsets, Scavenger receptors

541 Hypo and Hyper responsiveness to bacterial LPS may be due to differential expression of Toll-like receptor-4 in chicken macrophages from different genetic backgrounds. N. Dil* and M. A. Qureshi, *NC State University, Raleigh, NC*.

Macrophages respond to external stimuli by inducing the expression of various cytokines, adhesion molecules, and enzymes, that modulate various immune functions. Inducible nitric oxide synthase (iNOS) is one such enzyme that catalyses the biosynthesis of nitric oxide which in turn mediates several immunological and physiological functions. We have shown previously that macrophages from Cornell K-strain ($B^{15}B^{15}$) exhibit higher iNOS activity in terms of nitrite production as compared with GB1 ($B^{13}B^{13}$) and GB2 ($B^{6}B^{6}$) chicken macrophages regardless of the LPS bacterial source. In the current study we exposed macrophages (1×10^6) to 5 μg/mL LPS from *Escherichia coli*, *Shigella flexneri*, *Serratia marcensces*, and *Salmonella typhimurium*. Northern-blot analysis revealed that K-strain macrophages expressed higher intensity of iNOS mRNA (iNOS/β-actin ratio) than macrophages from GB2 (which was hardly detectable even in 20 μg total RNA) regardless of the LPS source. We further investigated if any differences exist in possible molecular mechanism(s) involved in iNOS gene expression in these two strains of chickens. The constitutive expression of LPS-related macrophage cell surface receptors CD14 and Toll-like receptor-4 (TLR4) was examined via flow cytometry using anti-human CD14 and TLR4 antibodies. CD14 surface expression and intensity was not different between macrophages from K and GB2 chickens. In contrast, while the overall percentage of TLR4-positive macrophages was the same (K-strain, trial 1 = 92%, trial 2 = 62%; GB2, trial 1 = 91%, trial 2=64%), the receptor intensity (i.e. receptor numbers) was significantly higher (P=0.05) in K-strain macrophages (mean fluorescence intensity trial 1 = 145; trial 2 = 131) than in GB2 (trial 1 = 101; trial 2 = 98) macrophages. Furthermore, TLR2 (a previously thought candidate as LPS signaling molecule)-positive cell numbers were higher in K-strain than the GB2 macrophages in one of the two trials with no difference in the intensity of TLR2 cell surface expression in either trial. These findings suggest that the observed differences in iNOS expression and activity among the K-strain (hyper responder) and GB2 (hypo responder) chickens are, at least in part, due to differential expression of LPS signaling molecule, namely Toll-like receptor-4, leading to relatively stronger LPS-mediated activation of K-macrophages.

Key Words: iNOS, CD14/TLR4, macrophage

542 Effect of a *Lactobacillus*-based dietary probiotic on oocyst shedding and interferon-γ production following *Eimeria acervulina* infection in broilers. R. A. Dalloul*[1], H. S. Lillehoj[2], and J. A. Doerr[1], [1]*Dept. of Animal & Avian Sciences, Univ. of Maryland, College Park, MD/USA*, [2]*Parasite Biology, Epidemiology and Systematics Laboratory, USDA-ARS, Beltsville, MD/USA*.

Previously we reported increased resistance (reduced fecal oocysts) in *Lactobacillus*-treated broilers to *Eimeria acervulina* (EA). The present study was designed to examine IFN-γ (interferon-gamma) and oocyst production under similar conditions. Day-old male broiler chicks were fed control (CON) or probiotic-supplemented (PRO)(Primalac®) diets. In Exp. 1 (24 chicks/diet) chicks were orally challenged with 10^4 oocysts of EA on day 20. Sera and intestinal secretions were sampled at 3, 6, 9, and 12 days post-infection (d PI). In Exp. 2 (8 chicks/diet), the chickens were challenged with $2x10^4$ oocysts/bird and oocysts were enumerated at 10 d PI.

Intestinal IFN-γ in CON chicks was constant through the sampling period except at 6 d PI when a significant ($P < 0.05$) increase occurred. In contrast, PRO chicks had a significantly higher IFN-γ at 3 d PI, which then declined until 12 d PI. No differences in serum IFN-γ were observed. No significant differences in anti-coccidial antibodies were found. Fecal oocyst shedding was slightly but significantly lower for PRO than for CON chicks; however, the reduction in shedding was not as great as in a previous study when half the inoculum rate was used. These results suggest an immunoregulatory effect of PRO diets on the local immune system in poultry and provide a rationale for further study to investigate the beneficial effects of *Lactobacillus*-based probiotics in food animals.

Key Words: Mucosal immunity, *Lactobacillus*, *Eimeria acervulina*

543 Antigen-Induced Ion Secretion in the Chicken Intestine Following Oral or Intraperitoneal Immunization Against Bovine Serum Albumin (BSA). J.L. McReynolds*[1], A.P. McElroy[2], H.D. Danforth[3], and D.J. Caldwell[1], [1]*Texas A&M University, College Station, TX*, [2]*Virginia Tech, Blacksburg, VA*, [3]*USDA/ARS/LPSI/PBEL, Beltsville, MD*.

Our laboratories are investigating epithelial ion secretion, as mediated by Type I hypersensitivity, as a determinant and potential component of functional immunity in the chicken intestine. The present study evaluated antigen-elicited changes in ion secretion following immunization of SCWL chicks against BSA by oral or intraperitoneal (IP) routes. Oral immunization consisted of administering a daily *per os* bolus of 1 ml of 25 mg BSA/ml to chicks between 10 and 16 days of age. IP immunization consisted of administering 1 ml injections of 10 μg/ml BSA-10mg alum (AlK(SO4)2) to chicks on either 1,7, and 14 or 10 and 16 days of age. IP control groups received 1 ml injections of 10 mg alum only. Distal ileal segments from BSA-immunized or control chickens were evaluated for *in vitro* responsiveness to antigen in Ussing chambers on days 20-22 of age in three replicate experiments. Ileal segments from oral BSA-immunized chickens responded to antigen in a significantly (P<.05) greater degree than other experimental groups. This response, a change in transmural short circuit current (ΔIsc), occurred within 1 minute of antigen exposure and reached a maximum level (ΔIsc=40.54) within 3 minutes. Response of negative control tissues was significantly lower (ΔIsc=12.47). When tissues from chickens receiving IP BSA or alum on days 1,7, and 14 were compared, significant differences were not observed (ΔIsc=12.78 and ΔIsc=7.87, respectively). Similarly, when ileal segments from chickens receiving IP BSA or alum on days 10 and 16 were compared, significant differences were not observed (ΔIsc=32.3 and ΔIsc=10.03, respectively). The present data confirm and extend previous findings from our laboratories suggesting epithelial ion secretion is a component of mucosal immunity in chickens. Further, these data may have important implications for vaccinating poultry against enteric pathogens.

Key Words: mucosal immunity, intestinal anaphylaxis, chicken