Effect of Supplemented L-Carnitine on Maintenance Energy Requirements of Working Labrador Retrievers

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Objectives
The objective of this study was to determine the maintenance energy requirements of working Labrador Retriever dogs supplemented with oral L-carnitine.

Introduction
L-carnitine supplementation has long been investigated for its potential as a weight-loss and exercise performance aid in a wide array of species, with some conflicting results. L-carnitine has been recognized for its role in lipid oxidation and sparing of muscle glycogen. To date, no research has been performed to determine if supplementation with L-carnitine has an effect on maintenance energy requirements (MER) in L-carnitine supplemented dogs versus non-supplemented dogs. In the present study, data obtained during an L-carnitine performance study was used to calculate and compare the MER of Labrador Retrievers supplemented with L-carnitine and to those not receiving an L-carnitine supplement.

Animals and Housing
All dogs were housed individually in climate controlled kennels at night and were aired outside in social groups during the day for approximately 6-8 hours, dependent on weather. All dogs had free access to automatic waterers.

Diets and Supplements
All dogs were fed a low L-carnitine basal diet for the duration of the studies (Study 1, ME = 3987kcal/kg, L-carnitine = 14.9%; Study 2, ME = 3988kcal/kg, L-carnitine = 19.3%). The L-carnitine group received 250mg of a powdered Carnikine™ L-carnitine supplement mixed with 3.75g sucrose. The control group received 4g sucrose. On resting days, all dogs were fed once daily in the morning. All received an initial meal of 200g with their prescribed supplements to ensure the full dose was consumed by each animal. After the first 200g was consumed, the dogs were then offered the remaining portion of their meal. On days that the dogs were exercised, they received their first 200g and supplements prior to exercise and the rest of the meal after the exercise was completed. Any feed refusals were weighed and recorded.

Experimental Design
Two similar studies were performed over the course of two years. Study 1 utilized 40 Labrador Retrievers (22M/18F) and Study 2 utilized 58 Labrador Retrievers (28M/28F). All dogs were fed the same basal diet, and were exercised for 14 weeks per study. In study 1, all dogs performed one long endurance run per week increasing incrementally from 8.046km to a final long run of 24.14km. All dogs also performed sprinting runs twice weekly (increasing incrementally from 549m to 1097m) that mimicked an AKC hunter test run. In study 2, all dogs performed two long endurance runs per week, increasing incrementally from 8.046km to a final long run of 24.14km. All dogs wore Actical® accelerometer and Garmin® GPS collars during exercise to track and quantify work effort. During the long endurance runs, the dogs ran alongside an all-terrain vehicle and were free to run, play, swim, stop, etc. All feed intake and refusals were weighed each day for each dog to determine energy consumption. All dogs were scanned using a dual energy x-ray absorptiometry machine at baseline and at the conclusion of the study to determine fat and lean mass gain and loss. Basal MER and MER with activity included were determined over the course of the two studies using metabolic body weight, feed consumption data, lean/fat mass change, activity points generated from the exercise program, and activity points generated from normal daily activity (24h). The caloric value per activity point was determined to be 0.00022kcal/kg bw

Results

Study 1, February–May: Basal maintenance energy requirements for Study 1 showed significant differences between the L-carnitine and control groups, both overall and for the male dogs (Fig. 1). The cool temperatures at the time of the study took place likely contributed to better energy efficiency in Labrador Retrievers supplemented with L-carnitine. The male Labrador Retrievers had a much higher MER compared to the females, likely to the higher amount of lean mass found in males compared to females. The MER breakdown is shown in Fig. 2.

Study 2, June–September: Basal maintenance energy requirements during Study 2 were not significantly different between L-carnitine and control groups (Fig. 3). This trial was performed in the summer months, with the average daily temperature being 25°C. The difference in the MER is attributed to the temperature differences at the time of each trial. The MER was significantly lower in Study 2 compared to Study 1. Male Labrador Retrievers continued to have a higher MER compared to the females. The MER breakdown for Study 2 is shown in Fig. 4.

Conclusions
- During cooler temperatures, exercised Labrador Retrievers that are supplemented with L-carnitine have better energy efficiency and a lower maintenance energy requirement.
- The maintenance energy requirements of Labrador Retrievers in Study 1 in cool temperatures were significantly higher than for Study 2 in warm temperatures.
- Male Labrador Retrievers had significantly higher maintenance energy requirements compared to females due to the differences in lean mass.

References

Presented by: Petfood Forum Industry