

# AVMA Animal Welfare Forum: Pet Bird Welfare

November 7, 1997, Rosemont, Illinois



The following papers were submitted by speakers at the 1997 AVMA Animal Welfare Forum, held at the Clarion International Hotel at O'Hare in Rosemont, Ill. These papers have not undergone peer review; opinions expressed are those of the authors and not necessarily those of the American Veterinary Medical Association.

During the Forum, the 1997 Animal Welfare Award was presented to Dr. Luther T. Albert of Madison, Wis.

Contributions from the following sponsors ensured the success of the Forum: Church & Dwight Company Inc, Fort Dodge Animal Health, The Hartz Mountain Corporation, Hill's Pet Nutrition Inc, Hoffmann-LaRoche Inc, The Iams Company, Innovative Veterinary Diets Inc, Johnson & Johnson Inc, Laseber Company, Mortar & Pestle Pharmacy, Novartis Animal Health, Ralston Purina Company, Sherwood Davis & Geck, Vet-A-Mix/Lloyd Laboratories, and Waltham USA Inc.

The AVMA Animal Welfare Forum is an annual event planned by the Animal Welfare Committee, under the direction of the Executive Board. For additional information about the Forum or the Animal Welfare Award, please contact the AVMA Division of Education and Research.

## Table of Contents

Welcome—Richard C. Swanson and James R. Koschmann	1216
Pet birds: historical and modern perspectives on the keeper and the kept—David L. Graham	1216
Appreciating avian intelligence: the importance of a proper domestic environment Christine Davis	1220
Considerations in selecting an appropriate pet bird—Liz H. Wilson	1222
Twenty years of progress in pet bird nutrition—Greg J. Harrison	1226
Twenty years of progress in pet bird research—Keven Flammer	1231
Twenty years of progress in avian anesthesia and surgery—Robert B. Altman	1233
Emerging trends in pet bird diets—Ronald B. Reid and William Perlberg	1236
Perspectives on pet bird welfare from the pet industry—N. Marshall Meyers	1238
Captive management of birds for a lifetime—Susan L. Clubb	1243
Adding value to nature through macaw-oriented ecotourism—Charles A. Munn	1246

# Welcome

Dr. Richard C. Swanson  
President-Elect

It is my pleasure to welcome you, on behalf of the more than 60,000 members of the American Veterinary Medical Association, to the Eighth AVMA Animal Welfare Forum. The Animal Welfare Forum is held each year as the culmination of the AVMA Animal Welfare Week, which is a series of events designed to promote animal welfare. Throughout the years, the forum has served as a platform for highlighting and exploring important animal welfare concerns.

From farm animals to laboratory animals, we have

tackled a wide variety of difficult animal welfare issues. This year's forum is no different, as we focus our attention on pet bird welfare. Pet birds are an important and rapidly growing segment of the companion animal population, and an excellent panel of speakers has been assembled to review and stimulate discussion of critical issues affecting their welfare. Our goal for this forum, as it has been for all previous forums, is to promote the well-being of animals. The AVMA is proud of the vital role veterinarians have played in advancing pet bird welfare.

Dr. James R. Koschmann  
Program Chairman

As a member of the AVMA Animal Welfare Committee and this event's program chairman, I also welcome you to the 1997 Animal Welfare Forum. Approximately 20 years ago, the pet bird industry exploded when the antics of a sulfur-crested cockatoo named Fred, featured in the television show "Baretta," won the hearts of American viewers. The public's new

interest in avian companionship triggered new challenges for the pet bird industry and the veterinary profession. This year's Animal Welfare Forum gives us an opportunity to review the successes and failures of the past 20 years and target new directions for pet bird research. As always, this forum is intended to ask questions, not point fingers.

## Pet birds: historical and modern perspectives on the keeper and the kept

David L. Graham, DVM, PhD

I have twice observed chimpanzees in the zoo display the putatively altruistic, nurturing behavior of feeding birds. In both instances, the chimpanzees were eating quietly and, occasionally, with gentle flicks of their hands, brushed dropped crumbs of food toward nearby house sparrows. Under the benign, casually interested gaze of their feeders, the birds avidly picked up their food and waited for more, just as pigeons in the park wait for food from the archetypal "pigeon lady." On one occasion, a chimp adjusted its position and startled the sparrows, which took flight. The chimp's gaze followed the sparrows' seemingly effortless departure from its enclosure with the same focused interest

and wonder as would a thoughtful human being, and it stared for more than a few moments in the sparrows' direction of flight before again slouching against the hard wall of its limited world. Watching this chimp, the thought occurred to me that human beings, perhaps even during their apprenticeship as prohomnids, have long enjoyed a fascination with birds that is not based solely on their potential as food. Pondering the mystery and beauty of birds and the freedom of their flight is a profoundly atavistic muse.

Human beings are captivated by the freedom of birds' flight, the beauty of their plumage, the tastiness of their flesh and eggs, and their pleasing songs. Ancient cave and rock art images dating from Paleolithic to more recent prehistoric periods document humankind's early awareness of, and regard for, birds.

From the Schubot Exotic Bird Health Center, College of Veterinary Medicine, Texas A&M University, College Station, TX 77843.

The earliest known artistic representations of birds are images of great auks painted approximately 20,000 to 25,000 years ago on the walls of the recently discovered Cosquer Cave on the coast of France near Marseilles. The auk, a flightless bird, inhabited the shores of the land-locked Mediterranean Lake during the last Ice Age and was a readily available food item for Cro-Magnon hominids. Other birds, such as the barn owl, eagle, tinamou, ostrich, emu, stork, crane, and various waterfowl, are included among those that prehistoric human beings commemorated in paintings and carvings on rock surfaces.

Parrots are portrayed in numerous petroglyphs and pictographs in the Southwest region of the United States. That parrots were not native to the region indicates there existed a trade in psittacine birds from further south in Mexico and Central America. The bird trade is not a modern phenomenon. Kokopelli, the whimsical, hunch-backed flute player whose graven image appears throughout the Southwest, was sometimes pictured in the company of large, hook-beaked, long-tailed parrots that were unmistakably macaws. Theoretically, Kokopelli (and his cohorts) were back-pack traders of goods between the people of Central America and the protoindians of the Southwest. Among the goods they traded were macaws and other parrots. On a canyon wall of a tributary of the lower Pecos river in Texas is a pictograph of a macaw with one wing plucked of its flight feathers. Was this an attempt to render a pet flightless? Or does it depict the practice of maintaining parrots as a source of decorative feathers? It is hard to imagine that parrots maintained through several molts as a continuous source of feathers would not have become appreciated as pets. Indeed, skeletal remains of scarlet macaws are found in carefully prepared, ritual burial sites of the Mogollon people in southern Arizona.

Bird plumage was also valued for its heat-insulating ability. Prehistoric and early historic Scandinavians built small rock shelters as artificial nesting sites for the wild eider duck. During nesting season, eggs were collected for food and soft eiderdown from nests was used as fill for clothing and bedding. Eider duck nest cairns are found on the coasts of Norway, Iceland, and Greenland.

Humankind's association with birds has not always worked to birds' benefit. The great auk was eaten. Likewise, the red jungle fowl, the progenitor of the domestic chicken, was kept and propagated for its flesh and eggs. Eggs and young of communally nesting shore birds and the tasty squab of the rock dove were first collected from natural nesting sites. Later, it was discovered that pigeons would breed and produce their delicious squabs in enclosures (lofts). Adult pigeons that escaped would return to the loft from great distances if they were rearing young (the origin of homing pigeons), and some returned more quickly than others (the origin of racing pigeons).

Wild birds of many species were trapped or shot for food; fowling was a cottage industry, and the common British surname "Fowler" is testimony to the occupation followed by many from medieval times until the early 20th century. In America, commercial

hunting of wild birds for meat was the principle cause of extinction of the carrier pigeon. Today, wild populations of native and introduced bird species are scientifically managed by governmental and private agencies for the purpose of harvest by hunters.

First in the Middle East and later in Asia Minor, eastern Asia, and Europe, human beings trapped and trained birds of prey as a means of capturing food, and later, for the sport of falconry. Crusaders returning from the Holy Land brought Arab refinements of falconry back to Europe. Among the most precious commodities that the Vikings of Iceland and Greenland exported to Europe and the Middle East were the magnificent white gyrfalcons so favored by falconers from medieval times to the present day. In 1984, I saw a white gyrfalcon purchased from a bird market in Riyadh, Saudi Arabia, for the equivalent of \$350,000. Clearly, humankind's admiration and quest for the beautiful and exotic endures.

Our focus, however, is not on humankind's use of birds for food, as sources of decorative or insulating plumage, as racers or carriers of messages, as the object of sport hunts, or as active hunt participants. Rather, it is on the associations that evolved from humankind's appreciation for social interaction with companion animals. Alexander the Great is reputed to have had a pet parrot; perhaps it really was an Alexandrine parrot from the valley of the Indus at the eastern reach of his empire. Later, as the Roman Empire expanded from the Eternal City, trade in birds followed; a painting of a ring-necked parrot decorated a villa in distant Roman-occupied Britain.

By the early medieval period, an extensive trade in birds had infiltrated the known portions of the world. Frederick II of Hohenstaufen, the Holy Roman Emperor of the twelfth and early thirteenth centuries, an avid falconer and avian biologist par excellence, wrote an extensive treatise, *de Arte Venandi cum Avibus* (the art of hunting with birds). In that work, he comments not only on falconry but also on many aspects of avian biology, anatomy, and behavior. His familiarity with white "Groneland" gyrfalcons and with white-crested parrots (cockatoos) indicates that trade in birds followed quickly on the heels of exploration and discovery; the Vikings had reached Greenland little more than a century before his writing. Furthermore, Frederick commented on bird vocalization and noticed that, among vocally imitative birds, parrots are capable of the best rendition of the human "R" phoneme. As an early Renaissance man, he had closely and objectively observed pet parrots.

