*The 44th Symposium of Veterinary Medicine: Animal Welfare*

**Koret School of Veterinary Medicine,**
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INVITED LECTURES

# Habituated Wild Boar in the City of Haifa: Management Pattern to Cope with

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Establishment of wild boar populations in Haifa city, which are based on anthropogenic food sources, caused continues conflict while losing their fear from people. In former years, intensive culling of few hundreds individuals per year, was the only management action that was done. Feeding of domestic cats was very familiar in large parts of the city, which attract wild boars. The amount of culling from 5 years increased to greater than 3 times from 150 to 430 individuals per year while the conflict endured. A joint project of Haifa municipality and Israel Nature and Park Authority (INPA) in order to reduce the wild boar population, was carried out according to the following principles principles: 1. Decrease food and water source by efficient sanitation. 2. Fencing and blocking wild boar paths using robust fence (1.2 meter height) from open areas to the external neighborhoods. 3. Capturing and culling of intractable individuals that habituated and threatened the residents. Monitoring the activities effect was estimated by municipality weekly reports, GPS collared wild boars and camera traps. Intensive and tight sanitation of garbage cans in streets and parks contribute to > 8 times decrease of tipping down of garbage bins events in the last year. Extensive enforcement of few hundred cases in the last year, was executed to deal with feeding wild boar by residents. There was sharp decrease of wild boars entering fenced and sanitized neighborhoods documented by GPS and tagged wild boars carried out after few months. A few dozen of intractable individuals from some neighborhoods that were culled, contributed to a large decrease in wild boar appearance. Tight sanitation alongside blocking the entrance paths to neighborhoods presented an effective tool to decrease of conflict with wild boar in cities and settlements. Culling individuals should be only a complementary activity to deal with habituated individuals.

# A Quest for Alternative Management of Wild Boars

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The wild boar (*Sus scrofa*) is a medium size ungulate, native to Europe, Asia and North Africa, and an introduced species to North America and Australia. Wild boars have expanded their populations and geographic distribution over the past few decades, leading to increased conflicts with humans and often leading to habitat modifications. The most common management tool to minimize their conflict with humans has been culling. Yet, studies, show that culling wild boars might have an reverse effect, leading to higher reproductive potential and to elevated population size. Under elevated hunting pressure the yearling males, which naturally form their own small packs, stayed with their natal groups. Furthermore, we found that under high hunting pressure females' hair progesterone levels were significantly higher compared to that of females roaming under low hunting pressure. Our study may suggest that the increased access of yearling males to the females in their groups, due to hunting pressure, might contribute to the high reproduction levels observed under culling regimes. We believe that wildlife managers should develop alternative methods for culling to deal with the increased worldwide conflict with humans. For example, we found that both sanitary measurements and the addition of mud puddles in an urban forest significantly decreased the conflict between humans and wild boars.

# Insights from a 20 Years' Research on Free-Roaming Cats

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The domestic cat had been distributed around the globe mainly as a pet. Over the years, it formed non-domiciliary populations known as free-roaming cats. Free-roaming cats often suffer from impaired welfare and were shown to cause adverse environmental effects, such as ecological damage, nuisances and public health hazards. The management of these populations is implemented mainly by the trap-neuter-return (TNR) method, as it is considered as a humane control method. Despite the extensive use of this method, there is disagreement among researchers, regulators, and animal organizations, in regard to the effectiveness of this method in reducing free-roaming cat numbers, improving their welfare, and reducing the environmental adverse effects that they might cause. In our research, we examined few aspects of TNR effectiveness, along with the performance of a uniquely designed controlled field experiment, over a 12-y period and spanning a 20-km$^2$ urban area. We found positive correlation between neutering and cat health and survival. High intensity-TNR reversed population growth, reaching an annual approximately 7% reduction, only when it was applied in geographic contiguity. This population reduction was limited by a rebound increase in cat reproduction and longevity. We conclude that cat population management by TNR should be performed with high intensity, uninterruptedly, and in geographic contiguity to enable population reduction. To enhance management effectiveness and mitigate compensatory effects, we recommend further evaluating an integrated strategy that combines TNR with complementary methods (e.g., vital resource regulation, ill cat euthanasia, and adoption).

