**T92** Effects of diet and age on metabolic characteristics and gene expression profile in the dog. Part 1: Metabolic characteristics. K. S. Swanson*, K. N. Kuzmuk, L. B. Schook, and G. C. Fahey, Jr., *University of Illinois, Urbana, IL.*

The objectives of this experiment were to determine the effects of diet on metabolic characteristics and gene expression profile in old and young dogs. Old (ave. age = 11.1 0.6 yr; 6 M; 6 F) and weaning (age = 8 wk old; 6 M; 6 F) Beagles were used. Three of each gender and age were randomly assigned to one of two dietary treatments. Diet A was primarily composed of high quality, animal-derived ingredients and was formulated to contain 30% crude protein and 20% fat. Diet B was primarily composed of plant-derived ingredients and was formulated to contain 22% crude protein and 8% fat. Old dogs were fed to maintain bodyweight while weaning puppies were fed ad libitum. Blood samples were collected via jugular puncture at baseline and after 3, 6, and 9 months for analysis of complete blood count (CBC) and serum chemistry profile. A 4-day total fecal collection was performed to determine total tract macronutrient digestibilities after 3 months on the experiment. Data were analyzed using the GLM procedure of SAS. As expected, dry matter (DM) and organic matter (OM) digestibilities were greater (P < 0.05) for dogs fed Diet A. Dry matter (P = 0.06) and OM (P < 0.05) digestibilities also were greater in old dogs. Dogs fed Diet B had lower (P < 0.05) fecal DM% and greater (P < 0.05) fecal output (when expressed either on as-is or DM basis) and fecal output (as-is): food intake (DM) ratio. Age had a major impact on CBC and serum hematology profile. At baseline, young dogs had greater (P < 0.05) total white blood cell, neutrophil, lymphocyte, and blood glucose concentrations. Old dogs had greater (P < 0.05) red blood cell, hemoglobin, hematocrit, albumin, creatinine, blood urea nitrogen and total protein concentrations at baseline. In conclusion, diet and age had dramatic effects on nutrient digestibility, fecal characteristics, CBC, and serum chemistry profile.

Key Words: Canine, Nutritional genomics, Nutrient digestibility

**T93** Effects of diet and age on metabolic characteristics and gene expression profile in the dog. Part 2: Gene expression profiling. K. S. Swanson*, K. N. Kuzmuk, L. B. Schook, and G. C. Fahey, Jr., *University of Illinois, Urbana, IL.*

Detecting dietary effects on gene expression profile in geriatric and weaning dogs was the objective of this experiment. Blood samples were collected via jugular puncture at baseline and after 3, 6, and 9 months for RNA isolation. Liver biopsies also were collected after 6 and 9 months for RNA isolation. Isolated RNA samples can be hybridized with an oligonucleotide microarray to generate a gene expression profile. Oligonucleotide microarrays monitor the expression of hundreds or thousands of genes simultaneously, making them a powerful alternative to conventional techniques that limit experiments to measuring only a few genes at a time. We designed an oligonucleotide microarray containing 384 genes with major emphasis placed on metabolic pathways and immune function. With the use of Vector NTI (Informax Inc., Frederick, MD), a bioinformatics tool used for sequence analysis and molecular biology data management, canine expressed sequence tags (ESTs) and gene sequences were identified from the public domain. Genes of interest were analyzed to determine unique oligonucleotide sequences (70-mers) that could be used as a probe on the microarray. Selected sequences were then synthesized and printed on microarray slides. As with humans, diabetes is highly prevalent in dogs and is positively correlated with age. Identification of biomarkers predictive of disease is needed and is a goal of this experiment. Therefore, genes associated with glucose metabolism, and homologous to human genes demonstrated to contribute to the development of diabetes were included on the microarray.

To conclude, a 384-gene oligonucleotide microarray has been developed to study metabolic pathways and immune function in dogs with a strong emphasis on glucose metabolism and diabetes. This microarray will be used to generate gene expression profiles of dogs in the current experiment and those in future experiments.

Key Words: Canine, Nutritional genomics, Oligonucleotide microarray

**T94** Case study of preparing a submission for regulatory clearance of a new ingredient. L. B. Deffenbaugh*, Kemin Nutrisurance, Inc.

