

Introduction

Determining amino acid (AA) requirements in adult and senior dogs is important due to AA incorporation back into the maintenance of tissues. Without adequate intake of AA, animals can exhibit muscle atrophy or experience changes ultimately resulting in metabolic disease. Thus, it is important to accurately estimate AA requirements in animals of various age groups to ensure that AA are supplied in accurate amounts.

Several methods to estimate amino acid requirements exist. However, the indicator amino acid oxidation (IAAO) is a useful method due to its ability to accurately estimate AA requirements in a quick manner (Elango, 2009). In vulnerable populations, including senior age groups, this method becomes important because the AA requirement can be established without creating deficiencies as those that are needed to conduct a nitrogen balance study. Nutrition tools such as the IAAO method can be combined with advanced technology such as dual energy x-ray absorptiometry (DEXA). DEXA provides an estimation of body composition. Lean mass, a component of body composition, can then be determined.

As previously mentioned, in order to develop and maintain lean mass, amino acid requirements must be met. The first limiting amino acid, lysine, is the most crucial amino acid in diet formulations. Therefore, the ratio of lysine is often set with proportion to crude protein (CP). This experiment was created in order to determine if the CP level of diets affects lysine requirements. The two experiments discussed in this poster are of a series of experiments aimed to define the dietary requirements of amino acids in young and senior Labrador Retrievers using the IAAO technique.

