

EFFECTS OF A MUSCLE-TARGETED NUTRITIONAL SUPPLEMENT IN AGEING DOGS: A PILOT STUDY INTEGRATING MULTIMODAL MUSCULAR ASSESSMENT WITH POINCARÉ PLOT ANALYSIS

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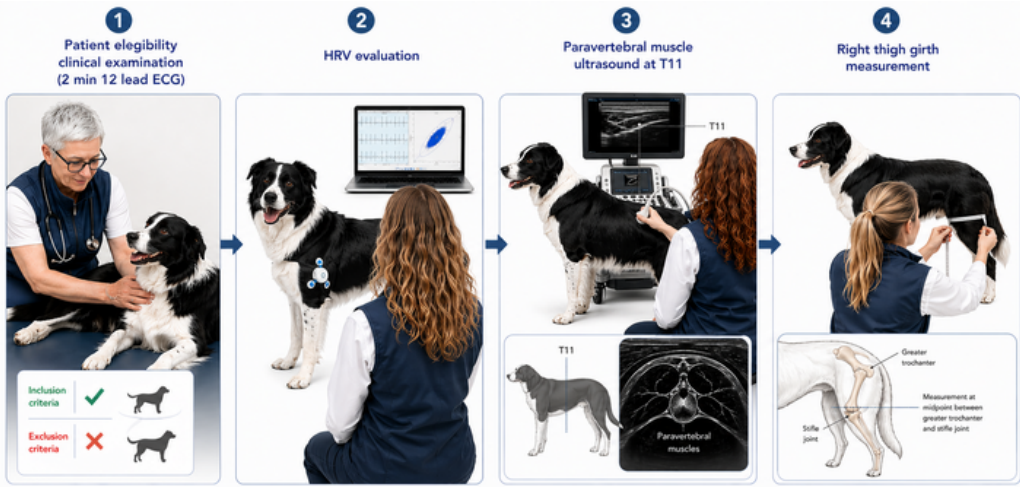
INTRODUCTION MATERIALS & METHODS

Sarcopenia is a relevant condition in ageing dogs, characterised by **progressive loss of muscle mass and function**. Since morphology alone may not fully reflect muscle impairment, a **multimodal assessment** is needed. Limb girth and muscle ultrasonography offer practical tools to monitor morphometric change, while Poincaré plot analysis may provide complementary information on autonomic modulation, recovery and fatigue-related physiological adaptation. The **supplement** evaluated in this pilot study contains **collagen and fenugreek** (*Trigonella foenum-graecum*), selected for their potential role in musculoskeletal support and muscle-related metabolic modulation. This study aimed to determine whether a muscle-targeted nutritional supplement could support improved muscle function in ageing dogs, based on objective measures.

Fifteen dogs were enrolled. 5 males and 10 females, with a median age of 10 years (range 7–13). Breeds included Border Collies (n=6), mixed-breed dogs (n=6), Labrador Retriever (n=1), Pit Bull (n=1), and French Bulldog (n=1). They underwent a four-step sequence evaluation: **clinical examination** and 2-min **12-lead ECG**, muscle **ultrasonography**, 5-min **HRV (Heart Rate Variability)** recording, and finally **limb girth** measurement.

The **HRV recording** was obtained with a Cortrium C3+ device, and analyzed with a dedicated software (Kubios HRV Scientific).

The **muscle ultrasound** evaluation was obtained bilaterally on the right and left thoracolumbar epaxial muscles at the level of T11, with the dog standing in a neutral position. Ultrasound measurements of the mid-femoral region were obtained bilaterally with the dog in lateral recumbency. The **girth measures** were obtained bilaterally on the right and left pelvic limbs using a Gulick-type measuring tape, at the midpoint between the greater trochanter and the stifle joint, with the dog standing square.



