

# The Latest Research on Senior Pet Nutrition

**Sally Perea, DVM, MS, DACVN**

Natura Pet Products, Inc.  
Senior Nutritionist

NATURA PET

# Pets - Living Longer

- Pets are living longer due to improved nutrition and veterinary care
- In 2002 it was estimated that 30% to 40% of dogs and cats in the US were  $\geq 7$  yrs
- Today, 50% of dogs in the US are  $\geq 6$  yrs of age



# What Age is a Senior?

- The age that a pet is considered a senior can vary with individual pet, species, & breed size
  - Large breed dogs  $\geq 6$  years
  - Small & medium breed dogs  $\geq 8$  years
  - Cats  $\geq 8$  years





# Senior Pets and Health Concerns

- Certain health concerns become more common as a pet ages, such as:
  - Overweightness or obesity
  - Osteoarthritis
  - Reduced immune function
  - Cognitive function loss
  - Dental disease



# Senior Pets

## Optimal Nutrition

- How can senior pet foods address these health concerns and best meet the needs of senior pets?
- Consider dietary modifications:
  - Distribution of macronutrients
  - Ingredient selection
  - Supplementation with key nutrients



# Overweightness/Obesity

- Studies conducted in 2005 & 2006 showed that 35% of cats and 34% of dogs in the US are overweight or obese
- Many senior pets have reduced energy requirements due to a decrease in lean body mass and activity level
  - Cats differ from dogs in that they are more likely to maintain energy needs with age; however, many cats entering their senior years are already over weight





# Overweightness/Obesity

- Dogs greater than 8 yrs of age have been shown to consume approx 18% fewer calories than breed-matched dogs under 6 yrs of age

Taylor EJ, Adams C, Neville R. Some nutritional aspects of ageing in dogs and cats. *Proc Nutr Soc* 1995; 54: 645-656.

- Studies in cats have not shown a decline in energy needs & reveal that their ability to efficiently digest fat declines with age

Harper EJ. Changing Perspectives on Aging and Energy Requirements: Aging and Digestive Function in Humans, Dogs and Cats. *J Nutr* 1998; 128: 2632S-2635S.



# Overweightness/Obesity

- Obese pets are known to have an increased incidence of medical conditions, including:
  - Diabetes mellitus
  - Pancreatitis
  - Orthopedic disease
  - Dermatopathies
- Lund EM, et al. Prevalence and risk factors for obesity in adult cats from private US veterinary practices. *Intern J Appl Res Vet Med* 2005; 3(2): 88- 96.
- Lund EM, et al. Prevalence and risk factors for obesity in adult dogs from private US veterinary practices. *Intern J Appl Res Vet Med* 2006; 4(2): 177- 186.





# Overweightness/Obesity

- One study in dogs has shown that maintaining a lean body weight throughout life reduces the onset of age-related diseases and increases lifespan by almost two years

Kealy RD, et al. Effects of diet restriction on life span and age-related changes in dogs. *J Am Vet Med Assoc* 2002; 220: 1315-1320.



# Overweightness/Obesity

## Nutritional Modifications

- Reduced Energy Density
  - Reduced fat levels
  - Added dietary fiber
  - Reduced kibble density
- High Quality Protein
  - Generally at levels equivalent to or slightly higher than adult maintenance food counterpart



# Protein Requirements of Senior Pets

- Traditional approach was to reduce dietary protein levels in senior pet foods due to concerns of renal disease
- However, senior pets require higher protein levels to maintain lean body mass when compared to younger pets





# Protein Requirements of Senior Pets

- One study compared protein requirements for senior dogs (12 to 13 yrs of age) to their younger counterparts (1 yr of age)
- Young dogs were more efficient, requiring 0.4g of nitrogen/kg bw/day to replace liver and muscle protein reserves versus 0.6 g nitrogen/kg bw/day in senior dogs

Wannemacher RW, McCoy JR. Determination of optimal dietary protein requirements in young and old dogs. *J Nutr* 1966; 88: 66-74.