New ingredients for companion animal diets become available only occasionally because of the rigorous approval process. Regulatory options for clearance of a new ingredient for pet foods include: Food Additive Petition (US), Letter of Non-Objection (US), GRAS declaration (US) or an Assessment of Additives in Animal Nutrition (EU). The key objectives of the regulatory clearance processes are purpose (utility) and safety. Rosemary extract is a natural botanical for which antioxidant properties have been widely reported for decades. The US Food and Drug Administration allows for the use of rosemary extract as a flavor or spice, but not as an antioxidant, in animal feeds under 21 CFR 582.20, Substances Generally Recognized as Safe (GRAS). Kemin Nutrisurance, Inc. has prepared a Letter of Non-Objection submission to extend clearance of rosemary extract to include use as an antioxidant in animal feeds. While the data gathered for the submission appears replete and voluminous, the process to collect the information was quite straightforward once a clear outline was prepared. The data for the rosemary extract submission will be described in such a way to provide a template for readers who are considering preparation of an LNO submission for a new ingredient. The process was found to be valuable as the requirements for the submission fulfill many of the steps required to develop and launch a new ingredient.

Key Words: Regulatory clearance, Letter of non-objection, Rosemary extract

**T95** Effects of spray-dried animal plasma on apparent digestibility, intake and fecal consistency in adult Beagles. J. D. Quigley, III*, K. Dahm, and T. A. Wolfe, *APC, Inc., Ames, IA.*

Effects of spray-dried animal plasma (SDAP) on intake, fecal output, fecal scores and apparent total tract digestibility were determined using 14 adult Beagle dogs (BW = 13.3 kg). The SDAP (Endure, APC Inc.) was coated on the exterior of extruded dry dog food kibbles at 2% of weight. Coated kibbles (27% CP and 13 to 16% ether extract) were fed to dogs in two experiments (n = 6 and 8 in experiments 1 and 2, respectively) in a switchback design using two 15-d periods. The final 5 d of each period were used for feed and fecal collections. In experiment 1, kibbles were coated with 5% tallow, 2% commercial flavor and 0 or 2% SDAP. In experiment 2, commercially available dry dog food, previously coated with fat and flavor were coated with 0 or 2% SDAP by mixing in a cement mixer. Intake, fecal consistency and apparent digestibility of nutrients were determined. Addition of SDAP did not affect chemical composition of diets or intake of most nutrients. Fecal scores were unaffected but total feces excreted was reduced by 13.1 and 0.10. Changes in digestion that occurred with addition of SDAP suggested improved digestive capacity in dogs.

**Table:**

<table>
<thead>
<tr>
<th>Item</th>
<th>CON</th>
<th>SDAP</th>
<th>SEM</th>
<th>P*</th>
<th>CON</th>
<th>SDAP</th>
<th>SEM</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM intake, g/d</td>
<td>221</td>
<td>217</td>
<td>6</td>
<td>NS</td>
<td>262</td>
<td>246</td>
<td>9</td>
<td>NS</td>
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<tr>
<td>Wet feces, g/d</td>
<td>137</td>
<td>119</td>
<td>5</td>
<td>0.08</td>
<td>119</td>
<td>93</td>
<td>4</td>
<td>0.01</td>
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<tr>
<td>Fecal score**</td>
<td>3.82</td>
<td>3.80</td>
<td>0.10</td>
<td>NS</td>
<td>3.85</td>
<td>3.72</td>
<td>0.10</td>
<td>NS</td>
</tr>
<tr>
<td>Digestibility, %</td>
<td>78.3</td>
<td>80.1</td>
<td>0.4</td>
<td>0.04</td>
<td>83.1</td>
<td>86.2</td>
<td>0.6</td>
<td>0.01</td>
</tr>
<tr>
<td>Organic matter</td>
<td>84.4</td>
<td>85.2</td>
<td>0.3</td>
<td>NS</td>
<td>86.6</td>
<td>89.3</td>
<td>0.5</td>
<td>0.01</td>
</tr>
<tr>
<td>Crude protein</td>
<td>83.8</td>
<td>84.3</td>
<td>0.9</td>
<td>NS</td>
<td>85.8</td>
<td>89.4</td>
<td>1.1</td>
<td>0.07</td>
</tr>
<tr>
<td>Fat</td>
<td>93.2</td>
<td>94.2</td>
<td>0.2</td>
<td>0.03</td>
<td>93.5</td>
<td>94.5</td>
<td>0.4</td>
<td>NS</td>
</tr>
<tr>
<td>Ash</td>
<td>32.5</td>
<td>42.8</td>
<td>1.8</td>
<td>0.02</td>
<td>37.4</td>
<td>44.7</td>
<td>1.5</td>
<td>0.01</td>
</tr>
<tr>
<td>Crude fiber</td>
<td>1.8</td>
<td>20.3</td>
<td>3.0</td>
<td>0.01</td>
<td>5.4</td>
<td>29.1</td>
<td>2.3</td>
<td>0.01</td>
</tr>
</tbody>
</table>