## SCIENTIFIC ABSTRACTS

# Clinical Utility of Serum Fructosamine in Long-Term Monitoring of Diabetes Mellitus in Dogs

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Serum fructosamine (sFA) is used to assess glycemic control in diabetic dogs. Nevertheless, its interpretation is hindered by several limitations. This study evaluated the long-term diagnostic performance of sFA, along with clinical signs, in assessing glycemic control in diabetic dogs. This retrospective study included insulin-treated (for ≥1 month) diabetic dogs. sFA, body weight, appetite, polyuria/polydipsia and clinical scores (CS; well-controlled DM, CS-0; uncontrolled diabetes mellitus, CS-1) were recorded during follow-up visits. The study included 50 dogs (302 visits; median, 6 visits/dog; range, 2-20), of which 33 (66%) achieved CS-0. sFA was higher ($P$<0.001) on visits with CS-1 (mean, 563 µmol/L; 95% confidence interval [CI], 533-592) compared to visits with CS-0 (mean, 495 µmol/L; 95%CI, 467-523). Increase in sFA was associated ($P$<0.001) with increased OR of CS-1 (OR, 1.26; 95%CI, 1.15-1.39). sFA was moderately predictive of CS (area under the ROC curve, 0.72; 95%CI, 0.67-0.77; $P$<0.0001). sFA cutoff of 486 µmol/L, had 75% sensitivity and 59% specificity in predicting the CS. sFA was lower ($P$=0.04) when hypoglycemia was suspected or reported (mean, 501 µmol/L; 95%CI, 437-565) than in other visits (mean, 561 µmol/L; 95%CI, 528-593). Acute comorbidity contributed ($P$=0.009) to discordant sFA and CS. sFA was moderately accurate in classifying the CS in diabetic dogs. Incorporating sFA in monitoring potentially improved the CS. Decreases of sFA over follow-ups were indicative of improved CS, but might be suggestive of hypoglycemic episodes. Acute comorbidities decreased the diagnostic accuracy of sFA. Additional monitoring tools are advised when sFA and the CS are conflicting.

# Effects of Dietary Anti-Oxidants on Production and Welfare Markers in Heat Stressed Dairy Cows

**Daddam, J. R.,[1] Daniel, D.,[2] Pelech, I.,[3] Kra, G.,[1,2] Kamer, H.,[1] Lavon, Y.,[4] Moallem, U.[1] and Zachut, M.[1]**

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Heat stress negatively affects production and welfare of dairy cows, and increases oxidative stress. The objectives were to examine the effects of a plant extracts supplement (AXT; Axion ThermoPlus, CCPA, France) as anti-oxidants during heat load on production and indices of stress and welfare in dairy cows. Forty-two multiparous mid-lactation cows during peak summer (THI=77) were fed for 2 weeks either a standard milking cows' diet

(CTL, n=14), or supplemented with 100 g/d of AXT (100AXT, n=14), or 150 g/d of AXT (150AXT, n=14). The cows were cooled 5 times a day; then, half of the cows from each treatment were cooled or not cooled for 2 weeks, after which cows were switched for additional 2 weeks. Data were analyzed for effect of treatment, cooling and their interaction with PROC MIXED of SAS. Milk yields and dry matter intake were higher in 100ATX than in CTL, but not different in AXT150 compared to controls. The percentage of hours that VT was >39˚C was lower in AXT100 and in AXT150 than in CTL. Welfare indices: rumination time and laying down times were higher in 150AXT than in CTL, with intermediate values in 100AXT (not statistically significant compared to control). Supplementation of 100AXT during heat load increased feed intake, and production. Both doses lowered VT compared to controls. AXT150 improved welfare indices in dairy cows. This work indicated that plant antioxidants may be beneficial to heat stressed cows, and improve performance and welfare indices.

