ABSTRACTS

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Validation of a model to develop a symptom index for benign prostatic hyperplasia in dogs

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OBJECTIVES AND METHODS: Benign prostatic hypertrophy BPH is a spontaneous and age-related condition in humans and intact male dogs (1). With time, almost all intact male dogs will develop BPH, with >95% affected by 9 years of age (2). Even if symptoms related to BPH are relatively common particularly in dogs > 6, there are typically no clinical signs displayed by dogs with BPH until the condition has progressed to the point that the enlarging prostate causes them (1,2). However, it has been reported in men the absence of relationship between symptoms and objective measures of prostate with benign hyperplasia. Thus the prostate volume alone is not useful in the estimation of disease severity (3). Symptomatology in BPH affected dogs could include sanguinous preputial/urethral discharge, hematuria or hemospermia, tenesmus and dysuria. A presumptive diagnosis is based on detection of above mentioned symptoms and on detecting uniform prostatic enlargement by palpation, radiography and ultrasonography (4). Depending on the findings of physical examination and diagnostic imaging, additional procedures such as cytology and microbiology of prostatic fluid, and prostatic aspiration or biopsy can be performed (2,4). Dogs with BPH are treated only if clinical symptoms are showed (5).

A symptom index for BPH in men was created by the American Urological Association (AUA). AUA has then developed a questionnaire including 7 questions about BPH related clinical signs in humans. The aim was to objectify BPH symptoms severity with a score, to help men determine how serious their symptoms are and to check the necessity or the effectiveness of treatment. This questionnaire is worldwide known as the International Prostate Symptom Score (IPSS). The AUA symptom index is clinically sensible, reliable, valid and responsive. It is practical for use in practice and for inclusion in research protocols (6). As reported for AUA symptom index (6), in this study it has been developed and statistically validated a model to assign an objective score to canine BPH severity based on clinical signs observed and subjectively reported to vet by dog owner.

The medical records of the Animal Reproduction Unit of the Department of Veterinary Medical Sciences - University of Bologna were used to retrieve all cases of dogs with a clinical diagnosis of BPH observed between January 2001 and January 2007 and to build up a dataset. The dataset included 477 cases. Based upon the medical records, a score of 1 (low), 2 (medium) or 3 (high) was given to the disease severity of each case. Signs annotated in the medical records of each case reported to vet by dog owner.

The Nagelkerke pseudo r-squared coefficient was 0.946. The model correctly predicted the response variable in the 97.3% of the cases in corrected predictions calculated.

RESULTS: Overall, 373 subjects were entered in the model. Between them, 243, 107 and 23 animals have been respectively represented on the basis of medical records with a BPH severity score of 1, 2, and 3. The model was built using the Cauchit link function and the following predictors: age, Dyschezia/tenesmus (severity), dysuria (duration-length of time), urinary incontinence, urethral leakages (amount), urethral leakages (frequency), urethral leakages (duration), hematuria (amount), hematuria (frequency), hematuria (duration) and were graded using a scale from 1 (absence) to 4 (max intensity). In order to build up BPH dataset, signs and disease severity were always assessed and annotated by the same clinician or under his supervision. Signs of BHP were entered as predictors while disease severity as dependent variable to generate the predictive model. Breed, weight and age were also recorded in the database and evaluated as predictors as well. The ordinal regression procedure (PLUM) of the SPSS 12.0 for Windows software package was used to analyze the dataset with the ordinal response. In particular all predictors of the dataset were initially entered in the model and then some were removed based on the evaluation of the contribution to the model. The model were, finally, used to re-classify each case of the dataset and the percentage of corrected predictions calculated.

CONCLUSION: In the practice, diagnosis of BPH is usually based on anamnesis, symptoms and prostatic ultrasonographic features. Symptomatic BPH severity has always been established in a subjective manner, making often difficult a discussion or a comparison of clinical cases between clinicians. A predictive model could permit to assign a severity score to this pathology on the basis of signs objectively detected and assessed. The model applied in this study showed an high accuracy (97.3% - 363 cases) and only 2.7% of cases (10/373 subjects) were represented by a type not correctly predicted.
by the model. However, besides the low percentage, the prediction error was never between type 1 and 3, but between close types (1 and 2 or 2 and 3). In conclusion, in this study a BPH symptom index was created for the first time. As already proposed by AUA for symptomatic BPH in humans (6), results obtained in this study allow to include the predictors used in a questionnaire to submit to dogs owners or to be used by practitioners. It will be useful to standardize BPH severity with an objective score and to evaluate the necessity, the kind (medical or surgical) and the effectiveness of treatment.