*pProbability of a treatment effect; NS = P > 0.10.*

**Key Words:** Canine, Digestibility, Spray-dried animal plasma

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**Companion Animals**

**T92** Effects of diet and age on metabolic characteristics and gene expression profile in the dog. Part 1: Metabolic characteristics. K. S. Swanson*, K. N. Kuzmuk, L. B. Schook, and G. C. Fahey, Jr., *University of Illinois, Urbana, IL.*

**T93** Effects of diet and age on metabolic characteristics and gene expression profile in the dog. Part 2: Gene expression profiling. K. S. Swanson*, K. N. Kuzmuk, L. B. Schook, and G. C. Fahey, Jr., *University of Illinois, Urbana, IL.*

**T94** Case study of preparing a submission for regulatory clearance of a new ingredient. L. B. Deffenbaugh*, Kemin Nutrisurance, Inc.

**T95** Effects of spray-dried animal plasma on apparent digestibility, intake and fecal consistency in adult Beagles. J. D. Quigley, III*, K. Dahm, and T. A. Wolfe, *APC, Inc., Ames, IA.*
Four purpose-bred ileally cannulated adult female dogs with blood lines were used to evaluate the effects of supplemental spray dried plasma (SDP) on food intake, nutrient digestibility, and gastrointestinal microflora in healthy adult dogs. J. M. Dust*, 1 G. C. Liu, 1 C. M. Grieshop1, N. R. Merchen1, D. J. Quigly, HP, and G. C. Fahey, Jr.1, 1 University of Illinois, Urbana, IL, 2 APC, Inc., Ames, IA.

Eight mature dogs (19.3 ± 0.1 kg) were used in a replicated 4X4 Latin square design experiment to determine the consequences of feeding low-oligosaccharide, low-phytate soy on nutrient availability in complete foods fed to dogs. All foods were isonitrogenous (20% CP) and contained low-oligosaccharide soybean. A multivariate regression analysis was used to develop an equation based on chemical composition of the diet to predict ME content of dog foods. However, we found that the equation consistently under predicted ME compared to the observed ME in 55 balance trials. It was our objective to use these balance trials to develop an equation based on chemical composition of the diet to predict ME content of the diets. Eight diets that varied in ME content (3,463 to 4,233 kcal/kg) were fed at maintenance and used in the analysis. The diets varied in protein source, with the major protein sources being low-oligosaccharide whole soybeans, low-oligosaccharide low-phytate whole soybeans (2 sources), conventional soybean meal (2 sources), low-ash poultry meal, low-oligosaccharide low-phytate soybean meal or conventional whole soybeans (3 sources). The ratio of alpha-amino N (AAN) to non-alpha-amino N (NAAN) ranged from 3.5 to 14.4, therefore we hypothesized that accounting for the proportion of AAN in CP would improve the fit of the models. Model 1 had an r² of 0.46 and when AAN and NAAN were substituted for CP, the model had an r² of 0.79. Similarly, Model 2 had an r² of 0.43 and when AAN and NAAN were substituted for CP the model had an r² of 0.82. Residual analysis suggests that by replacing the CP term in Model 1 with ADF and NDF in Model 2 there was an improvement in prediction of ME content. By splitting CP into an AAN and NAAN fractions we have further defined the chemical composition of the diet. These data suggest that defining protein quality improves the ability to predict ME content of dog foods.

**Key Words:** Dogs, Metabolizable energy, Alpha-amino nitrogen
T100  Estimation of the proportion of bacterial nitrogen in canine feces using dianimipolic acid as an internal bacterial marker. L. K. Parr-Lilienthal¹, C. M. Grieshop¹, L. K. Speakman¹, A. Paterson¹, M. Larsson², and G. C. Kerley³ ¹University of Illinois at Urbana-Champaign, IL USA, ²Nestle Purina Research, St Joseph, MO USA.