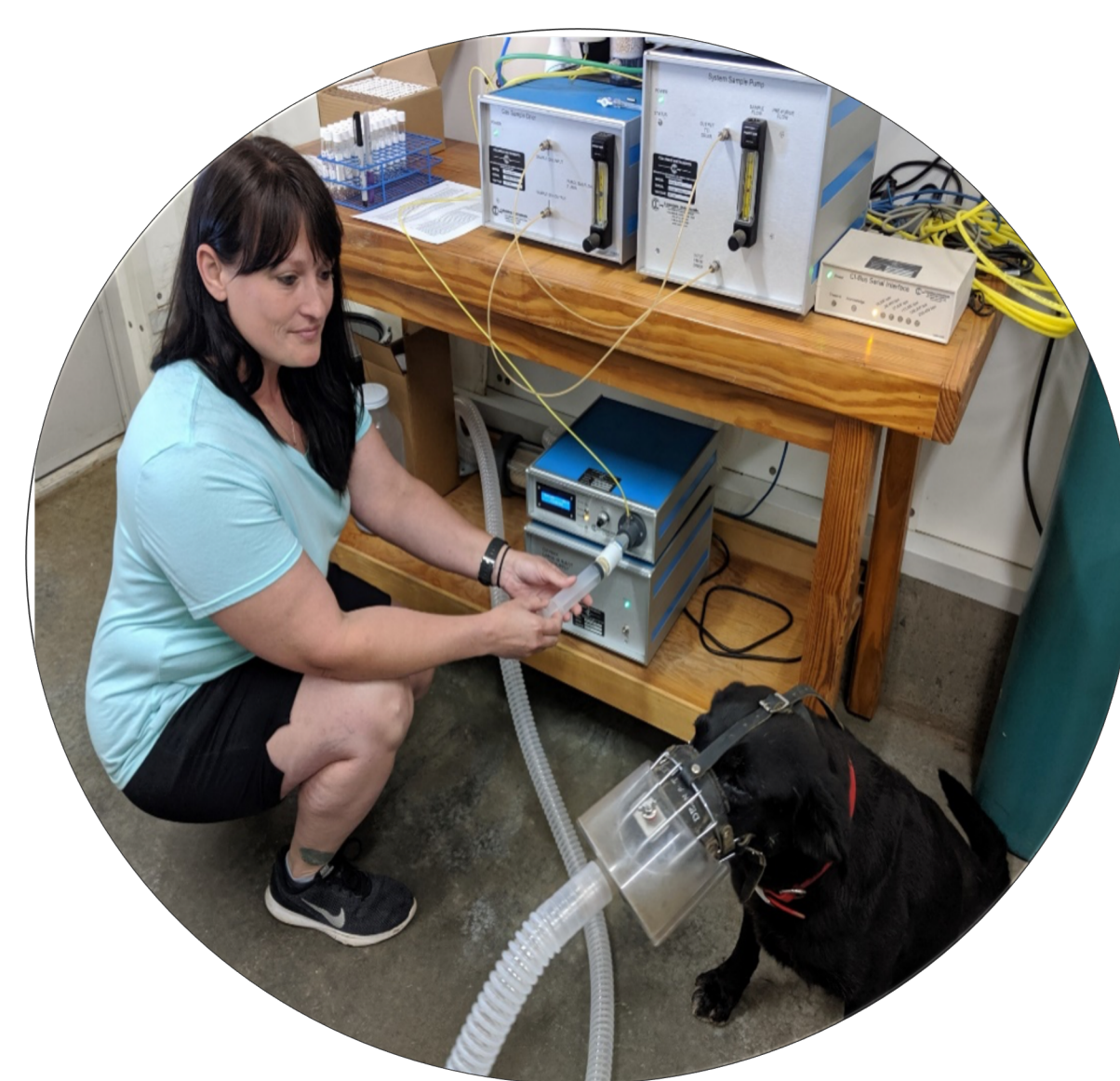
Objective

The objective of this experiment is to use the indicator amino acid oxidation technique to determine the lysine requirement in adult and senior Labrador Retrievers and determine how it is affected by crude protein inclusions.

