Companion Animals Symposium: Living Beyond 20: Discoveries in Geriatric Companion Animal Biology

486 Living beyond 20: Discoveries in geriatric companion animal management, nutrition and behavior. C. L. Morris*, *Omaha's Henry Doorly Zoo, Omaha, NE.*

It has traditionally been the responsibility of the animal science community to develop management, nutrition, health and well-being protocols for animals raised for production purposes. The vast array of scientific inquiry dedicated to production livestock have been instrumental in the management of these animals to optimize a value-based end product. Within the last several decades however, the animal science landscape has changed and diversified to include companion and exotic animals. In contrast to production animals, companion and exotic animals typically are not managed for production purposes; therefore, shifting the goals of animal husbandry away from production and toward longevity. Companion animals are valued in the home for their companionship and service, while exotic animals are typically managed for exhibit, education, research, or species conservation programs. This diversification of species included within the scope of the Animal Science community has provided a new direction for research efforts as the majority of these animals should live healthy lives that allow them to reach their senior years. Approximately 25% of dogs and cats in the United States are over 7 years of age and a large number of captive zoo animals are considered geriatric. In fact, many exotic animal species live longer in captivity due to managed health practices, genetics, optimal nutrition, and appropriate husbandry. These are significant and growing animal populations with specialized needs regarding nutrition, veterinary care, and behavioral husbandry management. While research efforts have been invaluable in promoting the health and longevity of these aging animal populations, additional research efforts are still needed to better understand the physical, physiological, and cognitive changes of geriatric animals and how to apply those discoveries to animal husbandry. The objectives of this symposium are to explore the scientific discoveries specific to the quality of life, nutrition and well-being of geriatric companion and exotic animals and to encourage and promote future research related to these growing animal populations.

Key words: geriatric animals, husbandry

487 Longevity, not production: When rate of gain is not the focus. T. A. Faber and G. C. Fahey Jr.*, *University of Illinois, Urbana.*

Feeding companion animals involves a different focus and strategy than feeding livestock. Diets for companion animals must be designed to supply the nutrient needs of the animal not only for today but for years to come. Changes in health and appearance associated with animal aging are based on genetic control, gradual loss of homeostasis of physiological systems, accumulation of toxic compounds (i.e., lipofuscin and free radicals), or combinations thereof. To enhance longevity, the process begins in utero. Proper development is dependent on the nutritional status of the mother, as she is the sole source of nutrients. After birth until weaning, the animal is mainly dependent on mother's milk. The mother's diet influences the nutrient composition of her milk and, thus, the nutrients the offspring receives. Post-weaning, factors such as body weight gain, calcium:phosphorus ratio, and essential fatty acid intake, play a role in the physical and mental development of the animal. Promoting the proper development of these systems may prevent health issues that may occur later in life. As an adult, the animal's nutrient intake should allow maintenance of a healthy body weight and proper nutrient balance to limit stress on physiological systems. A healthy body weight alone has been shown to play an important role in longevity. As the animal enters a geriatric state, the body's physiological systems begin to slow and they lose the ability to replenish themselves. Energy requirements may decrease by 20%, while protein and essential fatty acid requirements increase. Feeding a highly digestible, highly nutrient bioavailable diet, may improve nutrient absorption and keep the body nourished. In addition, feeding supplements such as glucosamine and antioxidants may improve joint health and limit free radical damage, respectively. Targeted feeding strategies throughout life may enhance the longevity of the companion animal.

Key words: companion animals, health, longevity

488 Obesity: What is wrong with being fat? D. P. Laflamme*, *Nestle Purina PetCare Research, St. Louis, MO.*

Few diseases in modern pets are "diet-induced." One possible exception to this is obesity, which is ultimately caused by consuming more calories than needed by the dog or cat. While fat is the most concentrated and efficiently stored source of calories, and protein least so, an excess of calories from any source will contribute to adiposity. Obesity is an excess of body fat sufficient to result in impairment of health or body function. In people, this is generally recognized as 20–25% above ideal bodyweight. This degree of excess is important in dogs as well. A lifelong study in dogs showed that even moderately overweight dogs (mean body condition score [BCS] of 6.7 out of 9) were at greater risk for earlier morbidity and a shortened lifespan. In addition, these dogs required medication for chronic health problems sooner than their lean-fed siblings. The average difference in body weight between groups was approximately 25%. Obese cats also face increased health risks, including an increased risk of arthritis, diabetes mellitus, hepatic lipidosis and early mortality. The risk for development of diabetes increases about 2-fold in overweight cats and about 8-fold in obese cats. Altered adipokine secretion appears to be an important mechanism for the link between excess body weight and so many diseases. Adipose tissue, once considered to be physiologically inert, is an active producer of hormones such as leptin and resistin and cytokines, including many inflammatory cytokines such as tumor necrosis factor α (TNFα), interleukins 1β and 6, and C-reactive protein. The persistent, low-grade inflammation secondary to obesity is thought to play a causal role in chronic diseases such as osteoarthritis, cardiovascular disease, diabetes mellitus and others. TNFα, for example, alters insulin sensitivity by blocking activation of insulin receptors. In addition, obesity is associated with increased oxidative stress, which also may contribute to obesity-related diseases. Management of obesity involves nutritional modification as well as behavioral modification.