RESULTS

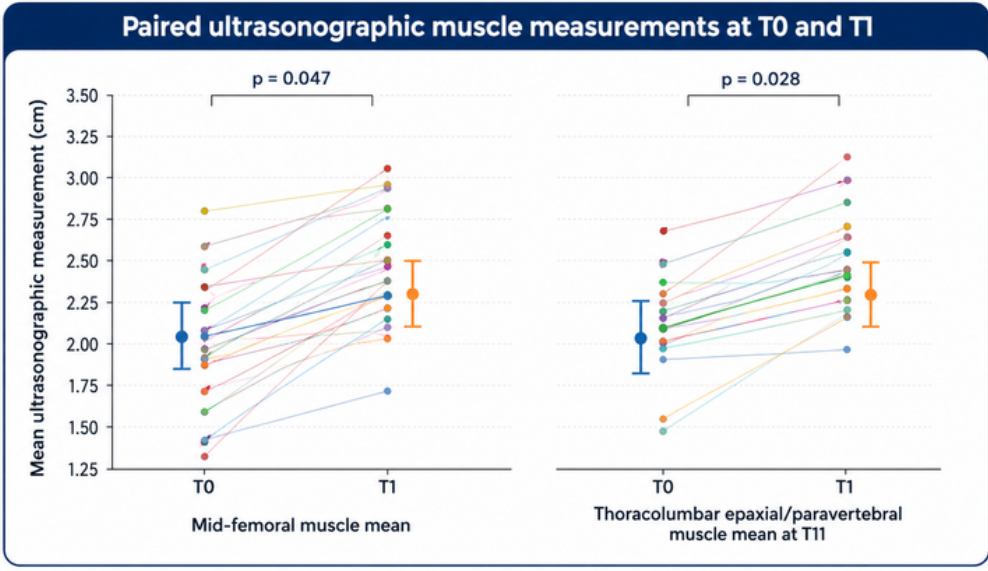


Figure 1. Paired ultrasonographic muscle measurements at baseline (T0) and after 30 days of supplementation (T1). Each line represents one dog, and each value corresponds to the median of three repeated measurements obtained at each time point. Significant increases were observed for the mid-femoral muscle mean and thoracolumbar epaxial muscle mean at T11. Statistical analysis was performed on dog-level mean values using a paired t-test to compare T0 and T1 measurements, with statistical significance set at $p < 0.05$.

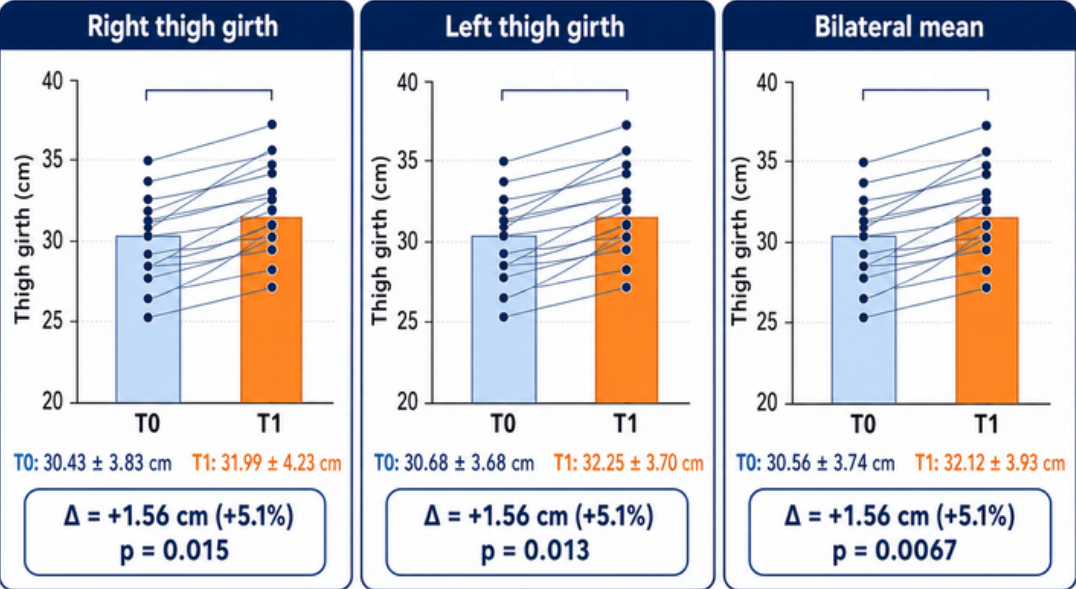


Figure 2. Mean thigh girth increased significantly from T0 to T1 in 15 dogs. Values are reported as mean $\pm$ SD after averaging three repeated measurements at each time point for each dog. Significant increases were observed for right thigh girth (30.43 ± 3.83 vs. 31.99 ± 4.23 cm; $p = 0.015$), left thigh girth (30.68 ± 3.68 vs. 32.25 ± 3.70 cm; $p = 0.013$), and bilateral mean (30.56 ± 3.74 vs. 32.12 ± 3.93 cm; $p = 0.0067$). T0 vs T1 comparisons were performed using the two-tailed Wilcoxon signed-rank test, with statistical significance set at $p < 0.05$.