Human beings collect, breed, and keep pet birds for one or more of the following reasons: 1) they are beautiful to behold; 2) their vocalizations are pleasing to the ear; 3) they interact with their keepers in social, even affectionate, ways; and 4) they feed human beings' egos via that most sincere form of flattery, imitation of the spoken voice. Finches, canaries, and their relatives usually satisfy reasons 1, 2, or both. Parrots are appealing for reasons 1, 3, and 4. In our modern, increasingly urbanized society, caged birds are popular as apartment pets. In comparison with dogs and cats, they require less room, eat less, make less mess (or at

least confine their mess to their cage), and do not need to be walked.

At first glance, it appears that birds have nothing to do except eat, sing (or talk), defecate, sleep, and look pretty. Paradoxically, the avian pathologist's view of pet birds includes evidence of a life beset with stress. The 2 things I have most often observed in tissues collected during postmortem examinations of pet birds are increased size and number of adrenal gland cells responsible for production of corticosterone (the hormone secreted in response to stress) and depletion of lymphocytes from the spleen and other organs of the immune system. These lesions are indicative of response to chronic or recurrent stress.

Why do so many birds suffer the insidious effects of stress? It seems to the casual observer that all their creature needs are met, so what is there to be stressed about? This is a bad assumption. That the life of pet birds is a bed of roses is a delusion. Let's look at the circumstances to which a creature naturally "free as a bird" must accommodate when it is given the status of a pet.

Pet birds are often lumped under the rubric "caged birds," an unfortunate sobriquet if there ever was one. That is not to say that pet birds will not be maintained, most of the time, in some form of enclosure designed to prevent their escape and to promote their display. Avian veterinarians are often asked by new pet bird owners, "What size cage is adequate for this kind of bird?" The literature of aviculture is rife with putatively knowledgeable statements about the appropriate dimensions of cages for a variety of species kept for breeding or as pets. In the case of breeding cages, the cage dimensions often suggested are those of the smallest cages within which a fertile, mated pair of a particular species has been documented to breed successfully. Stated another way, cage dimensions less than these prevent normal breeding behavior and reproductive success. Cage size for individual pet birds is often considered adequate (judging from commercially available bird cages) if the bird's extended wing span and length of tail can be freely accommodated within the cage. Of course, the bird must be standing in the center of its intended perch for that criterion to be met.

Are these humane and realistic criteria for determining the size of cage in which a bird or group of birds should be kept? Caged birds are wild birds that have been removed from their natural habitat or are only a few generations removed from their wild ancestors. Therefore, their instinctive behaviors are those of their wild, free brethren. Restriction or elimination of the exercise of these normal behaviors can be expected to result in modified or abnormal behaviors (and stress).

When a bird is made captive, be it for agricultural purposes, exhibition, or companionship, the first requirement is that it be deprived of that exercise of freedom we claim most to admire. Layer hens are maintained in batteries of lay cages, ratite birds are fenced in paddocks, falconers' birds are jessed and tethered to their perches, birds in zoos are confined in an aviary, and pet birds are caged. It would seem that the ideal enclosure for a captive bird is one of such size

and equipped with such internal furnishings that the bird would have no awareness of its captivity. Anything less is a compromise and acceptance, on the part of the keeper, that the kept may or will be subject to the stresses imposed by a lesser or greater degree of restriction of its normal behaviors.

Loss of free flight and regular exercise is not the only, or even the most important, deprivation imposed by the circumstances of captivity. Few captive birds are provided the opportunity to select, on a daily or seasonal basis, from the smorgasbord of foodstuffs in their natural environment. Fortunately, the days that adequate nutrition for caged birds meant meeting a pet's caloric requirements with a simple mixture of seeds are almost over. Development and commercial availability of carefully compounded pelleted or extruded diets have practically eliminated the formerly common diseases of malnutrition in pet birds, such as protein deficiencies, rickets, osteomalacia, hypothyroidism, and vitamin A deficiency. Other conditions, however, that are related directly or indirectly to nutrition and husbandry have appeared to replace these diseases.

Pathologic obesity affects many birds fed *ad libitum* and deprived of the normal amount of exercise needed to expend calories consumed in excess. Pathologically obese pet birds are a common sight to avian veterinarians, and obesity is life-threatening to the rotund perch potatoes. Obese birds are incapable of taking deep breaths and suffer severe and occasionally fatal oxygen deprivation if they are subjected to forced exertion instigated by fear or the well-intentioned efforts of their owners to start them on an exercise program. Body weight of cage-bound, sedentary pet birds should be monitored by means of regular veterinary examinations and appropriate dietary control, and maintenance of proper weight should be instituted.

Another diet-related condition has emerged coincident with increased use of complete, commercial rations and is a result of the long memory of aviculturists who recall the necessary supplementation of seed diets with a variety of vitamins and minerals. Continued supplementation of modern diets with vitamins, although well intentioned, has resulted in the death of many birds from the effects of vitamin D poisoning. Excess vitamin D causes calcification of a variety of tissues. The kidneys, stomach, heart, arteries, and lungs are common sites of pathologic mineralization that can be fatal.

Many of the animals domesticated by early human beings were naturally social species that lived in herds, flocks, or family-based packs. Wolves, aurochs, horses, sheep, goats, and geese are examples of species whose early and relative ease of domestication were in no small part a consequence of their social natures. Naturally social animals, when held captive and forced to adjust to human beings and their activities, can be expected to transfer at least some of their social focus to a trusted person.

Most parrot species are highly and obligately social. They interact, on a continuous basis, not only with their mates but also with others of their species. Deprived of conspecific contact, they readily socialize with people. It is not coincidence, then, that parrots are

particularly popular as pets. Their tendency to form a close, affectionate, social bond with their owner has long been valued. Such bonding is simply the fulfillment of their social nature. Even wild-caught adult parrots can be expected eventually to form attachments to people, and captive-bred, hand-reared parrots are socially imprinted on people long before they are weaned from hand-feeding. Let us consider how parrots are affected by becoming pets.

Few pet birds are fortunate enough to be maintained by individuals or families that value and treasure the opportunity for an intimate bond with another of nature's creatures. The pet bird becomes a permanent, continually interactive, and integral family member. It is handled frequently, freely, and naturally by all; indulges in mutual grooming behavior with its (to its) social equals; and is present at, and participates in, many activities in the home. For larger parrots with mean longevities approaching or surpassing that of human beings, family membership may bridge several generations. Acquiring a pet parrot is a responsibility and commitment that is to be undertaken with utmost seriousness and never on impulse.

Unfortunately, many parrots are purchased as appealing curiosities and, indeed, can be guaranteed to fascinate the family for an indeterminate amount of time. Ultimately, the initial novelty is lost, care is relegated to the child who "needs to learn responsibility," and evidence of fulfillment of that responsibility is considered to be merely daily feeding and weekly cage cleaning. The pet bird becomes a piece of house jewelry to be admired by guests and scratched on the neck at feeding time. Birds in this situation are not permanently or well integrated into the family's social milieu and are deprived of vital social stimulation. Enforced deprivation of social stimuli and interindividual contact (solitary confinement) is considered cruel and unusual punishment when imposed on people. Is it less than that when imposed on another creature with a social imperative equal to, or greater than, our own? Should we be surprised when the solitary, caged cockatoo or African grey parrot, aroused before dawn when its cage cover is removed, fed through a port in the side of the cage, and then left alone throughout the day, begins, out of boredom, to overpreen, then to chew, and then to pluck its feathers until it is naked except for its head and upper neck? A better question might be why all birds so maintained do not display this obsessive-compulsive automutilative behavior. Biological variation? After all, not all people confined in solitude develop psychoses.

Another hazard of being a pet bird derives from normal behavior. Behaviors have become instinctive or normal for a species because they have survival value. When human beings are ill, a display of incapacitation or illness usually elicits care, support, and solicitous behavior from family, friends, and physicians. In contrast, the environment within which birds evolved is stocked with a host of predators on watch for signs of weakness in their prey. Therefore, birds naturally con-

ceal any evidence of discomfort, illness, and weakness until physically unable to do so. At that point, were they in their natural habitat, they would fall prey.

Pet birds, however, that finally display outward signs of illness to their unobservant owners are often brought to the veterinarian with ill-placed confidence that an incipient problem is being nipped in the bud. The owner is horrified to find that their pet bird is in the advanced, debilitating stages of a serious, possibly fatal, illness. "But he was fine last night; this came on so suddenly; he really can't be that bad...can he?" "Yes, he can be, and he is" is the honest reply. This sad scenario is played out less often in the case of well socialized, frequently handled and examined family-member parrots. Evidence of weight loss, discolored or loose droppings, abnormal respiration, and reluctance to feed or accept favored treats are perceived far earlier in these birds by concerned family members than are similar signs in caged birds that are fleetingly noticed and rarely, if ever, closely observed.

It is disheartening to consistently observe stress-related lesions in an inordinately high proportion of juvenile and young adult pet birds submitted for post-mortem examination. It is somehow rewarding to occasionally view tissues of a 15-year-old budgerigar, 27-year-old cockatiel, or 65-year-old Amazon parrot that has reached the end of its otherwise healthy life because of the cumulative effects of old age. Such fortunate pets comprise a small minority of the total.

