

# Ultrasonographic measurements of the prostate gland in neutered adult dogs

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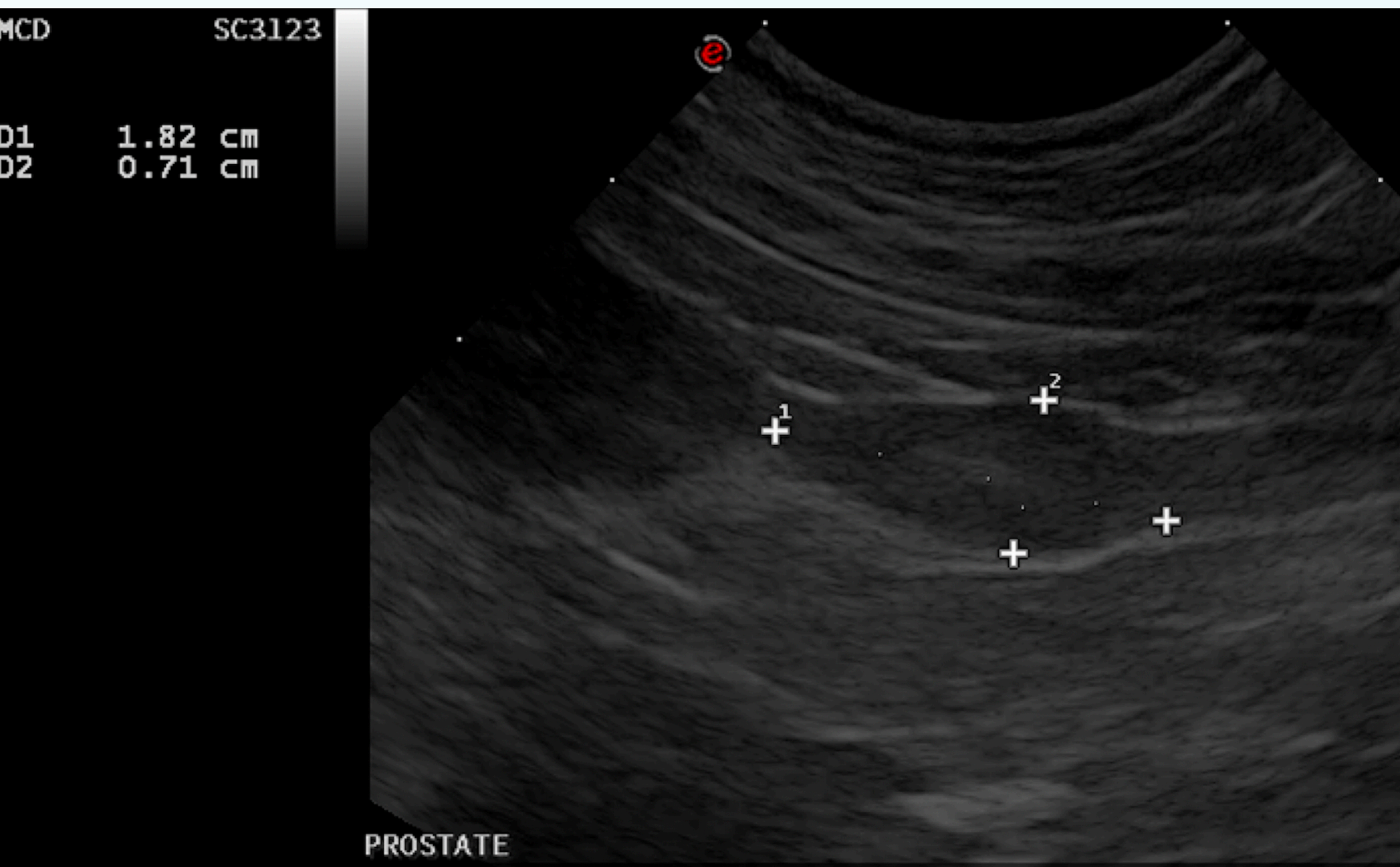
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## Abstract

