

## The Importance of the Purina Study

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When I think of human health topics presented in the media from the past year, the one subject that stands out is obesity. From low-carb fads to the extinction of supersize® fries, discussions on the epidemic of obesity in this country and its health consequences were everywhere. What surprised me, however, was that no one was speaking about this problem in our dogs. Obesity is the most common nutritional disease found in dogs and affects an estimated 25% to 44% of the canine population. So why isn't there an outpouring of concern for the weight of our canine friends as there is for their owners? The Purina Study should change that.

The Purina Study is a 14-year-long multi-institutional project funded by Nestlé Purina that followed the lives of 48 Labrador retrievers. Labrador puppies from family lines known to have a high prevalence of canine hip dysplasia (CHD) were paired at 8 weeks of age by gender and weight and then randomly assigned to two different groups. All dogs received the same nutritionally complete dry dog food from 8 weeks of age till death, except the "restricted-fed" pair mate received 75%

of the amount consumed by its "ad-libitum-fed" counterpart. During the first three years, the ad-lib dogs were allowed to eat as much as they wanted for 15 minutes each day. To prevent obesity, the feeding protocol was subsequently changed such that the amount of food given to the ad-lib dogs (now "control-fed" dogs) was made constant at 62 kcal of metabolizable energy (ME)/kg of body weight/day. The restricted-fed pair mate still received 25% less food than the control-fed dog. Dogs were weighed at regular intervals, were scored for body condition, and received routine vaccinations and antiparasite medications annually. Beginning at 16 weeks of age, radiographs were taken at regular intervals under general anesthesia to evaluate for the presence of CHD. At 8 years of age, radiographic evaluations took place looking for the prevalence of osteoarthritis (OA) in joints other than the hip. Dogs were monitored daily throughout life for illness and dietary protocols were not adjusted because of illness. Serum glucose, cholesterol, triglycerides, triio-



*Ideal body condition viewed from the side*

dothyronine ( $T_3$ ), lean body mass and body fat mass were measured, and later in life intravenous glucose tolerance tests were performed. Eventually, 46 out of 48 dogs were euthanized for humane reasons.

Results showed that the control-fed dogs were always significantly heavier and had higher body condition scores than their restricted-fed pair mates. For the entire length of the study, there was an increase in the frequency and in the severity of coxofemoral OA in the control-fed dogs. By 2 years of age, there was a 67% reduction in the prevalence of CHD in the restricted-fed group. By 5 years of age, 52% of the control-fed dogs, but only 13% of the restricted-fed dogs had radiographic signs of coxofemoral OA. At 8 years of age, OA that affected multiple joints was significantly more common in the control group. Seventy-seven percent of dogs in the control-fed group had 2 or 3 different joints affected

with OA, compared to only 10% of dogs in the restricted-fed group. The hip joint exhibited the most severe radiographic lesions

and this severity was significantly greater for control-fed dogs. Radiographic signs of OA did not always correlate with clinical signs, but significantly more control-fed dogs exhibited clinical symptoms of OA. Thirty-five out of all of the 43 dogs that developed OA eventually required treatment. The mean age to which 50% of dogs in each group survived *without* requiring long-term treatment for OA was significantly lower for control-fed dogs (10.3 years) than for restricted-fed dogs (13.3 years). In other words, the control-fed dogs required treatment for OA earlier in life than their restricted-fed pair mates.

The Purina Study also found that the median life span – the age at which 50% of dogs in each group died – of the restricted-fed dogs was extended by 15% or almost two years beyond that of the control-fed dogs. The 11.2-year-median life span for control-fed dogs was significantly less than the 13-year-median

life span for restricted-fed dogs. As both groups aged, mean percentage lean body mass decreased but was always significantly greater in the restricted-fed group. In addition, the restricted-fed dogs overall experienced a two-year delay in the loss of lean body mass, compared to their counterparts. Mean percentage body fat mass increased with aging and was always higher in the control group. Mean serum glucose, triglycerides,  $T_3$ , and fasted plasma insulin concentrations were significantly lower for the restricted-fed dogs. When annual intravenous glucose tolerance tests were begun at 9 years of age, higher mean glucose peaks were observed in control-fed dogs, and the mean time for glucose concentrations to return to normal was longer in this group. The most common chronic diseases diagnosed in decreasing order were: OA; malignant neoplasia (including malignant mammary gland neoplasia); benign neoplasia of the mammary glands; benign neoplasia other than mammary gland neoplasia; recurring skin disease; hepatic disease; cystic endometrial hyperplasia, pyometra, or recurring severe pseudopregnancies; hypothyroidism; and seizures. Thirty-nine dogs were eventually treated for one or more chronic conditions. As with OA, the mean age to which 50% of the dogs in each group survived without requiring treatment for a chronic condition was significantly lower



*Ideal body condition viewed from the top*

for the control-fed group (9.9 years) than for the restricted-fed group (12 years).

The significance of this study is staggering. First, the onset of coxofemoral joint OA was linear over time. As the dogs grew and aged, there was a linear increase in the number of cases of hip-joint OA. Some dogs did not even develop radiographic evidence of OA until they were greater than 2 years old. It is important, therefore, to continually evaluate dogs throughout their lifetimes for the development of hip OA and not just at 2 years of age as the Orthopedic Foundation for Animals (OFA) would suggest. Osteoarthritis is a function of age, and the older

to have have OA, not only of to have OA, not only of the hip but of other joints.

Second, the study clearly demonstrates that food intake is an environmental factor that can be controlled to limit the development and severity of OA. Throughout the entire length of the study, the restricted-fed dogs had significantly less OA and the rate at which they developed it was slower than their overweight counterparts. Even more important for owners was that limited food intake led to a delay in the need for treatment of OA. If a dog is determined at a young age – by the PennHip radiographic method – to be susceptible to developing CHD, we now can recommend that he be maintained at a slender body condition throughout life in order to delay and minimize the development of OA. Clients often want to know exactly how much to feed their dogs. Calculating daily caloric requirements is what most people find easy to understand. Because caloric requirements are influenced by metabolic and environmental factors, and vary from individual to individual, the equations that we generally use to calculate daily caloric requirements— $MER=144+62.2(BW_{kg})$  or factor  $\times [30(BW_{kg})+70]$ —can only be used as guidelines. Individual body condition scores are a more accurate representation of obesity or leanness and should be used as the factor for regulating food intake. Whichever body

condition scale one uses it is the ideal body condition that should be maintained. Such a conformation requires that a dog's ribs not be seen but be easily palpable with a slight fat cover, that he has a lumbar waist when viewed from above, and that his abdomen is slightly tucked when viewed from the side. (Figures 1 and 2) Clients must be educated on how to score their dogs and how to recognize when their pets are straying from the ideal body condition.

Finally, this is the first study to document that limited food intake increases life span and delays the markers of aging in mammals larger than rodents. Food-restricted studies in nonhuman primates are still ongoing, and most of what we know about the effects of diet restriction on aging comes from mice and rats. Having used a much larger mammal, the Purina Study may shed some light on our own aging process and what we can do to live longer. The study clearly reveals that restricting food intake and maintaining an ideal body condition in dogs leads to less chronic disease, a delay in the need for treatment of chronic disease, lower costs to clients, and improved quality of life.

An additional study which evaluated OFA and PennHip methods for diagnosing CHD should be published soon. Look for it!

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