One last potential problem for pet bird owners deserves mention. Birds can carry and disseminate disease agents that are infectious for human beings. Zoonotic diseases have become increasingly important in this modern age of immune suppression resulting from the AIDS virus or chemotherapy for organ transplantation or cancer. Chlamydiosis and avian mycobacteriosis are particularly important diseases. Chlamydiosis (psittacosis, parrot fever) has long been recognized to be transmissible to human beings from infected birds. During the last decade, great advances in the development of sensitive and accurate diagnostic techniques and implementation of effective treatment have begun to reduce the severe risk of exposure to this disease. Avian mycobacteriosis (avian tuberculosis), caused by members of the *Mycobacterium avium-intracellulare* group of acid-fast bacteria, which was once thought to be of minimal zoonotic importance, is now of major interest to public health personnel. Immunosuppressed patients are at far greater risk of infection and disease caused by this group of bacteria than are immunocompetent members of the population. Unfortunately, this infection can smolder slowly and imperceptibly in many birds for a considerable period of time before the bird appears ill; during this preclinical period, the organism may be shed into the environment. The pet bird owner should be aware of the risk, albeit low, of zoonotic infections if the family into which the pet bird is to be introduced includes young children, aged adults, or otherwise immunocompromised individuals.

Forum continued on next page

# Appreciating avian intelligence: the importance of a proper domestic environment

Christine Davis, AA

**B**ecause of changing lifestyles and the recent ability of owners to provide a safe and comfortable environment year around, birds are rapidly becoming one of the most popular species of companion animals. Their compact size and long life spans make them ideal pets for unmarried animal lovers as well as family households in which both adult members have full-time jobs. All too often, however, avian companions do not fulfill human expectations. Birds displaying behaviors deemed undesirable in other species are often punished arbitrarily, without consideration of the fact that birds are not domesticated creatures and do not behave as such. Unrealistic expectations, not the behaviors themselves, usually create the perception of problems.

For thousands of years, human beings have shared their lives with companion animals. In the beginning, these creatures served practical purposes such as providing food, protection, transportation, and materials for clothing. Later, they became companions in the truest sense, providing emotional comfort and enjoyment for those who kept them. This kind of interaction is most prevalent during the present time, because animals are seen as family members, often fulfilling roles of surrogate children.

When assessing avian behavior, it is essential to recognize that animals, such as dogs and cats, that have been part of human society for a long time, have been domesticated. Through selective breeding, individuals that did not possess characteristics deemed desirable for companionship were eliminated from the gene pool, resulting in animals that are radically different from their ancestors. Birds have not undergone long-term selective breeding. For all intents and purposes, they remain genetically wild, and many of their behaviors reflect this status. To successfully assimilate them as companions, it is imperative that people have a realistic understanding of how birds perceive the world. Only then can a rich and rewarding relationship develop.

Birds are flock creatures, and most people believe the primary function of the flock is social in nature; however, in the wild, birds are prey—they are eaten by predators. For them, the primary function of the flock is protection. They need the flock to survive. Social interaction is secondary to protection. Because of their status as prey, their reactions to the world around them will be different than those of most domesticated animals. For example, placement in an area with too much direct activity or excessive visual stimuli may frighten some birds and result in an acute fear response or other negative behaviors. Large individuals who may or may not actually be predatory in a particular household, such as dogs, cats, and physically active

children, may be reacted to as predators. This also may create undesirable behaviors. Because of their genetic status as wild animals, birds cannot compensate for potentially threatening situations. Compassion and understanding are essential considerations in the creation of a proper environment for them.

In domestic environments, the bird's position in the flock is demonstrated by the height of its roost, with more dominant individuals occupying higher positions than those of subordinate status. Birds have no concept of the traditional owner-pet relationship, and those that are assertive in nature and are allowed to roost in high places will often perceive themselves as the most dominant members of the flock (family). They may become aggressive or noisy if family members or visitors try to step out of their subordinate roles. This behavior may be heightened by hormonal surges that take place during breeding season or whenever the bird feels threatened. Sadly, many people have gotten rid of sexually mature birds, believing their aggressive behavior to be permanent rather than exacerbated by the way the bird has been physically kept and socialized. In such situations, changing the social status, or roost height, of the bird will often be sufficient to eliminate most of their aggression.

Novice bird owners are often surprised to find that their new companions are phenomenally complex. Birds are extremely intelligent and emotional beings that require balanced and appropriate interaction with their owners. If these characteristics are not considered, problems are almost certain to arise. A number of owner behaviors can exacerbate behavioral problems in birds. One is giving birds too little attention and failing to provide environmental stimuli; the other, ironically, is giving birds too much attention.

In the wild, birds are engaged in an endless series of activities. With the exception of a requisite afternoon siesta, food gathering, preening, playing, ripping up jungle foliage, and caring for young consume the bulk of their daylight hours. In domestic environments, birds often are misconstrued as being "low maintenance" animals and are not given sufficient toys and attention. During the day, when their owners are at work, it is common for birds to become bored. This can result in negative responses like screaming, biting, chewing of feathers, and, in severe instances, mutilation of their own flesh.

Birds live in "societies" in the wild, in which certain behaviors are, or are not, permitted by other flock members. In domestic environments, people often feel guilty because they work long hours or have other obligations that demand their time. As with their children, they may assuage feelings of guilt by keeping rigid schedules, spending many hours handling their

From PO Box 1067, Sierra Madre, CA 91025.

birds, or becoming overly permissive and not setting boundaries that clearly define what are, and what are not, acceptable behaviors. Unfortunately, birds in these environments seldom learn to entertain themselves, especially if they are one of the more demanding types, such as cockatoos. In these situations, if for any reason, the person needs to alter their schedule or spend less time with their birds, their birds may scream, chew their feathers, or mutilate their flesh in retaliation.

Like children, once birds understand their hierarchical position within the "flock" and are given appropriate boundaries, their attention is usually drawn to healthier pursuits. They learn to entertain themselves part of the time, playing with their toys and interacting with their environment. Even if they decide to experiment with negative behavior from time to time, it is relatively simple to redirect or eliminate the behavior before it becomes habitual.

As with any intelligent creature, when behavior problems arise, it is essential that the reason(s) for the behavior be addressed before attempts are made to correct the behavior. If not, the bird may be punished for what is a perfectly normal avian response to an environment or a situation. This is not only unwise, it is inhumane. Because of the complexity and uniqueness of each bird, it is almost impossible to manufacture a "cookbook" technique for behavior modification. Responses to various stressors or situations will vary, depending on each bird's personality and on contributing environmental factors.

One of the greatest ways that owners can facilitate human-companion bird interaction is to realize that they are sharing their lives with a creature who is highly intelligent. Birds have been known to function at the mental capacity of an average 5- to 6-year-old child with regard to many visual and auditory exercises, such as identification and differentiation of objects, shapes, colors, numbers, and people. It is also vital to remember that the bird's emotional level is that of a 2- to 3-year-old child. This means that they are jealous, possessive, and controlling and love high and low drama and theatrics. They also have short attention spans. Birds remain this way for their entire life spans. It is essential that birds be handled with these factors in mind. They are simply incapable of behaving in any other manner.

Although birds are intelligent and highly responsive to, and aware of, their surroundings, their treatment seldom reflects this fact. For example, many birds, especially those raised in highly interactive environments where people speak with each other on a regular basis, understand spoken words on a relatively sophisticated level. It is important, however, that they be addressed in "momese," meaning that words are spoken slowly and enunciated clearly. This technique has long been known to enhance comprehension in small children, yet has seldom been applied to interaction with companion animals.

Bird owners interested in enhancing their relationships with their pets often find that talking to them in "momese" will garner instantaneous and positive results. Playing with birds in the manner of playing with small children is also helpful in creating healthy

bird-owner relationships. Small toys and various objects of diverse shapes, sizes, and colors stimulate birds intellectually. Through the process of association and transference, birds' interests will be directed away from themselves. Birds will learn to enjoy playing with similar objects when their owners are not available, which keeps them entertained and lessens the probability of them becoming overly dependent or demanding toward their owners.

Whether one works with children or domestic animals, it is human nature to forget to compliment them when they are behaving in a desirable manner. Often, the only guaranteed interaction available to them is as a result of undesirable behaviors. To a highly social individual, whether human being or domestic animal, these experiences are considered to be positive in nature. This attitude, in essence, trains them to continue the behaviors and eventually becomes self-perpetuating. If, however, birds are praised for merely "being" and are told that they are good, that they are cute, or that they are loved, their quiet, desirable behaviors will be perpetuated. Although this concept may seem simplistic, if implemented from the earliest stages of the relationship between birds and their owners, little additional effort is needed to maintain a well-behaved and easily managed bird.

Because the number of one-person households is increasing and life spans are longer, the human-animal bond is growing in importance. For many individuals, nonhuman companions are their only friends and family and are treated as such. Unfortunately, human beings often place worth only on concrete items or services or upon companions who fill their roles in a strictly traditional, or human, manner. They often seek to lessen the importance of anyone or anything that does not fit their paradigm for what is, and what is not, valuable or desirable. They do not give credence to the reality that many people get out of bed in the morning only because they have a dog, a cat, or a budgie to feed. This is most profoundly demonstrated by situations in which human beings are unable to solicit the same degree of interaction from relatively antisocial people that a companion animal is able to achieve.

Ironically, any human being that is able to consistently give and earn the love, devotion, and attention that the average dog, cat, or bird regularly provides would be considered a miracle worker—a saint. Yet, for some reason, most people withhold this designation from animals and denigrate the great and wonderful, even magical, power that all types of creatures possess that permits them to create an environment of growth, love, and healing in many different people and in many different situations. Understanding and accepting the fact that the word "different" does not in any way mean "inferior," and that "domestic animal" does not in any way mean "inferior to humankind" can lead people to become more humane and, hopefully, allow them to recognize their role as stewards of the animal kingdom.

As people become more aware, they begin to realize that "anthropomorphism" is not a dirty word. Connotations associated with this term have kept people from creating truly compassionate and empathetic

relationships with other species. How can a human being assess the emotions of another animal? They cannot do so with any accuracy, even among themselves. Just because science has not proved other animals to have the same types of emotions as human beings does not mean that other animals do not experience life in an emotional manner. Human beings have eyes and ears—they can see and hear, but not nearly as well as a hawk or a dog can. Just as human sensory organs are not the best and most finely tuned in animal kingdom, it may be true that emotions, the existence of which is infinitely more difficult to prove or disprove, are more highly developed in many other species of animals than they are in human beings. Currently, an infallible means by which emotional responses can be scientifically assessed does not exist. To conclude that creatures do not have emotions is not logical. To say

that they probably do not have human emotions is. Also, until unequivocally proven otherwise, the possibility must be considered that other animals may have the capacity to feel emotions even more acutely than human beings.

