

Companion and Exotic Animal Biology

W58 *Ancylostoma* spp. in dogs of beaches and fishing villages of Navolato, Sinaloa, Mexico. M. C. Rubio Robles*, F. G. Torres N, I. Sánchez A, J. Gaxiola M, G. Estrada S, M. López V, G. Silva H, S. M. Gaxiola C, and N. Castro del C, *FMVZ Universidad Autonoma de Sinaloa, Culiacan, Sinaloa, Mexico.*

Ancylostoma spp. represents a serious health problem for animals and humans. These blood-feeding parasites produce Larva migrans, also known as creeping eruptions or sandworm eruptions. These are characterized by tortuous migratory lesions of the skin and occur when the larvae of dog hookworm penetrate the intact exposed skin and migrate through the epidermis progressing at the rate of few millimeters to about 3 cm/day. It is seen in tropical and subtropical areas. International travel and increasingly exotic diets have resulted in an increase in cases of cutaneous larva migrans in industrialized countries.

The objective of this work was to determine the prevalence of *Ancylostoma* spp. in dogs of beaches and fishing villages of Navolato, Sinaloa, Mexico. This was determined for a representative sample (both sexes, breeds and sizes of dogs) described by the technique of Thrusfield (1995) : $n=[t*SD/L]^2$. Where n = sample size, t = value of the normal distribution (Student t) for a 95% confidence level (t = 1.96), L = accepted error or precision (5%), and SD = weighted disease prevalence (%). On the basis of the technique described, the total number of sample animals determined for random sampling was 134. For each, dog feces were collected rectally by digital stimulus into previously identified plastic bags. The samples were transported under refrigeration at 4°C to the unit Laboratories of the FMVZ-UAS, and processed by the flotation technique with sugar solution. The results indicate that of the 134 dogs analyzed 55 (41.04%) were positive for *Ancylostoma* spp. This is a considerable number and the proportion of animals testing positive continues to be an issue of importance in the community. Frequently these dogs roam in and around the town and can distribute parasites. Residents and visitors are not well informed or ignore the risk of diseases that dogs can transmit to them.

Key Words: *Ancylostoma*, Dogs, Prevalence

W59 The prevalence of fleas in dogs of beaches and fishing villages from Navolato, Sinaloa, Mexico. M. C. Rubio Robles*, J. Gaxiola M, G. Estrada S, M. López V, G. Silva H, I. Sánchez A, F. G. Torres N., S. M. Gaxiola C, and N. Castro del C, *FMVZ Universidad Autonoma de Sinaloa., Culiacan, Sinaloa, Mexico.*

Adult fleas are a nuisance to humans and their pets, and can cause medical problems including flea allergy dermatitis, secondary skin irritations and, in extreme cases, anemia. Although bites are rarely felt, it is the resulting irritation caused by the flea salivary secretions that varies among individuals. Some may witness a severe reaction (general rash or inflammation) resulting in secondary infections caused by scratching the irritated skin area. Also, fleas may transmit tapeworms (more common infection is *Dipylidium caninum*) which normally infest dogs and cats but may appear in children if parts of infested fleas are accidentally consumed. The objective of this work was to determine the prevalence of fleas in dogs of beaches and fishing villages of Navolato, Sinaloa, Mexico. This was determined for a representative sample (with both sexes, breeds and sizes of dogs) described by the technique of Thrusfield (1995) : $n=[t*SD/L]^2$. Where n = sample size, t = value

of the normal distribution (Student t) for a 95% confidence level (t = 1.96), L = accepted error or precision (5%), and SD = weighted disease prevalence (%). On the basis of the technique described, the total number of sample animals determined for random sampling was 264. For each dog, fleas were collected with cotton and placed into previously identified plastic bags. The samples were transported to the unit Laboratories of the FMVZ-UAS, and observed microscopically. The results indicate that of the 264 dogs analyzed 211 (79.92 %) were positive for fleas. It is concluded that this is a considerable number of positive animals and if the present condition continues, it can pose serious problems for the community since frequently these dogs are at different parts of the town and can pass the infection to other healthy animals, visitors and family members.