# Overweightness/Obesity

## Nutritional Modifications

- L-carnitine
  - Vitamin-like substance that is important in the transportation and metabolism of fatty acids
  - Has been shown to increase the rate of weight loss in obese cats

Center SA, et al. The Clinical and Metabolic Effects of Rapid Weight Loss in Obese Pet Cats and the Influence of Supplemental Oral L-Carnitine. *J Vet Intern Med* 2000; 14: 598-608



# Osteoarthritis

- With age, joints can wear down and be a source of discomfort
- Maintaining an ideal body weight can provide some relief to joints
- Certain nutrients can also help with joint health such as glucosamine, chondroitin sulfate, and long-chain omega-3 fatty acids (EPA & DHA)





# Osteoarthritis

## Weight Control

- A lifelong study in dogs has shown that becoming overweight increases the prevalence of hip and shoulder joint problems and increases the severity of elbow joint osteoarthritis when compared to lean control dogs

Kealy RD, et al. Evaluation of the effect of limited food consumption on radiographic evidence of osteoarthritis in dogs. *J Am Vet Med Assoc* 2000; 217: 1678-1680



# Osteoarthritis

## Weight Control

- Maintaining a healthy body weight has also been shown to delay the onset of hip joint osteoarthritis, with overweight dogs showing evidence of hip disease on x-rays at six years of age versus twelve years for lean control dogs.

Smith GK, et al. Lifelong diet restriction and radiographical evidence of osteoarthritis in the hip joint in dogs. *J Am Vet Med Assoc* 2006; 229: 690-639.





# Osteoarthritis

## Senior Cats

- Awareness of osteoarthritis in cats has increased in recent years
- One study evaluated a population of cats, finding that 33.9% had radiographic signs of degenerative joint disease (DJD)
- Those cats with DJD were significantly older than those without radiographic signs

Clarke SP, et al. Prevalence of radiographic signs of degenerative joint disease in a hospital population of cats. *Vet Rec* 2005; 157(25): 793-799.





# Glucosamine & Chondroitin Sulfate (G&CS)

- Glucosamine & chondroitin sulfate (G&CS) are building blocks for the “cushion” in joints
- The “cushion” known as glycosaminoglycans are made from proteoglycans
- G&CS also has been shown *in vitro* to have anti-inflammatory effects and prevent breakdown of joint components



# Glucosamine & Chondroitin Sulfate (G&CS)

- Studies in dogs and cats have demonstrated that supplementation of G&CS:
  - Promotes normal joint cartilage metabolism
  - Decreases the signs of pain
  - Improves the ability to bear weight
  - Increases activity

Johnson KA, et al. Effects of an orally administered mixture of chondroitin sulfate, glucosamine hydrochloride and manganese ascorbate on synovial fluid chondroitin sulfate 3B3 and 7D4 epitope in a canine cruciate ligament transaction model of osteoarthritis. *Osteoarthritis and Cartilage* 2001; 9: 14-21.

McCarthy G, et al. Randomised double-blind, positive-controlled trial to assess the efficacy of glucosamine/chondroitin sulfate for the treatment of dogs with osteoarthritis. *Veterinary Journal* 2007; 174: 54-61

Lascelles BDX, et al. Evaluation of a Therapeutic Diet for Feline Degenerative Joint Disease. *J Vet Intern Med* 2010; 24: 487-495.





# Omega-3 Fatty Acids

## EPA & DHA

- EPA & DHA are found in marine fish, fish oil, and algal oil
- EPA & DHA serve as precursors for immune mediators that are less inflammatory
- EPA & DHA also reduce enzymes that breakdown connective tissue which can cause joint damage





# Omega-3 Fatty Acids

## EPA & DHA

- Four recent reports have demonstrated improved clinical conditions in dogs and cats with osteoarthritis when supplemented with long-chain omega-3 fatty acids
  - Roush JE, et al. Evaluation of the effects of dietary supplementation with fish oil omega-3 fatty acids on weight bearing in dogs with osteoarthritis. *J Am Vet Med Assoc* 2010; 236: 67-73.
  - Roush JK, et al. Multicenter veterinary practice assessment of the effects of omega-3 fatty acids on osteoarthritis in dogs. *J Am Vet Med Assoc* 2010; 236: 59-66.
  - Fritsch D, et al. Dose-titration effects of fish oil in osteoarthritic dogs. *J Vet Intern Med* 2010; 24: 1020-1026
  - Lascelles BDX, et al. Evaluation of a Therapeutic Diet for Feline Degenerative Joint Disease. *J Vet Intern Med* 2010; 24: 487-495.