# The Seroprevalence of *Neospora* spp. in the Israeli Equine Population and its Association with Pregnancy and Abortion

**Mimoun, L.[1] Steinman, A.,[2] Kliachko, Y.,[2] Tirosh-Levy, S.,[1,2] Schvartz, G.,[2] Blinder, E.,[1] Baneth, G.[2] and Leszkowicz Mazuz, M.[1]**

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*Neospora* protozoan parasites are endemic worldwide, infect livestock and companion animals and are a leading cause of abortions in cattle. In horses, *N. caninum* and *N. hughesi* have been associated with fetal loss, and neurological disorders, respectively. This study aimed to evaluate the exposure to *Neospora* in the Israeli equine population, in pregnant mares and in aborting mares. Serum samples from horses and thoracic fluid from aborted fetuses were tested for *Neospora* exposure by the indirect fluorescent antibody test (IFAT). Tissue samples from aborted fetuses were tested by polymerase chain reaction (PCR). The seroprevalence in 334 apparently healthy horses sampled at 30 farms throughout Israel was 24%, with older age ($p$=0.026) and housing management ($p$=0.033) significantly associated with seropositivity in univariable, but not in multivariable, analysis. *Neospora* seroprevalence in 152 pregnant mares from 36 farms was 66.4%, with older age ($p$=0.006) and Arabian breed ($p$=0.005) significantly associated with seropositivity in univariable, but not multivariable analysis. The seroprevalence in 107 of these mares that were re-sampled after parturition decreased to 48.6%. The seroprevalence found in 31 aborting mares was 70.9% and the molecular prevalence in their aborted fetuses was 41.9%. Sequence analyses of the PCR results identified all parasites as *N. caninum.* This study revealed high exposure of equines to *Neospora* parasites, with increased seropositivity in pregnant and aborting mares. Increased seropositivity during pregnancy may reflect increased parasite replication due to immunosuppression, which led to increased chance of fetal infection. These finding suggest that *N. caninum* could be a significant cause of abortion in horses in Israel.

# Evaluation of External Physical Features for Estimation of Endotracheal Tube Diameter in Dogs

**Simanovsky, S.,[1] Yaffe, M.,[1] Epstein, A.,[1] Bruchim, Y.,[1,2] Peery, D.[1] and Kushnir, Y.[1]**

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Endotracheal intubation, using the largest possible endotracheal tube (ETT), is essential for airway management in canine anesthesia. Despite studies correlating tracheal diameter to inter-nare distance, weight or other external measures, evidence-based guidelines for ETT selection are lacking. We prospectively recruited 36 dogs, 10 brachycephalic, 26 non-brachycephalic, weighing 2.2 - 75 kg, scheduled for head and neck computerized tomography (CT). Tracheal diameter at the level of the second cervical vertebra was measured on the CT scan. We recorded weight, body condition score, and external measurements, using a tape measure, including length of the humerus, and the minimal distance between nares, the eye and nare, eye and canine tooth, and both eyes. Correlations were evaluated using Spearman or Pearson correlation. Parameters were compared between groups using t-test, Mann-Whitney U test and Fischer Z transformation. Mean (± SD) Tracheal diameter was significantly smaller in brachycephalic dogs (13.50±4.16 vs 17.61±4.93). Weight had a significantly stronger correlation, and inter-nare distance a significantly weaker correlation, to tracheal diameter in non-brachycephalic dogs (r=0.91 and 0.47 respectively) vs. brachycephalic dogs (r=0.67 and 0.88). Inter-nare distance was smaller than the inserted ETT in 86.1% of cases. After excluding factors with multicollinearity, an equation comprised of head conformation and weighted combination of inter-nare-, inter-eye-, and eye to nare- distances as well as weight, predicted tracheal diameter, describing 76% of tracheal diameter variation. This study describes a novel method for estimating ETT size using external markers, which is superior to inter-nare distance or weight.