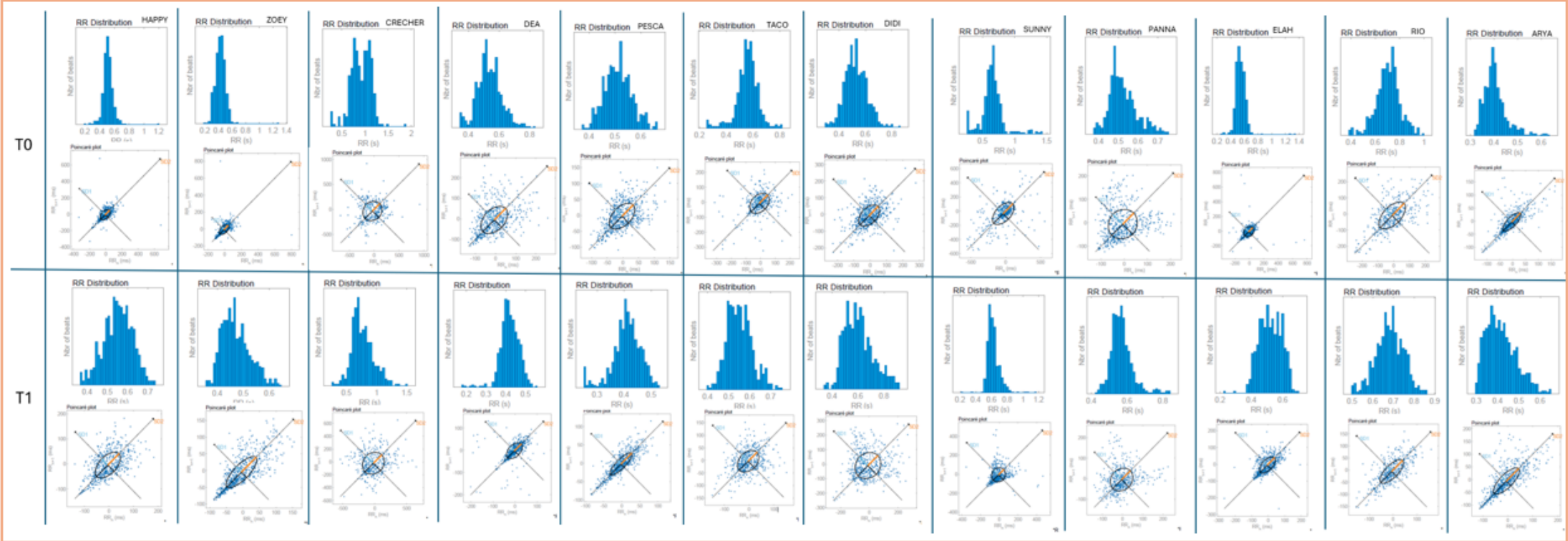


Figure 3. Poincaré plots and R-R interval histograms at baseline (T0) and after 30 days of supplementation (T1). Twelve dogs fulfilled the criteria for adequate Poincaré plot analysis. From T0 to T1, all subjects showed a variable increase in heart rate variability and/or a reduction in the density of short R-R intervals, suggesting an improvement in vagal modulation.

DISCUSSION

This pilot study suggests that 30-day **muscle-targeted supplementation** may support **measurable morphometric and functional changes** in ageing dogs. The increase in thigh girth and thoracolumbar epaxial muscle measurements is particularly relevant, as **muscle loss** is associated with canine ageing-related sarcopenia. HRV analysis showed a variable increase in HRV and/or reduced density of short R-R intervals, suggesting improved vagal modulation and autonomic adaptation. This may be clinically relevant because **muscle impairment, fatigue, recovery capacity, and autonomic regulation** are interconnected aspects of functional ageing. These findings may reflect the combined role of the supplement ingredients: **fenugreek, reported to support muscle strength, endurance, lean body mass, and metabolic modulation, and collagen, commonly investigated for musculoskeletal and joint support**. As this is a pilot study, further controlled research is needed to confirm these preliminary results.

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CONCLUSION

Thirty-day supplementation with a muscle-targeted complementary feed containing undenatured type II collagen and fenugreek seeds (*Trigonella foenum-graecum*) **was associated with significant increases in thigh girth and thoracolumbar epaxial muscle** ultrasonographic measurements in ageing dogs. Poincaré plot analysis also suggested improved HRV patterns, consistent with **enhanced vagal modulation**. These preliminary findings support a **multimodal assessment approach** combining morphometric, ultrasonographic, and autonomic parameters to monitor muscle-related changes in dogs at risk of sarcopenia and suggest that **this supplement may represent a useful nutritional support** strategy for sarcopenic patient. Further controlled studies are needed to confirm these results.

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