# Immune Function

- Immune function is known to decline with age in senior pets
- Nutrition has a known role in maintaining immune function and multiple nutritional interventions have been evaluated as a means of boosting immune function





# Immune Function

## β-Carotene

- Dietary supplementation with β-Carotene has been shown to stimulate cell mediated and humoral immune response in dog, as well as reverse declining immunological responses in senior dogs

Chew BP, et al. Dietary β-carotene stimulates cell mediated and humoral immune response in dogs. *J Nutr* 200; 130: 1910-1913.

Massimino S, et al. Effects of age and dietary beta-carotene on immunological variables in dogs. *J Vet Intern Med* 2003; 17(6): 835-842.





# Immune Function

## Vitamin E

- Vitamin E has a well defined antioxidant role within the body and may also indirectly enhance immune factors
- Increased dietary vitamin E levels helped to maintain lymphocyte proliferative activity in aged dogs.

Meydani SN, et al. Recent advances in canine and feline nutrition. Proceedings of the Iams 1998 Nutrition Symposium. Wilmington (OH): Orange Frazer Press; 2000. p. 295-303.



# Immune Function

## Vitamin C

- Vitamin C plays an important antioxidant role within the body, including its role in recycling and reactivating vitamin E
- Although vitamin C's effects on the immune function in aging dogs has not been specifically evaluated, decreased vitamin C status is known to be associated with depressed cell-mediated immunity, poor bactericidal activity, and impaired macrophage mobilization



# Cognitive Function Loss

- As the nervous system ages, brain function can slow down
- This slowing is referred to as cognitive dysfunction where pets may start to show less interest in play and interacting
- Antioxidants may help slow this functional loss and help keep pets interested in life





# Antioxidants

- Antioxidants can help prevent oxidative damage to cells
- Oxidative damage is theorized to be a leading cause of the signs of aging
- In addition to supplemented antioxidants, antioxidants from fruits and vegetables can be helpful in defending against oxidative damage



# Cognitive Function Loss

- Feeding a diet supplemented with a broad spectrum of antioxidants and mitochondrial enzyme co-factors has been shown to reduce the age-associated decline in cognitive function
  - Vitamins E and C, alpha-lipoic acid, L-Carnitine
  - Antioxidant rich food products from tomato, spinach, grape, carrot and citrus
  - Milgram NW, et al. Dietary enrichment counteracts age-associated cognitive dysfunction in canines. *Neurobiology of Aging* 2002; 23: 737-745.





# Dental Disease

- Dental disease can cause discomfort and is common in elderly pets
- Dental chews, special coatings on food, and therapeutic foods available through vets are available to help with oral care
- The best prevention happens with daily teeth brushing which can be done regardless of what food is preferred and fed





# Poorer Appetite and Reduced Sense of Smell

- Although many senior pets are overweight, many can be finicky eaters
- This may be due to dental pain or a reduced sense of smell
- The nervous system and the senses can lose some of their function with age
- More palatable foods may be helpful if this is a concern



# The Future of Senior Nutrition Research

- Use of genomic screening techniques to recommend diets
- Nutrigenomic techniques to evaluate how nutrients and age effect genetic expression
- Further identification and characterization of canine and feline microbiota and the effects of age

Fahey, G.C.Jr., et al. Age-Related Changes in Nutrient Utilization by Companion Animals. *Annual Rev. Nutrition* 2008, 28:425-445





**Sally Perea, DVM, MS, DACVN**

Natura Pet Products, Inc.

Senior Nutritionist

Natura Pet Products, Inc.  
330 Madson Place  
Davis, CA 95618

**NATURA PET**

800-532-7261 (phone)

530-601-5440 (fax)

[sperea@naturapet.com](mailto:sperea@naturapet.com)

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