What is undeniable is the human being's capacity to consciously react to all beings in a humane and compassionate manner. Other animals can only be what nature has made them—perfect in their own environments, perfect among their own kind. When they are loved, respected, and given copious amounts of praise, focused and interactive playtimes, and appropriate boundaries, birds do become the perfect lifetime companion for many people. It is ultimately up to the human being in the human-pet bird relationship to create an environment in which these special creatures may be fully appreciated.

## Considerations in selecting an appropriate pet bird

Liz H. Wilson, CVT

This report focuses primarily on parrots, because parrots are the "pet du jour." Human beings have kept parrots in captivity for thousands of years, but only recently have parrots become common as pets. Their popularity began 20 years ago with the appearance on the pet market of domestic-bred, hand-raised baby parrots. Wild parrots can be formidable to approach and may frighten faint-hearted potential owners. Domestic-bred, hand-raised baby parrots, however, toddle into potential owners' arms, cooing, and few people can resist them.

The appearance and demeanor of domestic-bred, hand-raised baby parrots makes parrot ownership seem easy. As a result, people have been buying parrots in increasing numbers without learning anything about these wonderfully intelligent and totally complex creatures. The number of parrot adoption groups is also on the rise as concerned individuals attempt to address the problem of unwanted psittacine birds that have lost their homes for various reasons. The purpose of this report is to provide veterinarians with information they need to assist their clients in determining what species of bird their clients should, or should not, consider and to provide information about the type of people that should, or should not, consider sharing their lives with a parrot.

### Should the Person Get a Bird at All?

People with certain personality types and health concerns are far less likely to enjoy long-

term avian companionship. Examples include the following:

*The potential owner is a "neat freak."* Birds are messy creatures, and this will never change. For example, favorite roosts for wild parrot flocks can be readily identified by the piles of detritus on the ground below.<sup>1</sup> Captive parrots are no different.

*The potential owner has a low tolerance for noise.* Generally speaking, quiet birds are sick birds. Healthy birds make noise.

*The potential owner wants a bird simply because they are beautiful.* Beauty alone will not justify the work and mess involved with bird ownership, especially that associated with parrot ownership.

*The potential owner wants a parrot because they talk.* Whereas a talking parrot can be amusing, entertainment value fades rapidly in light of the negative aspects of parrot ownership. Also, if speech is crucial, the person should be instructed to get a bird that already talks, because that is the only way to guarantee speaking ability. Finally, if the ability to talk is the only reason for purchase, the person should be encouraged to purchase a radio instead.

*The potential owner wants a parrot but is afraid of being bitten.* Sooner or later, all parrots will experiment with biting. If the person is afraid of being bitten, the parrot will sense this and bite to get control.

*The potential owner has asthma or respiratory allergies.* Respiratory problems can be exacerbated by bird dander, particularly dander from powder-down species such as cockatiels, African grey parrots, and especially, cockatoos.

From 64 Jonquil, Levittown, PA 19055.



## **The Potential Owner Has Passed the Preliminary "Tests," Now What?**

Once a person has decided he or she wishes to cohabit with a parrot, the availability of varieties from which to choose is staggering. There are many aspects to consider regarding bird ownership, including limitations in commitment, money, space, noise, and human personalities.

Potential life spans of most avian species are extraordinary. If genetically strong, fed properly, and provided with competent veterinary care, even small birds like canaries and budgies are capable of living longer than many breeds of dogs.<sup>1</sup> Larger species of parrots have potential life spans similar to those of people, so the level of commitment from the owner is crucial. These are not animals to be traded like used cars once the person gets bored.

Depending on species, the financial investment can be substantial. First is the initial price of the bird, which actually may only be a small percentage of the total financial outlay during the first year of ownership. Depending on species and size, an appropriate cage can cost twice as much as the bird, and play gyms, toys, and food are additional necessary expenses. Veterinary care for birds is usually more expensive than veterinary care for dogs and cats, because extensive testing is often required for an accurate diagnosis of disease, diagnostic samples obtained must be sent to special laboratories, support staff must be specially trained, and considerable time and patience is required to work with many avian species.

Space limitations are an important consideration. A captive bird needs the largest cage with safe interbar spacing that one can afford (or, as someone commented, "one size larger than one can afford"). Minimum cage size would enable the bird to easily spread its wings without touching the sides or top of the cage. Compensating for space occupied by food cups and toys, 1.5 times the bird's wingspan may suffice, depending on species. Large macaws can have wingspans of 3 to 4 feet, so these birds do not easily fit into small apartments. Smaller, extremely active species like lorries and caiques also need large cages in which to play. Because birds do not fly straight up and down like helicopters, the living space a bird requires is horizontal, not vertical. Most bird cages on the market are designed with the comfort of the owner, not the bird, in mind.

Noise levels may be a concern. When lay parrot magazines talk about "quiet" species, the use of the word is relative. This means the species is quiet, compared with avian species considered to be "noisy," which would be like saying a small terrier is quieter than a beagle. As the saying goes, "If you want a quiet pet, get a lizard or a fish." Certain species do make less noise than others, so birds like the pionus, jardine, budgerigar, and cockatiel are often more satisfactory for apartment dwellers.

In regard to human personalities and lifestyles, several scenarios will most likely lead to short-lived, unhappy parrot ownership. For example, parrots are not low-maintenance pets, so people who are extremely busy should not consider getting one. Basic cage

maintenance is time consuming, and this time commitment does not begin to approach that required for addressing the parrot's flock-based psychological need for social interaction.

Just as some breeds of dogs are more aggressive than others, most psittacine species are headstrong birds that rapidly develop behavior problems unless clear guidelines are established. Consequently, gentle-hearted souls who are unable to establish discipline are usually not successful parrot owners, especially of medium and large species. Out-of-control psittacines are a nightmare to live with, especially as they reach adolescence, and most end up on consignment in pet stores, abandoned in shelters, or dumped on parrot adoption agencies.

Most people do not understand that a parrot is ultimately a wild animal, domestic-bred or not. To say an animal is "domestic-bred" only indicates that it was born in the continental United States; it does not mean that the animal is domesticated. My favorite analogy is that of a tiger born in a zoo. It is domestic-bred and often bottle-raised by people but it is still a tiger. Most psittacine species are second- or third-generation from the wild and have no genetic information regarding adaptation to human habitats. Simply put, if birds are not taught how to be good pets, they will not know how to be good pets. The irony is that birds often then lose their homes because they do not know how to be good pets.

Most people are not prepared physically, or psychologically, to share their lives with wild animals. People want a pet that considers them (the person) to be the center of the universe, a pet that offers unconditional love. Parrots do not fulfill these obligations. Parrots are not dogs with feathers or feathered children. They are simply themselves—they are unable to make the compromises that the average person expects from a companion animal. Several years ago, Davis<sup>2</sup> used a wonderful analogy—that living with a parrot was similar to living with an extremely short, more than slightly crazed relative. You love your Uncle Fred, but you never know how he will behave, if he will like the people you want him to like, or even be polite to guests. But you love him anyway, because he is your Uncle Fred.

Even the cutest, most loving baby parrot will commit the ultimate betrayal—it will grow up and not stay a cute and cuddly baby. As it matures, it will go through developmental stages similar to those of human beings, with many of the accompanying problems. People may describe such birds by saying, "He used to be cute, but now he is mean." People who cannot understand that the behaviors of these birds are often genetically programmed may take negative behaviors personally. This reaction usually results in the destruction of the human-parrot relationship.

## **Characteristics of Selected Species**

First, a fundamental disclaimer: within each family of parrots, the differences in personality are endless, and the various parrot species have even more differences. For example, the blue-and-gold macaw is a different bird from the hyacinth macaw. Generalizations

can be meaningless when applied to individuals. Gender-related characteristics may also be important in some species. Socialization is important. Within human psychology, the effects of genetics and environment on human personality and development are subjects of an ongoing argument; the same argument applies to personalities of various psittacine species.

To find the best parrot, potential owners should go to the best breeder they can find and buy the cutest baby parrot available. In other words, when choosing a bird, breeding and socialization are more important than obtaining a specific species. Blanchard<sup>3</sup> agrees that properly nurtured and socialized parrots make the best pets, and the worst pets are birds raised with little concern for their physical and psychological development. It is no coincidence that assembly-line production of parrots for the pet trade often results in pets of poor quality.

**Budgerigars or budgies (or what Americans still insist on calling parakeets)**—These perky, busy little birds are an interesting contradiction: they are extremely popular and tremendously underrated. They have the advantages of being small, inexpensive birds that require a relatively small cage and, therefore, work well for owners that have financial and spatial restrictions. They are rarely silent, but their chirping noises are pleasant. They make excellent pets if they are obtained when young. Budgerigars tame easily and quickly, because they have been bred in captivity for generations. They give their owners back as much as their owners invest in them—the more interactive they are allowed to be, the better pet they become. Budgerigars are often excellent talkers, although their speaking voice is small. On the negative side, budgerigars have the shortest life span of the common psittacines. If derived from sound breeding stock, budgerigars can live as long as 18 years; however, they may live only 3 to 4 years if fed a straight seed diet. Budgerigars are also prone to benign and malignant tumors, probably because of countless generations of inbreeding.