Approximately 50% of the mass of dog feces may be of bacterial origin, but this number is based on human data. A bacterial marker can be used to determine the portion of fecal N that is of bacterial origin as well as the effect of dietary ingredients on the bacterial N content found in feces of the dog. Two experiments were conducted to determine the efficacy of dianimipolic acid (DAPA) and purines as bacterial markers in dogs. In experiment 1, five adult, female dogs were fed the same commercial diet. In experiment 2, fifty dogs were fed one of four test diets: a prebiotic-free control, or a diet containing either 1% choline, 1% mannooligosaccharide (MOS), or 1% chyoryl plus 1% MOS. Fresh feces were collected in both experiments and used to isolate a bacterial rich sample (BRS) by differential centrifugation. In experiment 1, the BRS had a 0.66 N-purine ratio and an 18.9 N:DAPA ratio. The coefficient of variation for the N-purine ratio was much higher than that for the N:DAPA ratio, indicating that DAPA would provide a less variable estimate of fecal bacterial N. Using either marker, approximately 50% of the fecal N was estimated to be of bacterial origin. In experiment 2, the N:DAPA ratio of the BRS was not different (P > 0.05) among treatments. Dogs fed prebiotic-containing diets had N:DAPA ratios ranging from 17.5 to 18.2, while dogs fed the control were lower at 15.9. For dogs fed prebiotic-containing diets, approximately 45% of the fecal N was of bacterial origin compared with 45% for dogs fed the control. When culturing fecal bacterial concentration using the average N:DAPA ratio for all dogs, little difference existed in the estimation compared to using the individual values. However, for dogs fed the control, the value using the average ratio was approximately 18% higher than when using the individual ratios. This is due to the lower N:DAPA ratio for dogs fed the control compared with dogs fed the other treatments. Based on the consistency of the N:DAPA ratio of the BRS, DAPA appears to be a valuable tool for estimation of bacterial N in feces.

Key Words: Diaminopimelic acid, Dog, Marker.

T101  The effect of preservation time length and thawing on Lactobacillus population from fecal material. C. J. Fu and M. S. Kerley, University of Missouri-Columbia.

A study was conducted to determine the effect of preservation time length on Lactobacillus population in dog feces. Lactobacillus is typically used as an indicator of dietary-induced bacteria population change, because its presence is important to normal bowel function. Also, reviewers have questioned the validity of using preserved digesta/fecal material for enumeration bacterial populations. The objective of this research was to determine fecal storage effects on Lactobacillus population number. The treatment conditions were: 1) Maintained in buffered (pH = 7) anaerobic dilution solution for 2 h, and then put in cold tap water for 30 min; and 3) Repeat of the freeze-thaw procedure on the thawed samples generated in treatment 2. Media used to plate the Lactobacillus were MRS broth (Difco, #288130, Sparks, MD, USA, 55 g/L) and agar (20 g/L) with 20 mg/L vitamin C. The bacteria were refrigerated at 4°C. The population count was compared to the population count of fresh material. The Lactobacillus population decreased (P < 0.05) after 2, 4, 7, and 14 days storage at 4°C with 92%, 83% 81%, and 68% of the initial population enumerated, respectively. The Lactobacillus population from treatment 2 and treatment 3 was decreased (P < 0.05) by 57% and by 89% compared to fresh material, respectively. We concluded from this study that statistical differences in Lactobacillus population could occur due to preservation conditions. However, population differences deemed of biological significance (10-fold reduction in population count) would only have occurred when fecal material was refrozen. Caution should be exercised when comparing Lactobacillus population counts across different preservation regimens.

Key Words: Feces, Lactobacillus, Preservation.