A reference for the prostatic dimensions in neutered adult dogs, as assessed on ultrasonography, is currently lacking in veterinary literature. The current study was aimed at providing a reference of the prostatic dimensions as assessed on ultrasonography, based on the dogs' body weight. A second aim of the study was to investigate whether there was a relationship between the subjects' age and prostate dimensions. A prospective, single-centre, reference interval study was conducted and 72 privately owned, adult, male neutered canines of a range of breeds and ages met the final inclusion criteria. Prostatic length and prostatic depth in the longitudinal orientation were found to be significantly different among the 3 categories ( $P=0.000$ ), with an increase in both prostatic length and prostatic depth with increasing body weight. Linear regression of the data set provided comprehensive formulas calculating prostatic length and depth based on dog's body weight ( $r^2$  of 0.69 and 0.53 for prostatic length and depth respectively).

### Introduction

Reference ranges for the size of the prostate gland of neutered adult canines, as assessed using ultrasonography, are lacking in veterinary literature. Diseases of the prostate are generally less common in neutered dogs compared to intact dogs (e.g. prostatitis, benign prostatic hyperplasia), with the exception of prostatic neoplasia, which has a higher incidence in neutered male dogs compared to intact male dogs. The current study was designed to provide the reader with a comprehensive reference range for the dimensions of the prostate gland of neutered male dogs, as assessed with ultrasonography.



Prostatic measurements in longitudinal scan plane, with prostatic length (1) and prostatic depth (2) demarcated.

### Methods

**Animals**  
A prospective, observational, reference interval study was performed at our private referral small animal hospital (AniCura-MCD, Amsterdam, The Netherlands). Dogs were included when they were found to be free of current or past lower urogenital disease, that were 12 months or older and were surgically neutered at least 6 wks prior to presentation.

**Data recording**  
All measurements of the prostate gland were acquired in the longitudinal scan plane by the primary author, the maximal length (L) was defined as the maximum length along the urethral axis and the maximal depth (D) was defined as the maximum measurement in the dorsoventral dimension perpendicular to the urethral course.

**Statistics**  
For a subset of the statistical analyses, the subjects were divided into 3 weight categories, small dogs (<10 kg), medium-sized dogs (10-25 kg) and large dogs (>25 kg). A Shapiro-Wilk test was performed to assess the normality of the measurements. A non-parametric test (Kruskal-Wallis) was performed to obtain weight category-based reference ranges ( $p<0.05$ ) for both prostatic length and prostatic depth. Linear regression analysis was performed with prostatic length or prostatic depth as dependent variable and subject weight (continuous) as independent variable. For assessment of the second hypothesis, a correlation test (Kendall's Tau) was performed to estimate the correlations between age in months and either prostatic length or prostatic depth.

### Results

72 dogs from a broad range of breeds met the final inclusion criteria and were selected for data analysis. The Kruskal-Wallis test showed a significant difference in both prostatic length and prostatic depth for the three different weight categories, with a p-value approaching zero ( $p<0.001$ ). Kendall's Tau rank test showed no correlations between age and the two prostatic dimensions (Kendall's rank correlation tau length -0.120 and weight -0.078,  $p>0.100$ ).

Weight category	Mean $\pm$ standard deviation	Range	Interquartile range (1 <sup>st</sup> - 3 <sup>rd</sup> quantile)
<b>Length in mm</b>			
Weight < 10 kg	15.2 $\pm$ 3.3	10.0-23.6	13.3-16.6
Weight 10-25 kg	20.9 $\pm$ 4.5	12.8-30.0	17.8-24.0
Weight > 25 kg	28.1 $\pm$ 5.3	16.7-42.0	25.3-30.0
<b>Depth in mm</b>			
Weight < 10 kg	7.9 $\pm$ 1.2	5.9-10.2	7.0-8.8
Weight 10-25 kg	9.8 $\pm$ 2.5	6.2-14.9	8.3-10.7
Weight > 25 kg	13.5 $\pm$ 2.7	9.9-19.8	11.1-15.1

Table presenting prostatic length and depth measurements of all included dogs, presented with 3 different weight categories.

### Conclusion

The results of the present study provide the reader with references of prostatic dimensions, which show a clear correlation with the dog's body weight. Both the measurements of prostatic length and depth, in the longitudinal plane, showed an obvious increase in value with increasing body weight, with a p-value approaching zero for both variables, thus indicating statistical significance

### Results

