



## The $^{13}\text{C}$ -bicarbonate tracer ( $^{13}\text{C}$ -BT) technique for estimation of $\text{CO}_2$ production and energy expenditure in dogs during rest and during physical activity

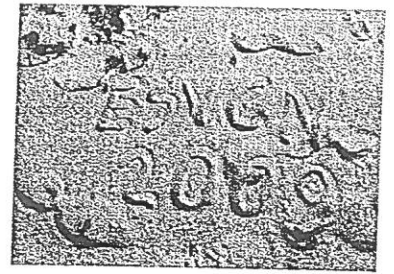
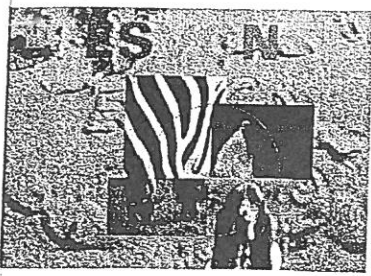
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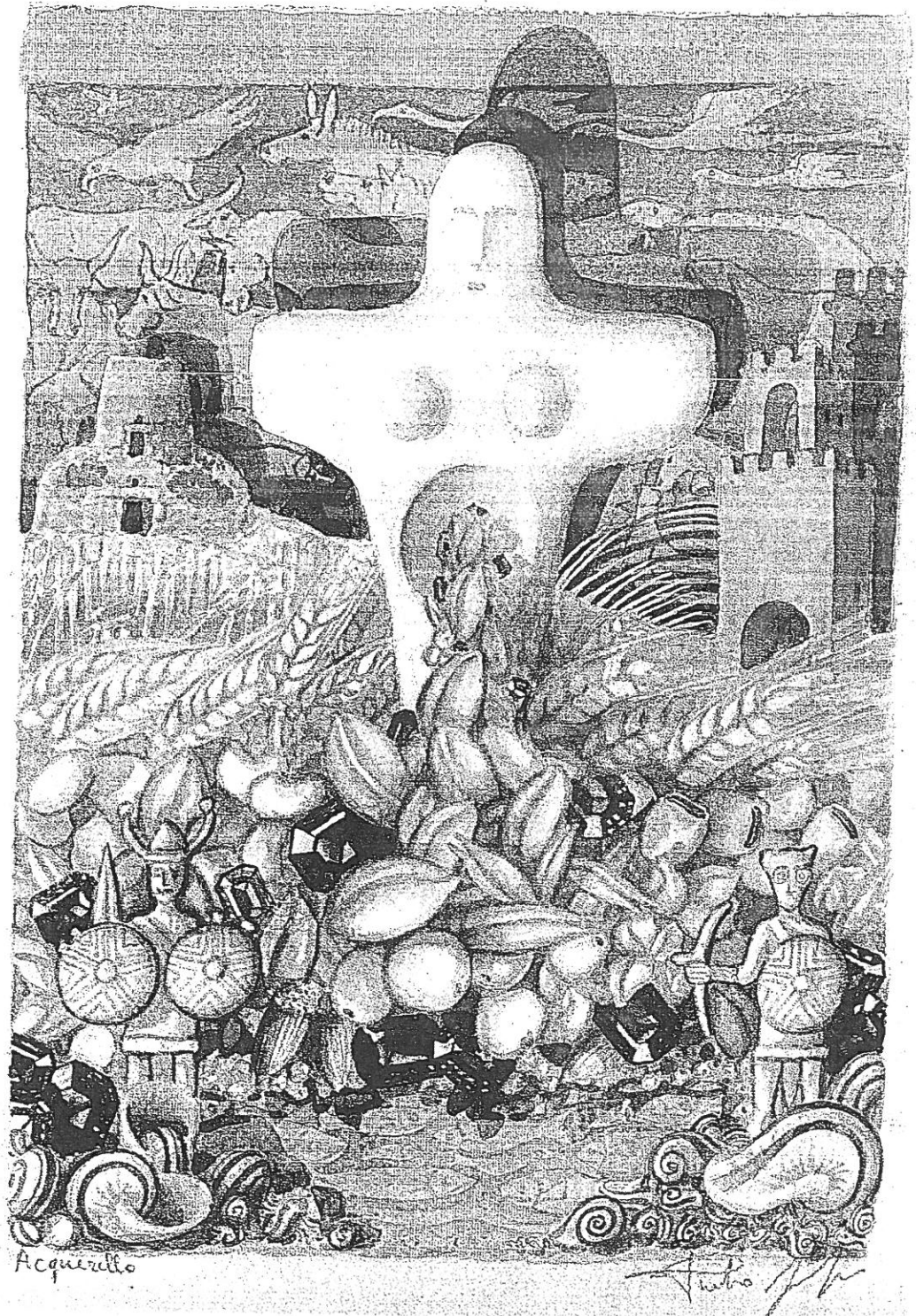
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## The $^{13}\text{C}$ -bicarbonate tracer ( $^{13}\text{C}$ -BT) technique for estimation of $\text{CO}_2$ production and energy expenditure in dogs during rest and during physical activity

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**Introduction:** The knowledge of energy requirements in dogs is very limited, and there are several factors that have influence on the rate of energy expenditure (EE). Thus, to provide accurate estimates of nutritional requirements and to be able to predict appropriate guidelines to dog owners about how to feed their dogs, it appears essential to be able to determine the true rate of energy expenditure in a reliable and feasible way during their daily life, routine jobs, sporting activities, or illness, in order to ensure optimal health and performance. In the present experiment, a non-invasive form of the  $^{13}\text{C}$ -bicarbonate tracer ( $^{13}\text{C}$ -BT) technique was assessed for estimation of  $\text{CO}_2$  production ( $\text{RCO}_2$ ) and EE in dogs during rest and physical activity.

**Materials and Methods:**  $\text{RCO}_2$  and EE were estimated from the  $^{13}\text{C}$  kinetics in six dogs (2 English Springer Spaniels, 2 German Shorthair Pointers and 2 Beagles), 1.5 – 12 years of age and ranging from 11 – 33 kg body weight, after oral administration of  $\text{NaH}^{13}\text{CO}_3$  by means of breath test. The measurements were conducted in two periods, including two days of rest, and three days with three hours of exercise per day. The ratio  $^{13}\text{C}/^{12}\text{C}$  in collected breath samples was measured by means of an IRIS infrared analyser.

**Results and Discussion:** Estimated EE was  $483 \pm 147$  and  $2007 \pm 924$   $\text{kJ}/\text{kg}^{0.75}/\text{day}$  during periods of rest and exercise, respectively. There were significant differences in EE between periods, and also between days within periods and dogs within periods. Variation in EE between dogs was assumed to be due to the individual differences in activity and life stage between the dogs and to insufficient standardization of the technique.

**Conclusions:** The  $^{13}\text{C}$ -BT technique seems possible to use as a non-invasive method to obtain reliable estimates of EE in dogs at different activity levels. However, the technique needs to be further standardized and validated.