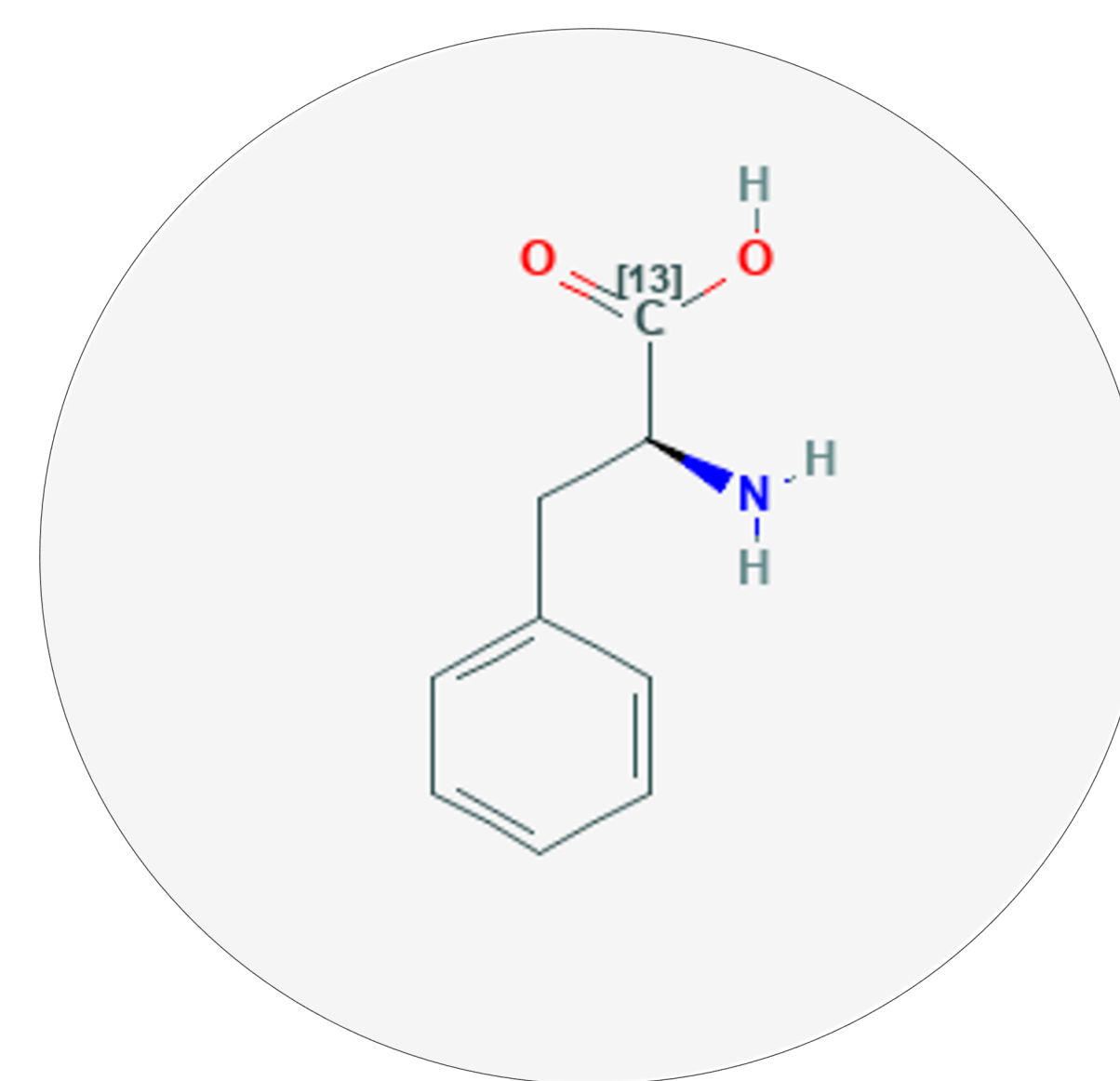
Indicator Amino Acid Oxidation



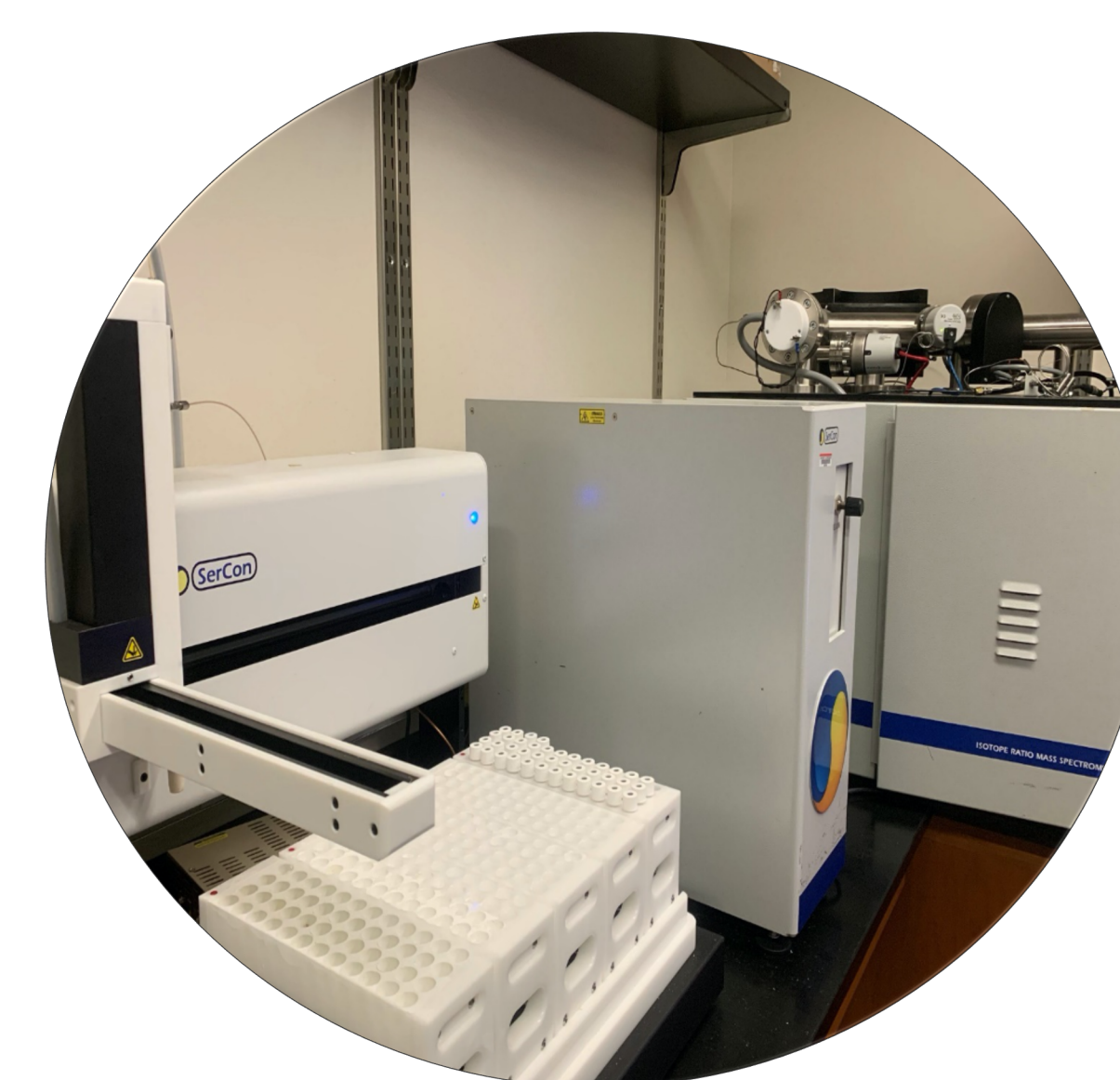
Feeding



CO₂ Production



Stable Isotope



Enrichment

Experimental Design

Two experiments were conducted to determine the Lys requirements in adult and senior Labrador Retrievers through the IAAO technique. Six young adult (1.3-1.5 yrs) and six senior (>8 yrs) dogs were allocated to each trial (6 dogs/exp) to determine the effects of feeding 13 and 18% CP on the Lys requirement. The control diet was fed for two days, followed by a day in which the test diet was fed, a tracer amino acid was supplied, and breath samples were collected. On test day, a priming dose of L-[1-¹³C]Phe (Cambridge Isotope Laboratories, Inc.) based on the subject's body weight was supplied, followed by [1-¹³C]Phe doses every 30 minutes, spanning a four-hour period. A respiration mask was placed on each dog every 30 minutes (Oxymax, Columbus Instruments), ¹³CO₂ was collected, and enrichment was determined by isotope ratio mass spectrometry (IRMS). Results for IRMS were converted to atom percent excess (APE) and analyzed using a broken-line model (JMP® Pro 15).

Results