**Cockatiels**—Of all psittacine birds, cockatiels probably make the best family pets. They need a reasonably small cage and, as long as fancy color mutations are avoided, are inexpensive as well. They make excellent pets if they are obtained when young, especially if they are hand-fed. Cockatiels have the least aggressive temperament of members of the psittacine family and are also not prone to many of the behavior problems seen in other psittacine birds. Their voice is pleasant, and males can learn to talk, as well as sing pretty little phrases, when sexually mature. Females are less aggressive than males but usually do not talk. On the negative side, cockatiels with fancy color mutations are prone to physical problems as a result of inbreeding.

Unfortunately, the popular recommendation of budgies and cockatiels as “beginner birds” completely underrates them as pets, making them prone to becoming throwaway birds when their owners decide to get a larger parrot.

**Lovebirds**—These are also small birds with a comparatively small price tag that need a correspondingly

small cage. Lovebirds make excellent pets if they are hand-fed (especially the peachfaced species). Breeding for color mutations has produced a startling rainbow of colors within the peachfaced species, but fewer physical problems have been associated with this practice in this species than with color-specific breeding of budgies and cockatiels. Despite the fables, these birds should not be kept in pairs if they are to be pets. If caged in pairs, they rapidly revert to their wild state and become aggressive. Within peachfaced species, males are usually less aggressive than females. Despite their name, lovebirds are headstrong little birds that are capable of serious aggression toward other animals. They have a shrill voice and rarely talk.

**Conures**—These birds make excellent pets if they are hand-fed and properly socialized, and they delight their owners with their comical personalities. Aratinga species are known for their extremely loud and unpleasant voices, but knowledgeable owners have been successful at patterning many of these natural vocalizations into more acceptable sounds such as talking and whispering. Because of these vocalizations, however, these species usually are not suitable for apartment life. Other species, such as maroon-bellied and green-cheeked conures, are reputed to be quieter.

**African grey parrots**—These parrots are heralded for their ability to reproduce human voices with remarkable clarity; however, not all African grey parrots talk. Unlike other psittacine species, young African grey parrots may not start talking until they are more than a year old. African grey parrots are considered to be among the more intelligent parrot species, so human caretakers have to work at keeping them busy and intellectually stimulated. Congo African grey parrots are currently extremely popular and are being mass-produced by many breeding facilities. However, early socialization is critical to the well-being of African grey parrots, and mass production makes this potentially high-strung species prone to psychological problems. If not properly acclimated to change, they can become highly stressed when their environment is modified. Consequently, maintaining these birds in static environments is unhealthy. This species is prone to feather mutilation and phobic behaviors; these behaviors also may be a result of insufficient early socialization. Properly socialized African grey parrots with clearly established behavioral limits are neither high strung nor neurotic. Timneh parrots are the underrated smaller species of African grey parrots. They are not as popular as their larger cousins and are often less expensive. However, they are reputed to be equally proficient at talking. Generally speaking, Timneh parrots do not seem as high strung as Congo African grey parrots, perhaps because they are not yet being mass-produced.

**Amazon parrots**—The best description of Amazon parrots is a quote from Linden,<sup>4</sup> who said, “A happy Amazon is a self-contained home entertainment center.” Amazon parrots tend to be acrobatic, noisy, exuberant, and extremely active, as well as prone to obesity if their caretakers are not careful about their diet.

Behavior varies widely between species and genders. Most Amazon parrots are good at entertaining themselves, so they are less prone to developing problems when left alone. The most popular species are the yellow nape, double yellow-headed, and blue-fronted Amazon parrots, which are excellent talkers and great singers. Along with their proficient speech comes other noise, and these birds can be very loud. These species also tend to be one-person birds, unless their human caretakers work to prevent this. Sexually mature males (6 to 8 years old) can be extremely aggressive during breeding season. Like all medium and large parrots, young Amazon parrots should never be allowed to perch on a person's shoulder, because too many problems can result from height dominance. These birds are intelligent and responsive, and most behavior problems (such as biting and screaming) can be prevented if the owner establishes clear and consistent control from the beginning. Orange-winged and lilac-crowned Amazon parrots tend to be quieter and more docile, and because everything is a trade-off, not as proficient in speech.

**Macaws**—Generally speaking, macaws are spectacular birds that are also extremely loud and destructive. Munn<sup>2</sup> described the scream of the large macaw to be "similar to having a trumpet blown in your ear." Intelligent and willful, macaws respond well to consistent control and a firm, loving hand. Macaws vary in size from the largest species of parrot, the Hyacinth, to the diminutive Hahns macaw, but all possess an exuberant, clownish personality. If hand fed and properly socialized, they make excellent pets for the right kind of owner. However, large species are prone to food-related behavior problems. This is because they need to be hand fed for many months, which is not convenient for most aviculturists and pet stores. Often, these birds are "force-weaned" by withholding hand feeding in an attempt to starve the baby into eating on its own. This common practice can lead to undesirable behaviors, such as obsessive begging and screaming.

**Cockatoos**—Nicknamed "the whores of the bird world," cockatoos are the ultimate "touchy feely" members of the parrot family. They are extremely intelligent and mechanical and prone to escaping from their cages. When they do escape, they often wreak havoc in the human habitat. These birds are prone to over-dependency (ie, they would like to become tumors on their owner's body), so they need to be encouraged to be more independent. They have incredible voices for

screaming and have to be ignored to not reward this behavior (which is extremely difficult). They are not usually proficient talkers, but exceptions exist. Sexually mature males of larger species are capable of serious aggression towards their owners. Cockatoos make excellent pets for the right person, but they often attract precisely the wrong personality type as owners (eg, people who are not comfortable setting behavioral limits). The resulting lack of control leads to severe behavior problems that threaten the bird's future as a pet. If spoiled, they become obnoxious and, often, end up on consignment in pet stores.

### The Right Kinds of People

The right kinds of people to cohabit with parrots are rare. They recognize that these birds are wild animals and are not extensions of themselves. They require these creatures to be nothing more than they are. These people understand that no one owns a parrot, because a parrot is owned only by itself. Their self-esteem is strong enough to withstand a parrot's changing moods and attitudes as it grows and develops. Their ego is strong enough that they do not need to use these birds to fill in deficits in their own personality or attract attention to themselves. They are honored to have the opportunity to share their lives with an extraordinary companion—a living fragment of the rain forest.

Hopefully, by being cognizant of species characteristics, veterinarians can help prevent unhappy pairings of parrots and the wrong kinds of people. Under the best of circumstances, parrots are difficult creatures to live with, and few people will actually enjoy long-term cohabitation with them. A parrot in the wrong home, living with the wrong people, is totally miserable and will make people around it equally miserable.

---

<sup>2</sup>Harris J, Annual Conference of the Association of Avian Veterinarians, 1996: Roundtable discussion.

---

### References

1. Richie B, Harrison G, Harrison L. *Avian medicine: principles and applications*. Lake Worth, Fla: Wingers Publishing, 1994;26-44.
2. Davis C. New techniques in pet avian behavior modification, in *Proceedings, Annu Conf Assoc Avian Vet* 1989;183-189.
3. Blanchard S. Parrot personalities, part I. *Pet Bird Rep* 1997;28:3-15.
4. Linden P. Amazon myths and misinformation. *Pet Bird Rep* 1994;19:4-12.
5. Munn CA. Macaws: winged rainbows. *Natl Geogr* 1994;185:118-140.

Forum continued on next page

# Twenty years of progress in pet bird nutrition

Greg J. Harrison, DVM

For the past twenty years, avian veterinarians have been occupied with developing diagnostic and therapeutic procedures for companion birds.<sup>1,2</sup> Birds have often been examined under emergency conditions, and many have died. In the late 1970s, the most common causes of illness were related to malnutrition and importation (eg, infectious diseases, parasite infestation, and immunosuppression from overuse of antibiotics)<sup>1-4,a</sup> or poor management associated with companion bird breeding facilities. Veterinarians were concerned about putting out these disease "fires," so preventive medicine was not of much concern.

At the same time, however, Milton Scott was conducting research in avian nutrition at Cornell University. Scott performed whole-body analyses of birds, which showed that all birds consisted of similar components (primarily ash and protein). He concluded that variation among bird species in intake of food-stuffs was principally a result of food availability and the bird's physical adaptations for procurement.<sup>5</sup> His research resulted in the first specific recommendations regarding nutrient requirements of pet birds.

Since that time, many advances have taken place in the medical and surgical care of companion birds, and one would assume that enormous strides have also been made in pet bird nutrition. Unfortunately, little scientific research has been conducted in this field.<sup>4,7,b</sup> According to experienced avian practitioners,<sup>8-11,c</sup> malnutrition is responsible for up to 90% of all clinical conditions, yet veterinarians continue to recommend inappropriate diets for birds, including feeding enormous amounts of table food and combining various commercial products.<sup>9</sup> In effect, these practices allow clients to become their birds' nutritionists. Pet shop personnel, in general, are also ignorant regarding bird care and allow economics to dictate their sales of bird food (usually in the form of seed) to the public.<sup>9,10,c</sup> Recommendations for feeding pet birds have changed drastically during the past 20 years (Appendix 1).

Nutritional requirements will probably never be documented for all psittacine species commonly kept as pets. However, today's avian professionals can help prevent malnutrition by offering birds under their care practical diets that are based on considerable data available for Galliformes, Anseriformes, and Passeriformes<sup>5,12,13</sup> and by evaluating and reevaluating clinical results obtained from feeding trials that use various formulations. Variables that must be considered when applying the limited formulas that have been developed include species, age, sex, genetic background, season of the year, housing, activity level, and whether the bird is laying eggs, raising young, molting, or recovering from surgery, disease, or other major stress.<sup>3,6,12,13,c</sup>

From The Bird Hospital, 5770 Lake Worth Rd, Lake Worth, FL 33463.