Key Words: Fleas, Dogs, Prevalence

W60 Diagnostic potential of serum proteomic patterns in canine *Fusarium* mycotoxicosis. M. C. K. Leung* and T. K. Smith, *University of Guelph, Guelph, ON, Canada.*

The clinical symptoms of canine *Fusarium* mycotoxicosis such as anorexia, growth inhibition, lethargy, and immunosuppression are often not specific enough for veterinarians to diagnose the mycotoxicosis. The low molecular mass range (1 - 10 kDa) of serum proteome holds great potential as a source of diagnostic biomarkers. Surface-enhanced laser desorption/ionization - time of flight - mass spectrometry (SELDI-TOF-MS) is a novel technique which generates a mass spectrum of a selected protein fraction in a biological sample. In the current experiment, SELDI-TOF-MS as well as conventional blood chemistry analyses were used to investigate the effects of a combination of foodborne *Fusarium* mycotoxins on the serum proteome of 12 beagle dogs. A control diet was prepared with corn, poultry by-product, and wheat as the main ingredients. A mycotoxin-contaminated diet was prepared by replacing control corn and wheat with naturally contaminated grains and contained deoxynivalenol (2.7 ppm), 15-acetyl deoxynivalenol (0.2 ppm), zearalenone (0.3 ppm), and fusaric acid (8.4 ppm). The animals was fed the experimental diets for a 14 day period and blood samples were taken. Blood chemistry analyses revealed an inhibitory effect of foodborne mycotoxins on serum concentration of fibrinogen and serum activities of alkaline phosphatase and amylase (P < 0.05%), but the other effects on blood hemoglobin concentration, serum protein concentrations, and serum enzymes activities were insignificant (P > 0.05). Serum samples were analyzed using cation exchange ProteinChip arrays and immobilized metal affinity capture ProteinChip arrays, producing 64 peaks at the mass range of 1 - 30 kDa. Intensities of 27 peaks were significantly down-regulated in response to the contaminated diet as compared to controls, while intensities of 11 peaks were up-regulated (P < 0.05). It was concluded that the foodborne *Fusarium* mycotoxins could affect the canine serum proteome. Further experiments are needed to identify, quantify, and validate these changes in order to discover applicable biomarkers of foodborne exposure to *Fusarium* mycotoxins.

Key Words: *Fusarium* Mycotoxins, Dog, Proteomics

W61 Dietary lysine: Calorie ratios and their influence on nitrogen metabolism and digestibility in overweight mature dogs. G. Hibbard*¹, K. R. McLeod¹, D. L. Harmon¹, R. Yamka², and K. G. Friesen², ¹University of Kentucky, Lexington, ²Hill's Pet Nutrition, Inc., Topeka, KS.

Two experiments were conducted to determine the effects of altering dietary lysine:calorie ratio on nitrogen metabolism and protein turnover in moderately overweight dogs. Exp. 1 used 8 moderately overweight female crossbred hounds fed four diets with varying lysine:calorie ratios (2.2, 3.0, 3.8, and 4.6 g lysine/Mcal ME) in a replicated 4x4 Latin square design experiment. Dietary lysine:calorie ratio was altered by adding crystalline lysine. Each of the four periods was 28 days in length, 14 days of which the dogs were fed ad libitum followed by 14 days of calorie restriction at 0.75 of maintenance for ideal weight. Collections took place the last seven days of each period, in which fecal, urine, and blood samples were acquired and protein metabolism was monitored using an oral dose (7.5 mg/kg) of 15N-glycine. Increasing the lysine:calorie ratio of the diet did not affect absorbed or retained nitrogen, however, plasma urea increased linearly ($P = 0.04$). Plasma total protein and creatinine concentrations were not affected by treatment. Protein synthesis, degradation and turnover were unaffected by treatment. Exp. 2 used 6 dogs in a design similar to above but they were fed at maintenance energy throughout either the 2.2 lysine:calorie diet from above (2.2), the 3.0 (3.0C) from above or a 3.0 lysine:calorie diet containing additional amino acids to provide an ideal amino acid profile based on published values (3.0I). Both 3.0 diets decreased ($P < 0.05$) urinary N, and N absorbed, and tended to increase N retained ($P = 0.11$), and % N retained ($P = 0.09$). These studies suggest that N metabolism can be altered by altering the lysine:calorie ratio of the diet but perhaps not during nutrient restriction.

Key Words: Lysine, Requirement, Amino acid

W62 Effect of added total sulfur amino acids and threonine on nitrogen balance in dogs. R. E. Bohaty*¹, M. R. C. de Godoy¹, K. R. McLeod¹, D L. Harmon¹, R. M. Yamka², N. Z. Frantz², and K. G. Friesen², ¹University of Kentucky, Lexington, ²Hill's Pet Nutrition, Inc., Topeka, KS.