Amino acid requirements of crude protein requirements for adult and senior Labrador Retrievers are shown in Table 1. The estimated mean and population requirements of adult and senior dogs was determined to be 1.56±0.25 and 0.81±0.37 g/1000 kcal ME (mean ± 2SD), respectively, when fed a 13% CP diet. For the 18% CP diet, adult and senior dog mean and population safe requirements were 1.36±0.18 and 0.86±0.07 g/1000kcal, accordingly.

Table 1. Four Rivers amino acid requirements for lysine in adult and senior Labrador Retrievers

g/1000 kcal	13% CP		18% CP	
	Adult	Senior	Adult	Senior
Minimum Requirement	1.56	0.81	1.36	0.86
Recommended Allowance	1.81	1.18	1.54	0.93

Table 2. NRC and AAFCO amino acid recommendations for lysine

	NRC	AAFCO
Minimum Requirement (g/1000 kcal)	0.70	1.58
Recommended Allowance (g/1000 kcal)	1.13	

Conclusions

The results suggest that as dogs age, the lowered lean mass requires less amino acid nitrogen and lysine to maintain body tissues. An effect of CP level on lysine requirements was observed when defining the AA requirement for adult dogs. However, there was no effect for seniors adding additional crude protein to the diet. This can be explained by the diminished growth rate of lean mass in older dogs.

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