Many veterinarians who serve clients that own individual or large collections of birds affected with malnutritional diseases have failed to realize the progress made by manufacturers of bird diets in recent years. The physiologic condition and behavior of birds may be dramatically improved after a change to a high-quality diet.<sup>1-14</sup>

## Avian Feeding Recommendations: 1977-1997

**Seeds**—The top 4 bird food companies in the United States base their formulations on seeds<sup>14</sup>; therefore, most companion birds in this country are eating seed-based diets—just as they were in 1977. The difference is that today, it is well known that seeds, regardless of how they are colored, mixed, or pressed into shapes, are not a complete and nourishing diet for pet birds. As early as 1923, scientists observed health deficiencies in caged parrots fed seed diets. Seeds (cereal grains such as sunflower, millet, oats, safflower, corn) are missing essential nutrients for bird health (Appendix 2<sup>1-3,4,5,7,9,10,12,15,16</sup>).

Pet birds are reluctant to give up seed diets for the following reasons<sup>4</sup>: their parents were probably raised on seeds,<sup>8,9,11</sup> birds are habitual creatures and do not want to change,<sup>8,10,15,c</sup> and seeds are high in fat content and taste good.<sup>9,12</sup> On the other hand, birds raised on formulated diets do not recognize seeds as food and are reluctant to eat them.<sup>6</sup>

**Seeds plus supplements**—As birds became more popular pets in the early 1980s, improper diet was identified as the primary cause of disease and death in pet birds. It was accepted by then that seeds were deficient in nutrients, so the term "malnutrition" was considered synonymous with "deficiency." The cure was perceived to be the addition of supplements to the seed diet.<sup>9</sup>

The first supplements consisted of liquid vitamins applied to drinking water; this approach was eventually rejected because of dilution, pollution, and rejection by birds. Similarly, cuttlebones attached to the side of cages did not replace missing calcium. Soon, manufacturers of seed diets claimed to have various topical applications or secret processes that allowed nutrients to penetrate hulls of seeds to render kernels balanced when consumed. None of these solutions, including colored seeds, vitaminized seeds, fortified seeds, or pressed and glued seeds, appeared to be effective, because clinical signs of malnutrition were still evident.

**Table foods**—The next step was to supplement birds' diets with fresh table foods (the greater the variety, the better). Eventually this recommendation became more specific, and bird owners were encouraged to include dark green, leafy, and dark yellow veg-

etables and fruits in their birds' diets because of their vitamin precursor content.<sup>3</sup> Owner compliance was high, because feeding birds from the table was an excellent opportunity for bonding. Publications on "how to make your bird a table food connoisseur" implied that such supplementation would result in a balanced diet.<sup>9,12,17</sup> The real effect was inconsistent feeding practices and birds that basically chose their own deficient diets.

Even fruits and vegetables available on the market today in the United States do not contain high-quality nutrients.<sup>9c</sup> Produce is often picked when immature so that it may be shipped around the world. Some fruits and vegetables are chemically treated so they resemble mature vegetables, and most are grown by using unsustainable agriculture practices. Actual nutrient concentrations in the soil in the United States have been dropping since the 1930s because of incorrect crop rotation; application of incomplete fertilizers that contain only nitrogen, phosphorous, and potassium; and lack of composting or trace mineral replacement.<sup>18,d</sup>

### Manufactured Bird Diets

Diets manufactured specifically for birds were initially developed on the basis of nutritional requirements established for poultry.<sup>4,7,12c</sup> While evaluating cockatiels' requirements for protein, lysine, and total solids, researchers<sup>6,12</sup> at the University of California at Davis looked superficially at sustainable diets and then specifically at formulated diets for use in hand raising. Other researchers studied energy requirements of canaries<sup>b</sup> and budgies.<sup>18,b</sup> Most data used to design food for today's companion birds are derived from these types of studies; manufacturers start with poultry and game bird foods and modify these foods to suit other species on the basis of results of feeding trials.<sup>4,5,7-9,12,17,c</sup> Manufactured diets appear to have the most potential for meeting pet birds' nutritional needs; however, the current lack of published standards prevents manufacturers from stating that their foods are complete and balanced.

Early manufactured foods—The earliest attempts to adapt companion birds to manufactured diets relied on available formulas for other species, including trout chow, chicken starter, turkey chow, and eventually, monkey chow (because the primate diet contains vitamin D<sub>3</sub> rather than D<sub>2</sub>). During the 1980s, a large number of offspring of psittacine species were hand fed, using a monkey biscuit-based formula that sometimes included baby cereal to dilute D<sub>3</sub> concentrations and peanut butter to increase fat content.<sup>5,9</sup>

Pellets—Today's formulated diets were actually available in the form of pellets in 1977 but were not very popular. The concept was valid, but the process of pelletization did not really cook the food or caramelize carbohydrates to increase palatability. The effect of pelletization, and later, extrusion, on the integrity of nutrients, such as fatty acids, was controversial. More important, poultry formulations were too high in salt, vitamins A and D<sub>3</sub>, and protein, which caused serious disorders in parrots.<sup>9c</sup>

Formulated diets—Formulated diets increased in popularity during the late 1980s because of the advent of extrusion. Extrusion is a process whereby ingredients are forced through a valve under high pressure and heat, resulting in a product with uniform appearance, increased palatability (from caramelized carbohydrates and incorporated air), increased digestibility, and long shelf life, because enzymes that would normally degrade the foodstuff are inactivated.<sup>8,9,12,c</sup>

A number of well-developed, high-quality formulated diets are available today as a result of feeding trials involving various companion bird species. Some diets are more readily accepted than others. Birds have taste receptors that respond to sweet, bitter, acid, and salt solutions.<sup>12,13,15</sup> Sugar or fat can be added to diets to facilitate acceptance; however, my research<sup>f</sup> has indicated that continued use of 10% sugar and 15% fat by weight in formulated diets is detrimental.

Foodstuffs in subtle shades of black, brown, yellow, and green (ie, natural food colors) have been most accepted by birds.<sup>10</sup> Several studies have indicated that use of dye in food decreases acceptance of food by birds, although owners may find dyed foods more attractive.<sup>10</sup>

The fallacy of balancing a diet at home—Recent work at the Animal Medical Center in New York verified that adding table foods or formulated diets to seeds does not balance birds' diets; formulated diets must comprise more than 75% of total intake to be effective. In smaller amounts, what owners offer and what birds select vary too much. Balancing seed-containing diets with extruded or pelleted rations is also ineffective.<sup>8,9,c</sup>

Cases of hypervitaminosis-A and -D<sub>3</sub> are well documented in pet bird literature.<sup>9,12c</sup> However, to ensure that nutrient concentrations consistent with package labeling survive the production process and to extend the shelf life of their product, some manufacturers double or triple the amount of nutrients initially included in their products so that nutrients become potentially toxic components. In my opinion, heat- and moisture-sensitive ingredients, such as vitamins, vitamin precursors, and pigments (eg, beta carotene), should be applied after extrusion or pelletizing.

### Evaluating Avian Diets

One of the most important aspects of preventive avian care is nutrition. Many veterinarians do not realize that malnutrition is the underlying cause of most clinical signs of disease they see in birds on a daily basis. Clinicians should maximize their ability to detect early signs of malnutrition (Appendix 3<sup>1,3,7-9,16,e,1</sup>), because these are also early signs of illness. Signs of chronic malnutrition (feather picking; sore feet; dry, flaky skin; liver disease; obesity; listlessness; lack of singing, talking, and playing; chewing the cage; biting people; and self-mutilation) could be considered evidence of cruelty, especially when high-quality formulated diets are available that have shown to relieve these often painful clinical signs in the absence of other treatment.

Clinical signs of malnutrition—Malnutrition can be the primary cause of obesity, generalized deficiency

syndrome, hyperkeratosis, metaplasia (resulting in poor feathering and skin quality), hepatic lipidosis, hypocalcemia, gout, mineralization of kidneys, and organ failure from dietary excess or deficiency. More often, malnutrition creates an immunosuppressed bird that expresses its condition by means of feather picking, persistent molting, cloacal prolapse, egg binding, chronic egg laying, foreign body consumption, behavioral problems, and susceptibility to bacterial, yeast, viral, and parasitic infections.<sup>1-3,13,16a,c,g</sup> Correction of these disorders is a major component of clinical criteria for evaluating nutritional status of avian patients.<sup>1</sup>

**Physical examination**—A thorough, standardized physical examination is the single most important tool for evaluating a bird's health and nutritional status. Results of physical examination are also used to monitor the effects of modifications in diet.<sup>2,16,c</sup>

**Fecal Gram's stain**—Results of a Gram's stain of feces from a psittacine bird may provide meaningful information, because the intestinal microenvironment responds to modifications in feeding and other husbandry practices by consistent, predictable, and measurable changes in bacterial variety and quantity. A healthy bird has primarily gram-positive bacteria and no gram-negative bacteria or yeast.<sup>8,a,c</sup>

**Evaluating pet bird diets**—It is important to monitor clinical signs of malnutrition and expected changes resulting from feeding a new formulated diet. Birds that do not conform to expectations when fed formulated diets can be reevaluated, and additional modifications can be made to individualize their diets for optimum results. If this fails, more extensive diagnostic work is indicated. Specific diets (eg, low iron for hemochromatosis-susceptible birds) may be warranted. Specialized diets<sup>6,c</sup> designed to treat various clinical conditions appear to hold promise.<sup>2,8,9,10,c</sup>

Practitioners must become familiar with preconditioning birds for dietary changes, recognize species that have difficulty with changes in diet, and incorporate ideas for overcoming client reluctance. Nutrition is a necessary component of treatment for most avian illnesses.

