Calculating Calories Based on Pet Needs

Resting energy requirement (RER) is a function of metabolic body size. Energy expenditure is related to surface area, and body surface area decreases as body weight increases. The equation for RER is the same for both cats and dogs. It is used to estimate the daily energy needed to sustain essential bodily functions (e.g. respiration, circulation, digestion, metabolism) while the dog/cat is at rest in a thermoneutral environment.

$$\text{RER (kcal/day)} = 70 * (BW_{kg})^{0.75}$$

For any animal not completely at rest, supplementary energy is needed to sustain additional work (e.g. activity, life-stage or physiologic condition, dealing with environmental conditions). These total daily energy requirements can then be ESTIMATED by multiplying the RER by an appropriate factor to estimate *maintenance energy requirement* (MER).

$$\text{MER (kcal/day)} = X * RER$$

These factors will vary by species (cat verses. dog), life-stage, reproductive status, activity level, and any condition that could significantly affect energy expenditure. A list of common factors to estimate MER can be found in the table below.

The most important thing to recognize, however, is that these equations for MER are ONLY ESTIMATES, as individual animals can vary by as much as 50% from the predicted values. These equations (or any feeding guidelines found on food packaging), therefore, should be used as starting points. The amount fed may need to be adjusted up or down to maintain or achieve an ideal body condition score. Alternatively, the animal's current intake (estimated from an accurate diet history) can be used as a starting point, and the amount fed adjusted up or down as dictated by the pet's current BCS.

Table 1: **Maintenance Energy Requirement (MER) Factors**

	Canine	Feline
Critical care/hospitalized	1.0 * RER	1.0 * RER
Weight loss/obese	1.0 * RER	0.8-1.0 * RER
Overweight-prone/inactive	1.2-1.4 * RER	1.0 * RER

Neutered adult	1.6 * RER	1.2 * RER
Intact adult	1.8 * RER	1.4 * RER
Gestation	1.6-2.0 * RER[1]	2-3 * RER[1]
Lactation	2-6 * RER	2-6 * RER
Growth (puppies/kittens)	2-3 * RER[2]	2-3 * RER[2]

1- depends on stage of gestation (cats steadily increase throughout gestation, while dogs remain relatively stable until the third trimester, at which point their energy needs increase)

2 – puppies and kittens have higher energy needs when they are younger and they start decreasing around 4 months of age until they are fully grown (which will vary with breed).