W202 Effects of Actigen supplementation on mRNA levels of mucin and markers of gut health in the jejunum of broiler chicks. K. M. Brennan*, T. Ao, J. L. Pierce, and K. A. Dawson, *Center for Animal Nutrigenomics and Applied Animal Nutrition, Alltech Inc.*, *Nicholasville, KY*.

Previous studies in our lab have indicated that the addition of Actigen, a yeast-derived feed supplement, to the diet positively affects gut health including increasing goblet cell size and small intestinal mucin secretion. Based on these data, the objective of this study was to compare the effects of supplementing Actigen and bacitracin methylene disalicylate (BMD) in the diet on mRNA levels of mucin and mucin-regulating genes in the jejunum of 6-week old chickens. Dietary treatments included 1) corn-soy control diet; 2) Diet 1 plus Actigen; 3) Diet 1 plus BMD. Chicks (n = 7) from each dietary treatment were randomly selected and killed at d42. Jejunum samples were rinsed and placed in RNAlater, then transferred to −20°C freezer until further analysis. Total RNA was isolated from stored tissue, treated with DNase and reverse transcribed into cDNA. mRNA levels of target genes were measured using real-time PCR and normalized to the housekeeping gene mitochondrial ribosomal protein L48 (MrpL48). Target genes included mucin 2 (cMUC2), keratinocyte growth factor 7 (KGF7), interleukin 18 (IL18), tumor necrosis factor α (TNFα) and toll-like receptors 2 and 5 (TLR2 and TLR5), 2 key markers for pathogenic insult in the gut. cMUC2 mRNA levels tended to be 1.29-fold greater in Actigen and BMD-treated birds than controls ($P < 0.10$). mRNA levels of mucin-regulating genes, IL18 and KGF7, were similar between Actigen and BMD treated birds. TLR2 and TLR5 mRNA levels were greater (1.20-fold and 1.23-fold, respectively) in BMD-treated birds than control. These data indicate that Actigen and BMD have similar effects on the mRNA levels of mucin and mucin-regulating genes in the jejunum of broiler chicks.

Key Words: mucin, broiler, gene expression

W203 Age changes in gastrointestinal pH in broilers. R. Angel*[1], B. Humphrey[2], and W. Saylor[3], [1]*University of Maryland*, *College Park,* [2]*California Polytechnic State University*, *San Luis Obispo,* [3]*University of Delaware*, *Newark*.

pH was measured in the different segments (crop, proventriculus, gizzard, duodenum, jejunum, ileum, ceca, large intestine) of the gastrointestinal tract (GIT) of broiler chickens, at different ages over 15 studies done over 2 years. Direct comparisons (same source of birds, same water and feed) of intestinal pH between broilers in batteries and floor pens were done. At least 2 and up to 5 birds by age and study were sampled. In 3 initial studies the pH was measured using 2 protocols: In situ, by inserting the pH probe (2 measurements) into the middle area of each region; and Ex situ, by inserting the pH probe (2 measurements) into intestinal contents diluted in distilled, deionized water (1:2.5 wt:wt ratio). Feed was also diluted in water (1:2.5 feed to water ratio) for pH determination (2 measurements) and facility water pH documented. Statistical analysis was run within study and between studies as one way ANOVA. Facility water pH was used as a covariate. The in situ method resulted in lower pHs for most GIT segments measured and always resulted in lower standard deviations. Given this the remaining of the work was done using only in situ measurements. Variability between birds was high. For example, at 5 d of age, where 5 birds were sampled, crop, gizzard, proventriculus, duodenum, jejunum, and ileal pH was 5.32, 2.37, 2.14, 5.99, 6.07, and 7.12, respectively and the standard deviation was 0.54, 0.92, 0.24, 0.28, 0.14, 0.12. pH decreased $P < 0.05$ after 5 d of age primarily in the proventriculus and gizzard (pH at 14 d of age was 1.15 and 1.90 in the proventriculus and gizzard, respectively). By 18 d of age the pH in the proventriculus and gizzard was similar ($P > 0.05$) to that at 5 d of age (2.50 and 2.64, respectively). By 46 d of age crop, gizzard, proventriculus, duodenum, jejunum, and ileal pH was not different ($P > 0.05$) from those at 5 d (5.85, 2.04, 2.36, 5.87, 5.97, and 7.15, respectively). It is possible that differences between ages were not found due to the high variation seen between birds. No clear patterns of change were seen between battery and floor pen raised broilers. Facilities water pH has the most impact on crop pH.

Key Words: broilers, gastrointestinal, pH

W204 Adaptive response in intestinal function in species with different dietary habits. D. J. Batchelor*[1], J. Brand[2], and S. P. Shirazi-Beechey[1], [1]*University of Liverpool*, *Liverpool, UK*, [2]*Monell Chemical Senses Center*, *Philadelphia, PA*.

The domestic cat (*Felis catus*) a carnivore, naturally eats a very low carbohydrate diet. In contrast the dog (*Canis familiaris*) a carno-omnivore is adapted to eat a varied diet. While cats appear to suffer from carbohydrate malabsorption following ingestion of high carbohydrate meals, dogs are able to cope with the diet containing higher levels of carbohydrate. The major aims were to determine expression (this includes function) of intestinal sodium/glucose cotransporter, SGLT1, and the brush border membrane disaccharidases, sucrase, lactase and, maltase in response to such contrasting diets. We first cloned and sequenced cat SGLT1, to determine its amino acid sequence and facilitate the production of a suitable antibody to cat SGLT1. We then measured the expression, and/or kinetics of SGLT1, sucrase, maltase and lactase, as appropriate, either by quantitative immunohistochemistry of fixed tissues or in purified brush border membrane vesicles. Intestinal tissues of healthy cats, n = 10 and dogs, n = 12 were provided by the University of Pennsylvania School of Veterinary Medicine and Monell Chemical Senses Center in Philadelphia. Animals had been euthanized, with the approval of the University Animal Care and Use Committee, for using the tissues for research purposes. Results: Feline SGLT1 amino acid sequence is closely related to that in other species; most notably to canine SGLT1. SGLT1 expression is 2-fold higher in the intestine of dogs compared with cats ($P < 0.001$), this is reflected in 2-fold increase in Vmax. Sucrase and maltase activity are (both 3-fold, $P = 0.0015$ and < 0.001, respectively) higher in dog intestine compared with cat; with dogs also retaining higher (1.6-fold, $P = 0.019$) lactase activity. The higher expression of SGLT1 and disaccharidases in dog intestine is not due to any structural changes; villus height and crypt depth are the same in cats and dogs. This study shows that dogs, in contrast to cats, have a higher capacity to digest and absorb carbohydrates.
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Key Words: intestinal adaptation, glucose transport, disaccharidase