1A. Seasonal Effects on the Metabolic and Nutritional Requirements of Dogs

- Melissa Brookshire, DVM

The effects of environmental temperature changes on the metabolic energy requirement (MER) of dogs have been overlooked by pet food manufacturers since the invention of processed pet food.

Seasonal impact on hair coat is well recognized by pet owners when they have to sweep piles of hair left behind by shedding pets. Seasonal shedding is the body's response to changing light patterns (Circadian Rhythm – See section 3 below) as well as changing temperatures. In the fall, the thinner summer coat is shed to make room for the denser winter coat. The opposite occurs when the seasons change back from winter to spring. Pets that live indoors will go through this same cycle of shedding and growing new coats, but the winter coat will not be nearly as dense in a house pet compared to an outdoor pet. So, when the pet that lives indoors is exposed to temperatures as mild as 68°F, they will burn more energy to maintain their normal body temperature of 101°F because their coat is not nearly as effective at insulating.

These effects have been investigated and published as long ago as the late 1800's by German scientist Max Rubner.[1] It is well accepted that dogs have variable nutritional requirements according to their level of work and even according to their size and breed. However, it has long been overlooked that dogs have variable nutritional requirements according to seasonal variations in environmental temperatures.

Rubner's study is still accepted today as fact and referred to by many scientific publications that explore the topic of environmental temperature changes and their impact on the dog. Rubner concluded that dogs that are metabolically neutral between 68°F and 86°F will double their metabolic rate (MER) when exposed to environmental temperatures of 41°F. Conversely, at extremely high temperatures of 95°F, the metabolic rate increases only moderately, by 10% above baseline.

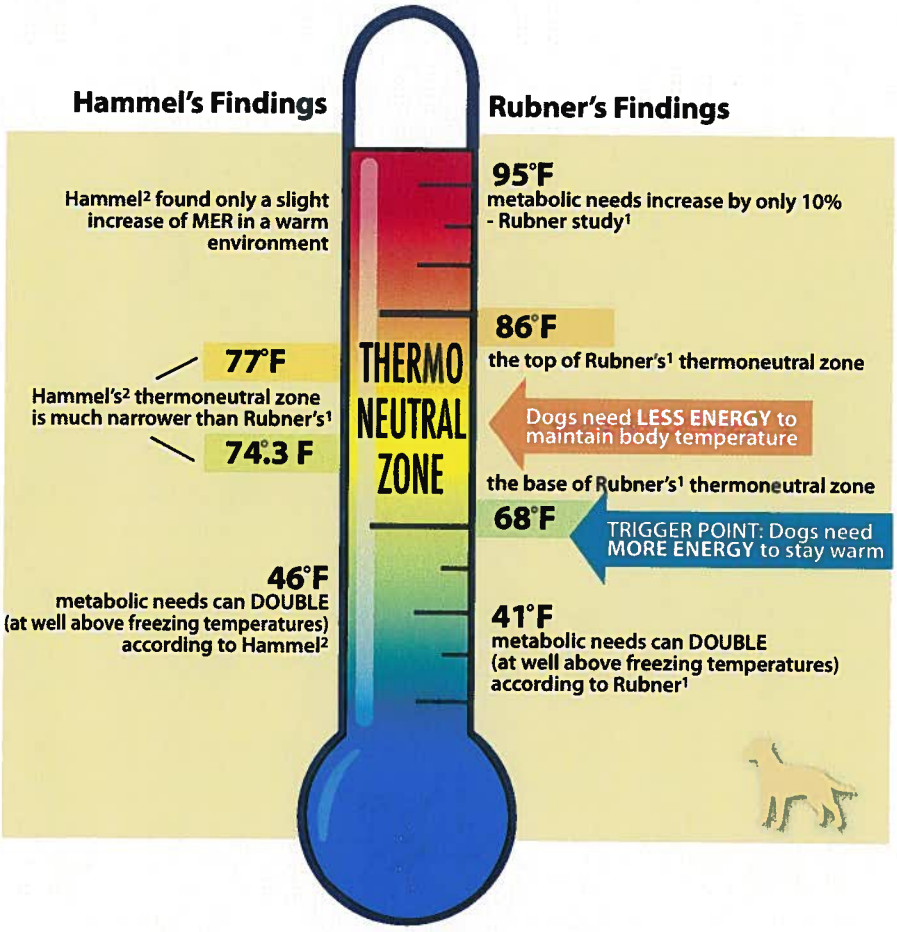

Fig. 1a-1. Metabolic Energy Requirements (MER) by temperature

In 1958, Dr. Harold Ted Hammel studied the heat production and heat loss in a group of 3 dogs at environmental temperatures of 46°F and 97°F. In this study, it was determined that the dogs had critical temperatures in a narrow range between 73.4°F-77°F - This means that above or below these two environmental temperatures, these dogs utilized additional energy to maintain their body temperature. However, the change in resting rate of heat production in the dogs in the hot environment was barely increased from that over the dogs in a thermoneutral environment, while the dogs in the cold environment nearly doubled their heat production and therefore metabolic rate.[2]

Conclusion: At 68°F & above, pets need less energy to maintain body temperature. Below 68°F, they need significantly more energy to maintain body temperature.