Previously, we have shown that formulating foods to provide an optimal ratio of 3.0 g lysine/Mcal ME results in increased N retention in mature overweight dogs. Therefore, the objective of this study was to further investigate whether increased levels of essential amino acids in conjunction with a dietary lysine:calorie of 3.0 would further improve N metabolism in mature overweight dogs. Four isonitrogenous and isocaloric foods all with 3.0 lysine/Mcal ME ratios were formulated. The control food levels of all essential amino acids to provide an ideal profile based on literature values (EAA). Additional foods had increased concentrations of total sulfur amino acids (TSAA), or a combination of TSAA and threonine (TT). Foods were fed to eight overweight, mature, female crossbred hounds in a replicated 4 x 4 Latin Square design experiment. Experimental periods were 28 days in length. Dogs were fed to maintain their current body weight days 1-14 of each period then reduced to 75% of maintenance for their individual ideal weight for days 15-28 of each period. Total feces and urine were collected 2 times daily for the final 6 days of each period for N balance. Urine and feces were composited by dog within each period and analyzed for N. Daily food intakes were similar across treatments whereas nitrogen intake was higher ($P < 0.05$) for animals on the control and TSAA diet

than for animals on the TT diet. There was no difference in fecal DM output, DM digestibility, fecal N excretion, N retained or N digestibility. Based on the measurements made in the present study we see no benefit for additional TSAA, TT or formulation for additional EAA in foods formulated to provide a 3.0 lysine/Mcal ME ratio.

Key Words: Amino Acid, Dog, Nitrogen Metabolism

W63 Effect of dietary protein level on urea production and protein turnover in the adult cat (*Felis catus*). T. J. Wester*¹, K. Weidgraaf¹, C. E. Ugarte¹, and M. H. Tavendale², ¹Massey University, New Zealand, ²AgResearch Ltd., Palmerston North, New Zealand.

Cats are unique among domestic animals as they are obligate carnivores and have a high protein requirement. However, little is known about how they regulate amino acid (AA) metabolism. This study was undertaken to examine the effect of dietary protein level on urea production and AA metabolism in cats. Cats ($n = 18$) were allocated to three treatments (15, 40 or 65% ME intake as CP), fed at maintenance for 3 wk, and then fitted with saphanous and cephalic vein catheters. On the following day, they received primed continuous infusions of [¹³C]bicarbonate (to measure basal CO₂ production), [1-¹³C]Leu and [¹⁵N₂]urea from 0 to 120, 120 to 480 and 0 to 480 min, respectively. Cats were fed hourly during infusion and Leu entry rate from diet was calculated. Breath was sampled at 0, 100, 110, 120, 440, 460, and 480 min to measure ¹³CO₂, with blood sampled at 0, 440, 460, and 480 min to measure ¹³C enrichments in Leu and ketoisocaproate, and [¹⁵N₂]urea. Values for Leu flux, non-oxidative Leu disposal (NOLD, an indicator of protein synthesis), Leu rate of appearance in plasma (Ra, an indicator of protein degradation), Leu oxidation, and urea production rate (an indicator of net protein catabolism) are shown in Table 1. Cats fed the diet with 15% of ME intake as CP had the lowest rate of whole body AA catabolism and oxidation, whereas protein synthesis was only different between the highest and lowest CP diets. This study showed that cats modulated protein turnover mainly by altering rates of AA oxidation and catabolism. (Supported by the Massey University Research Fund)

Table 1.

	Diet (%ME as CP)			SEM
	15	40	65	
Leu flux, $\mu\text{mol}/(\text{kg}\cdot\text{h})$	201.4 ^a	267.7 ^b	345.3 ^c	8.21
Leu NOLD, $\mu\text{mol}/(\text{kg}\cdot\text{h})$	121.5 ^a	141.6 ^{ab}	154.6 ^b	8.55
Leu Ra, $\mu\text{mol}/(\text{kg}\cdot\text{h})$	147.5	151.8	121.6	10.26
Leu oxidation, $\mu\text{mol}/(\text{kg}\cdot\text{h})$	80.0 ^a	126.7 ^b	191.8 ^c	10.62
Urea production, $\mu\text{mol}/(\text{kg}\cdot\text{h})$	456.6 ^a	713.0 ^b	1,321.0 ^c	73.68

^{a,b,c}Values in a row with different superscripts are different ($P < 0.05$)

Key Words: Feline Nutrition, Protein Turnover, Urea Production

W64 Microbiological and immunological effects of two yeast-based complex fermentation ingredients on adult dogs. D. C. Hernot*¹, G. C. Fahey, Jr.¹, S. Reeves², and M. Scott³, ¹University of Illinois, Urbana, ²Embria Health Sciences, Ankeny, IA, ³Diamond V Mills, Cedar Rapids, IA.