# Determination of Isometric Points in the Stifle of a Dog using a 3D Model

**Yair, N.,[1] Yiapanis, C.,[2] Meiner, Y.,[3] Shapiro, A.[3] and Milgram, J.[1]**

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Isometry is the term used to describe points on bones contributing to a joint that remain equidistant from one another as the joint flexes and extends. In cases of cranial cruciate ligament (CCL) rupture isometric points define the ideal location to place the material used in the repair. Isometric points have never been confirmed experimentally in three dimensions (3D) in the dog's stifle, which is the aim of this study. A static 3D model of the stifle was generated from a computer tomography scan of one dog, and a kinetic model was generated, from data collected from sensors attached to the tibia, when flexing the stifle through 80°. Kinetic data was superimposed on the static model by aligning specific points which were defined for both models. This allowed the tibia to rotate and translate relative to the femur based on the kinetic data. The contour of the distal femur

and proximal tibia were converted into point clouds and the distance between each point on the femur and all the points on the tibia was measured at 15 different positions. A total of 3681 isometric points were identified, with all points located in 2 pairs of isometric areas. One pair of isometric areas was at the insertions of the cranial cruciate ligament on the femur and tibia. A second pair was on the lateral aspect of the stifle. A better understanding of the location of isometric areas may lead to refinements in intra- and extra-capsular techniques used to treat cases of ruptured CCL.

# Retrospective Analysis of Factors Affecting Clinical Outcome in Dogs with Primary Nodal Diffuse Large B-Cell Lymphoma Treated with CHOP-Based Chemotherapy

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Numerous factors are known to affect the prognosis of dogs with chemotherapy-treated lymphomas. This is the first retrospective study on dogs with lymphoma in Israel. The objective of this study was to identify prognostic factors for dogs receiving CHOP-based chemotherapy for primary large B-cell lymphoma (BCL). Medical records of dogs treated for BCL at the Koret School of Veterinary Medicine from 2017 to 2022 were reviewed. Factors potentially related to prognosis were statistically analyzed. Forty-six dogs were included in the study. The complete remission rate was 87% (40 dogs). Median progression-free survival (PFS) for the entire population was 159 days (range 31-664). Median overall survival (OS) was 279 days (range 13-1196). Factors significantly associated with OS in the lowest quartile (≤279 days, n=22) only included presence of anemia at diagnosis (OR 8.87; 95% CI 0.98-80.18; P=.04). Factors significantly associated with OS in the upper quartile (>279 days, n=20) included higher number of grade 1 neutropenia events during treatment with vincristine (mean 1.23 (range 0-4) vs. 2.38 (range 0-6) P=0.02) and cyclophosphamide (mean 0.4 (range 0-2) vs. 1.44 (range 0-3) P <0.01) and higher number of dose delays (mean 2 (range 0-5) vs. mean 3.9 (range 0-10) P=0.04). The results of this study suggest anemia at diagnosis may be associated with a poor outcome in dogs receiving CHOP-based chemotherapy for BCL, whereas grade 1 neutropenia during treatment and, as a result, dose delays, may be associated with a better outcome.

# Acute Kidney Injury in Dogs: Etiology, Clinical and Clinicopathologic Findings, Prognostic Markers and Outcome

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Acute kidney injury (AKI) is a common condition in dogs, leading to severe uremia and associated with high morbidity and mortality. The current study objectives were to characterize the etiology, clinical and clinicopathologic findings and outcome in a large cohort of dogs diagnosed with AKI. This retrospective study included 249 client-owned dogs hospitalized at a veterinary teaching hospital and diagnosed with AKI. One hundred and sixty-four dogs (66%) survived. The most common clinical signs at presentation were lethargy (90%), anorexia (83%), and vomiting (68%). Putative etiologies included ischemic/inflammatory (58%), infectious (8%), nephrotoxicity (6%), or other (5%). Hospital acquired AKI was documented in 9% of the dogs. Median serum creatinine (sCr) at presentation and maximal sCr during hospitalization were 4 mg/dL (range, 1.1-37.9) and 4.6 mg/dL (range, 1.1-43.1), respectively. Maximal documented sCr was used for classifying dogs to IRIS AKI grades as follows: Grade I, 6 (2%), Grade II, 38 (15%), Grade III, 89 (36%), Grade IV, 77 (31%), and Grade V, 39 (16%). The overall mortality significantly increased with IRIS AKI grade ($P$=0.009). Anuria was significantly more common among non-survivors compared with survivors ($P$=0.002). Forty-seven (18.8%) dogs were treated with hemodialysis, of which 60% survived. Survival was substantially higher than previously documented. Non-infectious etiologies, higher AKI IRIS grade, acidemia, thrombocytopenia and hypoalbuminemia were associated with a negative prognosis.