Forty dogs and forty cats were used to evaluate the effect of increasing dietary antioxidants on delayed type hypersensitivity and circulating antibody response to vaccination. The experimental protocol was reviewed and approved by the Institutional Animal Care and Use Committee. Subjects were assigned to dietary treatment groups and fed the treatment foods for 84 days. Dietary treatments consisted of a control food meeting all requirements for adult maintenance and three treatment groups with incrementally increased antioxidant supplementation. The foods with increased antioxidant supplementation all received similar amounts of vitamin C and β-carotene with varying levels of increased vitamin E. Dietary vitamin E was increased by 500, 1000, and 1500 IU/kg in the supplemented foods. Circulating vitamin E increased in a linear (P < 0.01) and quadratic (P < 0.05) fashion with antioxidant supplementation in dogs and cats. The standard intradermal skin test (delayed type hypersensitivity) increased in response to increasing dietary antioxidants in dogs (P < 0.05) and numerically increased in cats. A standard vaccine for four strains of Leptospiriosis was used in the dog with the stimulated antibody response measured by specific serovar titer. The sum of the titers from each strain, when compared between the control and the dietary treatment groups had a quadratic trend (P < 0.1) with the maximum response occurring at 1000 IU Vitamin E/kg. Rabies serology was used to determine an antibody response in cats. A quadratic response (P < 0.05) was demonstrated in cats with the treatment groups of the first two levels of antioxidant increase having increased titers and the highest antioxidant level supplementation group having a decreased titer when compared to the control. In conclusion, immune function benefits of increased response to a vaccine and increased immune response in an intradermal skin test, were demonstrated in both dogs and cats when antioxidants were added to the food. Both dogs and cats had a maximal benefit by the 1500 IU/kg addition of vitamin E to foods.

Key Words: Antioxidants, Canine, Feline.

T103  Evaluation of delta-6 desaturase kinetics in canine liver microsomes for alpha-linolenic acid in the presence of competitive amounts of linoleic acid. J. E. Bauer* and B. L. Dunbar, 1Texas A&M University.

The rate-limiting step in the conversion of essential fatty acids to long chain derivatives is controlled by delta-6 (d-6) desaturase. This enzyme competitively utilizes both linoleic (LA) and alpha-linolenic acids (ALA) as substrates. Efforts to characterize the kinetics of unphosphorylated enzyme for ALA are confounded by the presence of endogenous LA present in the source material. A technique to correct this problem was developed and used to more accurately estimate the Km and Vmax of d-6 desaturase for ALA in the presence of these inhibitory amounts of LA. Microsomes were prepared from fresh canine liver tissue from normally fed adult, mixed breed dogs, and incubated with 14C labeled LA or ALA substrates under standardized conditions. Lipids were extracted, saponified, and the resultant fatty acids phenacylated. Fatty acid phenacyl esters were separated by HPLC and counted by liquid scintillation counting. LA and ALA contents of the microsomes were determined using internal standardization and gas chromatography. This data was then used to construct a graphical correction for the presence of varying and competitive amounts of LA in canine hepatic microsomal enzyme preparations. A similar correction for LA activity was unnecessary due to insignificant amounts of ALA in the microsomes. Delta-6 desaturase activities (Vmax) of 62.4 and 5.4 pmol/min mg protein with ALA and LA respectively were thus found with apparent Km values of 12.4 and 41.8 mM, respectively. These data show that dog liver microsomes have EFA desaturation capabilities and that ALA is preferred due to its higher Vmax and lower Km compared to LA. In spite of this preference it was found that liver concentration of ALA averaged values of 12.4 and 41.8 mM, respectively. The rate-limiting step in the conversion of essential fatty acids to long chain derivatives is controlled by delta-6 (d-6) desaturase. This enzyme competitively utilizes both linoleic (LA) and alpha-linolenic acids (ALA) as substrates. Efforts to characterize the kinetics of unphosphorylated enzyme for ALA are confounded by the presence of endogenous LA present in the source material. A technique to correct this problem was developed and used to more accurately estimate the Km and Vmax of d-6 desaturase for ALA in the presence of these inhibitory amounts of LA. Microsomes were prepared from fresh canine liver tissue from normally fed adult, mixed breed dogs, and incubated with 14C labeled LA or ALA substrates under standardized conditions. Lipids were extracted, saponified, and the resultant fatty acids phenacylated. Fatty acid phenacyl esters were separated by HPLC and counted by liquid scintillation counting. LA and ALA contents of the microsomes were determined using internal standardization and gas chromatography. This data was then used to construct a graphical correction for the presence of varying and competitive amounts of LA in canine hepatic microsomal enzyme preparations. A similar correction for LA activity was unnecessary due to insignificant amounts of ALA in the microsomes. Delta-6 desaturase activities (Vmax) of 62.4 and 5.4 pmol/min mg protein with ALA and LA respectively were thus found with apparent Km values of 12.4 and 41.8 mM, respectively. These data show that dog liver microsomes have EFA desaturation capabilities and that ALA is preferred due to its higher Vmax and lower Km compared to LA. In spite of this preference it was found that liver concentration of ALA averaged only 2.4 mM. Thus, tissue ALA concentrations his may never exceed the Km for desaturation unless high dietary ALA is provided. Hence conclude, by contrast, that ALA may be underutilized because its microsomal content (64.4 mM) exceeds its Km. These characteristics may explain low in vivo ALA conversion rates in dogs and cats.