Key words: obesity, canine, feline

489 Cognition and behavior in geriatric animals: If they had Sudoku what would it look like? K. L. Overall*, *University of Pennsylvania, Philadelphia.*

Especially when it comes to pets, we often think that decrements in mental and physical acuity are "normal aging changes." What if such

changes are the result of an interaction of "lack of use" with physiological/molecular responses to a life of exposure to stressors? If this is true, and there is a now considerable evidence to suggest that it is, we may be able to ameliorate age-related cognitive changes through a series of interventions including medication, diet, exercise and targeted cognitive stimulation. The type of stressor may matter. Military working dogs who are deployed live longer than those who are not deployed: their world is stressful, but it also is stimulating. The trick may be to define "targeted cognitive stimulation" in non-humans. In short, what does Sudoku look like if you don't have written language? Problem solving can be tactile, olfactory, visual-spatial, social, et cetera, yet few of these avenues are pursued. New evidence from dogs suggests that there are creative interventions that can ensure that we may delay decrements in cognitive function in canines and other animals who depend on us. In turn, these animals may be excellent models for testing interventions for humans.

Key words: canine cognition, dog, brain aging

490 Skinny old critters: Managing diet and expectations. C. L. Morris[1] and J. Cline*[2], [1]*Omaha's Henry Doorly Zoo, Omaha, NE* [2]*Nestle Purina Petcare Product Technology Center, St. Louis, MO.*

There are significant unstoppable changes in multiple organ systems as animals age. The age at which visible or clinical signs of aging occur is dependent on species, genetics, lifestyle, environment and diet. Though aging is a natural progression of physiology, emerging research indicates that many changes may be delayed through appropriate dietary management and alterations in lifestyle and environment of geriatric animals. The aging process may impact diet palatability, intake and food preference in some geriatric animals as a result of physical changes in nasal epithelium, hyposmia, hypoguesia, or food fatigue/aversion. Additionally, a more serious "visible" sign of aging is the reduction in nutrient utilization along with energy demands that may be in conflict. For example, old dogs require about 40% more protein than young dogs of the same size (Wannamaker and McCoy 1966); however, energy demands in some animals may be elevated or reduced. Although obesity is a major concern in both pet animals and zoo animals, many pet cats and captive exotic felids lose body condition throughout the aging process. Up to 33% of cats over 11 have compromised fat digestibility and 25% of cats over 11 have decreased protein digestibility (Perez-Camargo 2010; Cupp 2010). With obesity being a major concern for companion and zoo animals, caloric restriction without malnutrition throughout the lifetime remains a proven method for extending lifespan and slowing the aging process in mammals (Anderson et al., 2009). During a 14 year study in dogs, it was concluded that age at which chronic disease required treatment could be delayed by about 2 years through calorie restriction during their lifetime. Most animals that live their natural lifespan will likely develop an age related disease. Prevalent "aging" diseases in companion and zoo animals include neoplasia, hypo/hyperthyroidism, diabetes, kidney, liver or heart disease. Management of animal's environments, diet, plane of nutrition, managing expectations of caregivers, and public perceptions will be discussed.

Key words: geriatric animal nutrition, companion animals, exotic animals

491 Bones and joints: Improving mobility in senior years. B. Lussier*[1,2], [1]*Department of Clinical Sciences, Faculty of Veterinary Medicine, University of Montreal, St-Hyacinthe, Quebec, Canada,* [2]*University Hospital Research Center, University of Montreal, Montreal, Quebec, Canada.*

Osteoarthritis (OA) is frequently encountered in small animal practices. It is a chronic, crippling disease. It has been reported to affect 20% of the canine population in the USA. It is a degenerative process invariably leading to joint effusion, fibrosis and pain thus reducing the quality of life of dogs. OA in dogs is secondary to conformational, hereditary, degenerative and traumatic diseases. The most frequent causes of OA in dogs are hip dysplasia, elbow dysplasia, osteochondrosis and rupture of the cranial cruciate ligament. Some of these are hereditary conditions, while the causes of others are unclear. It has been established that nutrition may play a role in modulating the occurrence or severity of these diseases. At a young age, nutrition is important to prevent or decrease the expression of developmental diseases of dogs. It has been reported that lifetime food restriction has a significant impact on the lifespan of dogs. It significantly increases median lifespan and decreases the prevalence and severity of OA in several joints. In the latter months or years, when dogs are clinically afflicted by OA, its treatment is multimodal. Management of OA consists of the following: surgically treating the primary cause if possible, reducing the patient's weight, using adapted activity combined with physical therapy, using therapeutic nutrition and finally using pharmacological therapy. The nutritional management of OA is 2 fold: weight management and therapeutic nutrition. It is well recognized that weight reduction can alleviate the clinical signs of OA in dogs and that a weight increase is detrimental to function in OA dogs. Therapeutic nutrition must thrive to provide nutrients that may help reduce inflammation and pain, support cartilage repair, slow the degenerative process, thus improving function of the patient. Specifically developed diets and supplements have been used. They contain: Ω-3 fatty acids, greenlipped mussels, L-carnitine, chondroitin sulfate, glucosamine, antioxidants, vitamins E and C. In conclusion, nutrition plays an important role in the prevention/delay of OA, in modulating the severity of OA and in the treatment of dogs clinically afflicted by OA

Key words: osteoarthritis, canine, nutrition