Nine female hound-mix dogs were used in a replicated 3x3 Latin square design to evaluate microbiological and immune responses of

two complex fermentation ingredients derived from a proprietary process consisting of *Saccharomyces cerevisiae* and the media on which they are grown. Dogs were given 400 g of food daily with one of 3 gelatin capsule treatments: 1) control (empty capsule), 2) 0.143 g yeast fermentate (Embria Health Sciences, Ankeny, IA), and 3) 1.0 g yeast culture (Diamond V Mills, Cedar Rapids, IA). Blood concentrations of lymphocytes positive for CD3, CD4, CD8 α , and CD21 cell surface markers and serum immunoglobulin concentrations were measured. Gene expression of cytokines TNF- α , IL-6, IFN- γ , and TGF- β also was determined by quantitative real-time PCR (qRT-PCR). Lactobacilli, bifidobacteria, *Escherichia coli*, and *Clostridium perfringens* populations were quantified in feces using qRT-PCR. Population changes within the predominant fecal microflora were evaluated using parallel DGGE. Immune indices measured in this study were not affected by treatment. No differences were found among treatments for any of the cell surface markers analyzed, or any of the serum immunoglobulins measured. Yeast fermentate decreased lymphocytes compared to the control. The two yeast-based complex fermentation ingredients decreased ($P < 0.05$) *Cl. perfringens* fecal populations compared to the control. Yeast culture had a more significant ($P < 0.05$) effect than yeast fermentate. In conclusion, the yeast-based complex fermentation ingredients had a beneficial effect on microbial ecology by reducing *Clostridium perfringens* populations.

Key Words: Yeast, Dogs, Microbiology

W65 Nutrient levels in crop milk and plasma as an indicator of free-ranging American flamingo (*Phoenicopterus ruber ruber*) nutrient status. A. S. Hunt* and A. M. Ward, Fort Worth Zoo, Fort Worth, TX.

Crop milk and plasma samples were collected from six to eight week old juvenile American flamingos (*Phoenicopterus ruber ruber*) to evaluate nutrient availability and status in a free-ranging population. These samples were gathered with the goal to establish a database to assess the appropriateness of captive hand rearing formulas and nutrient status of captive and hand reared chicks. Samples were obtained in August

of 1999, 2000, 2001, 2003, and 2005 at the Ria Lagartos Biosphere Reserve (El Cuyo, Mexico) and analyzed for minerals, vitamins and carotenoids. The majority of the results were not normally distributed within and among years ($P < 0.05$, Shapiro-Wilkes), therefore coefficients of dispersion were calculated to describe the variability of medians across years. The dispersion coefficients were greater for crop milk than plasma ($P < 0.001$, paired t-test) for 11 of the 13 nutrients (Table 1). Minerals, vitamins, and carotenoids in crop milk samples collected at a single point during lactation are highly variable and therefore a poor indicator of nutrient requirements and status. Plasma nutrient parameters may present a more viable option for evaluating the status and requirements of growing flamingos.

Table 1: Nutrient median (M) levels (dry matter) and dispersion factor (DF) in *Phoenicopterus ruber ruber* crop milk (CM) and plasma (P) samples.

ppm	CM (n \approx 135)		P (n \approx 103)	
	M	DF	M	DF
Calcium	65	0.10	118	0.20
Phosphorus	500	0.62	216	0.07
Sodium	1650	0.71	1394	0.14
Potassium	200	0.52	67	0.56
Magnesium	20	0.20	17	0.13
Zinc	21	0.98	1.08	0.34
Iron	174	0.77	3.19	0.35
Retinol	5.75	0.77	0.26	0.56
α Tocopherol	17	1.0	6.16	0.49
β Carotene	1.62	0.99	0.05	0.41
Echinenone	2.24	0.99	0.57	0.40
Canthaxanthin	6.46	0.85	2.21	0.23
Lutein	1.21	0.99	0.13	0.71

Key Words: Crop milk, Flamingo, Nutrients