Key Words: Antioxidants, Canine, Feline, Fatty acid, Vitamin E.
other species. The data further suggest that high levels of dietary ALA may be needed to exceed the Km for d-6 desaturase.

**Key Words:** Delta 6 desaturase, Kinetics, Alpha linolenic acid

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**T104**  
**The effect of dietary fat on the fatty acid composition of olfactory mucosal tissues in young adult dogs.** C. T. Middendorf, K. A. Cummins*, E. A. Altom, and M. Craig-Schmidt, Auburn University, AL.

Previous studies have indicated that dogs fed a diet high in saturated fat had a decrease in olfactory acuity. A study was designed to determine the influence of dietary fat source on the phospholipid fatty acid composition of olfactory and respiratory mucosa in young-adult dogs. Fifteen young-adult female beagles (average age = 2 yr, body weight average = 9.69 kg) were randomly assigned to receive one of three diets varying in the amount and source of fat. These were Diet A, with 12% crude fat; Diet B, containing 16% crude fat formulated by the addition of 4% corn oil to the maintenance diet; and Diet C, containing 16% crude fat formulated by the addition of 4% coconut oil. Dogs were fed the diets for a period of sixty days, euthanized, and then samples were collected from the olfactory turbinates and nasal passage. Fatty acid compositions of phosphatidylcholine (PC) and phosphatidylethanolamine (PE) were analyzed by capillary gas chromatography. The amount of 16:0 in respiratory PC was greatest from dogs fed Diet B (P<0.10), while the amount of 20:4n-6 incorporated into respiratory PC was less (P<0.10). No differences were reported for the 20:4n-6 content in PC of olfactory mucosa (P>0.10). The amount of 18:2n-6 in PC from both mucosal tissues was greater in dogs fed Diet B than in dogs fed Diets A or C (P<0.10). Despite increased amounts of 18:2n-6 in Diet B, there were no differences among treatments in the amount of 18:2n-6 or 20:4n-6 incorporated into PE (P>0.10) of either tissue. No differences were observed in the ratio of unsaturated to saturated fatty acid incorporation into phospholipids (P>0.10), or in the mean chain lengths (P>0.10). No differences were observed in the unsaturation index for the PE fractions and the olfactory PC (P>0.10). However, the unsaturation index was lower in dogs fed Diet B in respiratory mucosal PC (P<0.10). Results from this study do not fully explain the differences observed in olfactory acuity.

**Key Words:** Canine, Nutrition, Lipids

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**T105**  

Hypoadrenocorticism (Addison’s) is a recognized late onset disorder in the dog. Symptoms are diffuse and a result of deterioration of the adrenal cortex with its subsequent reduction in the capacity to synthesize and secrete glucocorticoids and mineralocorticoids. Diagnosis of Addison’s is by ACTH stimulation challenge. Some breeds have a higher than expected incidence of Addison’s suggesting a genetic component to the disorder. We have recently reported that Addison’s has a genetic basis in the Bearded Collie and Standard Poodle although the mode of inheritance differed. Here we compare the heritabilities and mode of inheritance for the disorder in two additional but related breeds, the Leonberger and the Portuguese Water Dog (PWD). Owners were requested to submit data on the Addisonian status for the above-mentioned breeds along with pedigree, gender, and DNA. The binary nature of the data required a threshold model; a mixed Bayesian analysis model was used to arrive at heritability estimates. Complex segregation analyses were employed to characterize mode of inheritance. The heritability estimates for Addison’s disease in the Leonberger (n=294 dogs) and PWD (n=504) were 0.62 and 0.57, respectively. In contrast to the findings in Standard Poodles, the Leonberger and PWD data do not support a single locus of large effect fed influencing the transmission of Addison’s disease. However, when the Leonberger data is corrected for ascertainment bias, the major gene model becomes significant. Although these findings may reflect limited sample sizes, the possibility that different though related breeds have unique patterns of inheritance for Addison’s disease may affect the search for genes causal in the expression of canine Addison’s.

**Key Words:** Hypoadrenocorticism, Dog, Heritability