**Evaluating avicultural diets**—Criteria for evaluating avicultural diets in addition to parental health include number of eggs laid, percent of fertile eggs, number of eggs hatched, number of surviving chicks, and incidence of problems in young (bent beak; bent legs; crop-emptying problems; failure to thrive; slow weight gain; improper body [weight] proportions; improper feather development, color, or stress lines; crying; gram-negative bacterial and yeast infections; and death). Preliminary research results<sup>6</sup> indicate that formulated diets and limited amounts of seeds, nuts, fruits, and vegetables comprise the ideal breeding diet, although this approach lacks complete documentation.<sup>3,9,12,15,c</sup>

**Refining formulated diets**—Formulated diets continue to be refined as new clinical and scientific data are generated. Well-informed and experienced avian practitioners are able to make minor adjustments in clinical use of these formulations.

**Following manufacturers' directions**—For formulated diets to provide optimum results, directions for feeding must be reinforced to clients by veterinarians. Appropriate guidelines<sup>d</sup> follow:

- ▶ Buy fresh food every 4 to 6 weeks and store it in a cool environment. Smell and taste for freshness often. Freeze product if storing longer than 6 weeks.
- ▶ Feed fresh food daily. Because light, moisture, and heat affect freshness of all formulated products, insist that owners place only fresh food in the bird's bowl daily. Many bird owners accustomed to feeding seeds are used to "blowing and topping off."
- ▶ Avoid overfeeding. This is especially important when using a product with components that are not consistent in appearance; birds will selectively consume certain components and reject others.
- ▶ Avoid oversupplementation. Most manufacturers recommend their diets be fed in excess of 90% of total intake.<sup>4,c</sup>
- ▶ Restrict supplements to products that would correct possible imbalances and not stimulate breeding (eg, fresh yellow or orange meaty fruits and vegetables and green leafy vegetables). If the diet is organic, supplements should also be organic.
- ▶ For pet birds, avoid supplements that stimulate nesting and breeding activity. These include high-fat seeds and nuts or high-sugar carbohydrates (eg, fresh sweet corn, apples, grapes).<sup>c</sup>

**Formula variations**—Research has not been done to confirm differences in dietary requirements among pet bird species, but such differences appear to exist. Alert avian veterinarians should be able to determine from feeding trials, experience, and physical examination what adjustments need to be made to basic formulas. For example, higher concentrations of fat and protein but lower concentrations of calcium and vitamins A and D<sub>3</sub> may be beneficial for Moluccan and Palm cockatoos, Queen of Bavaria conures, African grey parrots, and macaws.

Age is also an important variable. Young birds in rapid growth stages require richer, "production-type" diets. A new and rapidly growing group, aging or geriatric birds, also requires modifications to maintenance formulas.<sup>16,c,d,f</sup>

**Nonchemical components**—Evidence indicates that birds are attracted to foods that do not contain additional chemical substances. Birds avoid foods treated with pesticides if given a choice. Artificial colors, flavors, and preservatives are potential toxins. Birds eating organic foods appear to have noticeably less feather picking, fewer bacterial and yeast infections, and a lower incidence of liver disease.<sup>16,c,d,f</sup>

Quality of ingredients plays a role in nutritional results. Products considered "safe" for animal food, such as renderings or fish meal, may not be suitable for feeding to companion birds. Poultry foods developed for birds with lifespans defined in weeks do not seem appropriate for birds that may live 50 years.<sup>8,c</sup>

**Sustainable agriculture**—Organic family farms tend to be small and are concerned with sustainable

agriculture. Organic farming requires crop rotation, control of pests by encouraging predatory species in crop rows, and restoration of humus and soil fiber to reduce irrigation and restore healthy bacterial populations. Organic farming is absolutely necessary in the Midwest region of the United States and other locales to control water run-off and replenish aquifers. Well water in many parts of the world is unsafe for human consumption because of ground water contamination with pesticides. A recent HBO special titled "Rachel's Daughters: Searching for the Causes of Breast Cancer" left little doubt of the need for organic food sources for human beings.

### Avian Preventive Medicine

**Practical diet change**—Converting a bird to a well-developed, formulated diet is an important step in treatment of malnutrition and may require a specific plan to encourage the bird to accept the diet change.<sup>d</sup> If the client's bird is young and robust and the client is cooperative, this process can be accomplished in the home. Some recalcitrant birds can be admitted to the veterinary clinic, where a new environment, daily weighing, and tube feeding (if necessary) can facilitate conversion. Veterinarians must realize that most birds have been on seed diets for a substantial period of time and are marginally, if not seriously, malnourished, so the diet must be changed with minimal stress to the bird.<sup>7,8,c</sup>

**Results of proper feeding**—Certain consequences of a dietary change may not be perceived by owners as positive. As epithelium starts to heal, birds may begin peeling, flaking, picking, molting, or sneezing, so the veterinarian needs to explain that these behaviors are temporary, intermediate steps to restoration of health. Frequent misting with water and certain holistic remedies may help soothe affected tissues.<sup>e</sup>

Ultimately, proper feeding results in lower incidence of disease, faster response to treatment when disease does develop, and increased production in breeding birds.<sup>f</sup> Beneficial results are seen in avian patients affected with feather picking, hepatic lipidosis, black or other feather discoloration associated with various liver dysfunctions, proventricular dilatation (macaw wasting), prolapsed cloaca, egg binding, chronic egg laying, foreign body consumption, objectionable personalities, and general need for surgery or medical attention to bacterial, yeast, and viral infections.<sup>4,f</sup> Better housing and curtailing of importation have also contributed to improved health of psittacine birds.<sup>7,8,12,16,c,f</sup>

**Transformation to avian preventive practice**—Now that well-formulated diets for birds are available, a transformation in bird health is underway not only in appearance and behavior of companion birds but also in their resistance to disease, response to treatment, ability to heal quickly after surgery, and ability to regain normal reproductive activity.<sup>4</sup> Most importantly, malnutrition is seldom seen.<sup>1,2,16,c</sup>

Of course, malnutrition is not the sole cause of illness in companion birds, but because it has finally been recognized as a preventable cause, avian patients may now live healthier, more enjoyable, and longer

lives. Equally important, it allows veterinarians to experience the pleasure and rewards of practicing preventive medicine on companion birds.

Modifications will be made to recommended feeding practices for pet birds as results of controlled studies become available, but as Murphy<sup>13</sup> points out, "Satisfactory criteria for accurately qualifying the nutrient requirements of animals remain elusive." Our current knowledge of avian nutrition is primarily derived from studies of domestic birds that have a selection for nutrient reserves that has been relaxed for generations. The study of nutritional requirements of wild birds should be focused on the diversity of their diets as well as their phenotypic and genotypic metabolic, physiologic, and behavioral plasticity. Analyses of nutritional needs should be designed mainly to provide approximations of requirements for groups of birds sharing similar dietary habits (eg, frugivores, nectivores, or insectivores).

<sup>a</sup>Glünder G. Influence of diet on the occurrence of some bacteria in the intestinal flora of wild and pet birds (abstr), in *Proceedings. 1st Intl Symp Pet Bird Nutr 1997*;30.

<sup>b</sup>Kamphues J. Development of body composition in growing pet birds (canaries, budgerigars and lovebirds) (abstr), in *Proceedings. 1st Intl Symp Pet Bird Nutr 1997*;38.

<sup>c</sup>Harrison GJ. Diagnosing and treating malnutrition in psittacine birds (abstr), in *Proceedings. 1st Intl Symp Pet Bird Nutr 1997*;106.

<sup>d</sup>Organic Difference brochure, HBD Intl Inc, Delray Beach, Fla.

<sup>e</sup>Roudybush Inc, Paso Robles, Calif.

<sup>f</sup>Barnecko J, German L. Relations between feeding and color of feathers in gouldian finch and barraband parakeet (abstr), in *Proceedings. 1st Intl Symp Pet Bird Nutr 1997*;36.

<sup>g</sup>Janeczek F, Avifood, Gräfelfing, Germany; Personal communication, 1998.

### Appendix 1

Twenty years of recommendations for feeding pet birds

1970s	Seeds, grit, cuttlebone, greens, liquid vitamins, turkey food, dog food, trout chow, canary seed, lory diets, flamingo diets, early pelleted products, monkey biscuit, bread, milk, fruits, meat, chicken starter, vegetables, nuts, eggs
1980s	Dog food, variety seeds, nuts, fruits, vegetables, oyster shell, sprouts, egg shells, mynah bird pellets, trout chow, bread, wheat germ, insects, cuttlebone, pound cake, multivitamins, soybeans, bean mixes (with or without dog food), monkey biscuit, turkey pellets, mash, kibble or crumble, mixed animal pellets (pig, monkey, turkey, pigeon, rabbit, mouse, hamster), fruit, sprouts (and then no sprouts), table food, egg, bread, pellets, cooked beans, peanut butter
1990s	Well developed, formulated (pelleted and extruded) diets leaning toward "natural" ingredients and certified organic bird foods available; professionals mistakenly continue to recommend seeds and supplements or treats, rice, pasta, cereals, vegetable, fruits, meat, legumes, dairy products, bones, pellets, cooked mixes, breads, and muffins

### Appendix 2

Compounds in which seed diets are deficient

Vitamins	Choline, niacin, biotin (H), pantothenic acid, riboflavin (B <sub>2</sub> ), vitamin A, vitamin D <sub>3</sub> , vitamin E, vitamin K, folic acid (M), cyanocobalamin (B <sub>12</sub> )
Minerals	calcium, phosphorus (70% as phytates), sodium, magnesium
Trace minerals	selenium, iron, copper, zinc, manganese, iodine, chromium, vanadium, bismuth, tin, boron
Pigments	chlorophyll, carotenoids, canthaxanthin
Protein (amino acids)	lysine, methionine
Fiber	soluble (mucopolysaccharide), insoluble
Vitamin precursors	beta carotene

## Appendix 3

### Clinical signs of malnutrition

Location	Clinical sign
Skin	Hyperkeratosis, flaky, dry, pruritus, loss of elasticity, easily torn, slow to heal, excessive bleeding
Bottom of feet	Worn smooth without a scale pattern followed by ulceration and painful bumblefoot
Wing, leg, and tail membranes	Thin, easily torn in areas of stretch, evidence of bird tearing and picking at membranes
Uropygial gland	Swelling
Feathers	General loss of feather quality; feathers thin vanes and unable to open up because of retained sheaths; constant presence of pin feathers from frequent molts; worn-out looking feathers from infrequent molts; feathers with saw-toothed edges; broken, bent, missing, or malcolored feathers (usually presence of black and blue, red, or green feathers); feather picking and consumption
Beak	Excessively long with layered, horny material on all dorsal surfaces
Muscles	Poor tone and conditioning, cockatiels unable to bite hard or crack seeds
Cloaca	Commonly crusted, flaccid, and easily prolapsed
Behavior	Irritable, inactive; excessive chewing on wood, plants, toys, and grit, leading to potential foreign body consumption; overeating, overdrinking; constant regurgitation; less talking and playing, biting or chewing of self or others
Body conformation	Obesity, presence of lipomas, lack of body fat on low-fat diet
Nails	Require constant trimming or become excessively long and may curl
Eyes	Discharge, nonresponsive eye blink, liths in lacrimal ducts
Nares	Discoloration or stickiness of feathers over nares, liths in rhinal cavity, results of Hemocult test are positive
Urine	Biliverdinuria, polyuria, polydipsia, and hyperuricemia
Gram's stain of feces	Predictable change in quantity and quality of bacteria represented (trend is toward low total counts consisting of primarily gram-positive rods, a small number of gram-positive cocci, rare gram-negative bacteria, and yeast)
Immune system	Depressed; birds more susceptible to bacterial, viral, yeast, and parasitic infections
Radiographic evaluation of organs	Reduced liver shadow in birds on low-fat diet; liver enlarged in birds consuming high-fat diets (corresponding passive response of air sac mass)
Reproductive tract	Fewer eggs, fewer fertile eggs, hatching problems, egg binding, egg-related peritonitis, young with bent beaks, flaccid crops, bent legs; bacterial, yeast, simple protozoa problems; prolapsed uterus, cystic ovary, chronic egg laying, uterine liths
Liver	High-fat seed diets lead to fatty liver degeneration; low-fat diets (high in fruits, vegetables, and table food) lead to reduced liver size (microhepatia); hemochromatosis; bile duct herniation resembling gall bladder; gall liths
Kidney	Polyuria/polydipsia; glucosuria, hematuria, gout, renal liths
Pancreas	Regurgitation; poor weight gain; poor digestion (undigested food in feces)
Serum	Lipemic; enzymes elevate markedly upon handling or travel
Mouth	Filled with debris, abnormal bacteria and yeast; lith-filled salivary ducts
Respiratory tract	Loss of voice; change in voice; harbors bacteria, yeast, fungi (exaggerated in low-humidity environments); sinusitis; syringitis; air sacculitis; liths
Central nervous system	Convulsions; loss of equilibrium
Muscles/skeleton	Bent or twisted beaks, legs, sternum

## References

- Hochleithner M, Hochleithner C, Harrison GJ. Evidence of hypoparathyroidism in hypocalcemic African grey parrots. *Avian Rep Exam* 1997;10:1-4.
- Vaughn SB. Feather picking: a mystery of avian medicine. *Bird Talk* 1997;115(8):42-47.
- Dorrestein GM, Zwart R, van der Hage MH, et al. Metaplastic alterations in the salivary glands of parrots in relation to liver vitamin A levels, in *Proceedings, 1st Intl Zoo Avian Med Conf* 1987;69-73.
- Underwood MS, Polin D, O'Handley P, et al. Short-term energy and protein utilization by budgerigars (*Melopsittacus undulatus*) fed isocaloric diets of varying protein concentrations, in *Proceedings, Assoc Avian Vet* 1991;227-237.
- Scott ML. Nutritional principles as a guide to optimum maintenance, development and reproduction in captive birds, in *Proceedings, 1st Intl Bird Captivity Symp* 1978;121-137.
- Roudybush TE, Grau CR. Cockatiel (*Nymphicus hollandicus*) nutrition. *J Nutr* 1991;121:S206.
- Ullrey DE, Allen ME, Baer DJ. Formulated diets versus seed mixtures for psittacines. *J Nutr* 1991;121(Suppl):S193-S205.
- Harrison GJ. Practical diet conversion and why. In: *1997 Convention notes*. Schaumburg, Ill: AVMA, 1997;46-48.
- Hess L, Mauldin G, Rosenthal K. Nutrient content of commonly fed companion bird diets, in *Proceedings, Assoc Avian Vet* 1997;229-232.
- Miller JP. Pet birds plea: enough seeds, already. *Wall Street Journal* 1996 May 20:B1 (col 1), 2.
- Wyndham E. Environment and food of the budgerigar. *Aust J Ecol* 1980;5:47-61.
- Brue RN. Nutrition. In: Ritchie BW, Harrison GJ, Harrison LR, eds. *Avian medicine: principles and application*. Lake Worth, Fla: Wingers Publishing, 1994;63-95.
- Carey C, ed. *Avian energetics and nutritional ecology*. New York: Chapman & Hall, 1996;35, 36, 38, 47-50, 58, 62-63, 160-181.
- Fucini J. 1997 Pet age retailer report. *Pet Age* 1997;27:14-25.
- Murphy ME. Nutrition and metabolism. In Carey C, ed. *Avian energetics and nutritional ecology*. New York: Chapman & Hall, 1996;32-38.
- Picozzi M. Stop feather picking. *Nat Pet* 1997;42-44.
- Roskopf WJ, Woerpel RW. Practical feeding strategies for individual pet birds. In: Roskopf WJ, Woerpel RW, ed. *Diseases of cage and aviary birds*. 3rd ed. The Williams & Wilkins Co, 1996;235-241.
- Modern miracle men. 74th Cong, 2nd Sess (1936) (testimony of C. Northen).



# Twenty years of progress in pet bird research

Keven Flammer, DVM

Companion avian medicine is a relatively new veterinary discipline. During the past 20 years, the sources of birds, number of birds owned as pets, attitudes and expertise of bird owners, and skills of avian veterinarians have changed considerably. Research by veterinary practitioners and academicians has contributed greatly to improvements in avian health care.

## A Glimpse of Avian Medicine in 1977

In 1977, some budgerigars, cockatiels, and lovebirds were raised in this country, but most birds in the pet trade were wild caught. Psittacine birds were imported from 3 continents and crowded into quarantine stations and holding facilities that elicited stress and promoted the spread of disease. More than 100 species of psittacine birds were imported, many for the first time, in large numbers.

Widespread ownership of large psittacine birds was new, and inexperienced owners often failed to provide appropriate care. Many birds were housed in solitary cages and fed seed diets and were not socialized with their owners or other birds. Malnourishment, stress, poor husbandry, and infectious diseases were common. Bird owners often failed to recognize subtle signs of disease and would wait too long before seeking medical attention for their pets.

Avian medicine was a fringe discipline of small animal practice in 1977. Few birds were owned as pets, and avian veterinary services were not in demand. Many owners considered birds to be replaceable and did not feel there was much that could be done for a sick bird. Perhaps a hundred or fewer veterinarians nationwide claimed to be skilled in avian medicine, and it was difficult to find a veterinarian that would evaluate birds in many rural areas of the country.

Challenges facing avian veterinarians in 1977 were considerable. Avian veterinarians were able to save many sick birds, but published, scientifically based information was sparse, and most practitioners were largely self-taught. Only a few texts devoted to avian medicine were available.

Importation and wholesale procedures mixed birds from multiple continents. New viral and microbial diseases were being identified. Laboratories were ill equipped to handle the small blood samples available from birds, and clinical pathologic tests avian veterinarians now use routinely were rarely available. When tests were available, lack of reference values hindered interpretation. Antimicrobials were available to treat infections, but little scientific information was available to guide dosing. Diseases, such as beak and feather disease, polyoma virus, and sarcocystis, had yet to be characterized, and their causative agents had not been identified.

From the Department of Companion Animal and Special Species Medicine, College of Veterinary Medicine, North Carolina State University, Raleigh, NC 27606

## Avian Medicine in 1997

It is remarkable to compare avian practice in 1997 to the scenario just described. Birds have become popular pets; the current pet bird population is estimated to be 13 to 50 million.<sup>1,2</sup> Most birds in the pet trade are now domestically produced, because the Wild Bird Protection Act effectively ended importation of most psittacine species in 1993.<sup>3</sup> Ending importation reduced the number of diseased birds entering the pet trade. Hand-rearing techniques were developed in the 1980s, and many birds in the pet trade are now hand raised. Hand raising produces an engaging, personable pet that fulfills aspects of the human-companion animal bond previously believed to be limited to interactions with cats and dogs.<sup>3</sup>

Most bird owners now know much more about the needs of their avian pets. Magazines, books, and videos stress good husbandry and disease prevention and explain social needs of birds. Many owners provide enriched environments and better diets and are more aware when problems develop. Birds are viewed less as replaceable and more as valued members of the family.

Avian medicine has made considerable progress since 1977. There are almost 3,000 members of the Association of Avian Veterinarians, and most small animal practices have a veterinarian that evaluates birds. Much information has been published during the past 20 years, including 4 comprehensive texts within the past 5 years. Specialty texts address avian diagnostic imaging, clinical pathology, aviculture medicine, and surgery. Research papers are published monthly in a variety of journals, and the *Journal of Avian Medicine and Surgery* is dedicated to nondomestic avian problems. Ample continuing education opportunities are available for beginning and experienced avian practitioners. Most major small animal veterinary conferences include sessions on avian medicine, and the Association of Avian Veterinarians holds an annual meeting attended by approximately 500 avian practitioners. The American Board of Veterinary Practitioners established criteria for board certification in avian medicine in 1993, and 3 residency programs currently qualify participants to take the avian board examination.

Specialty avian practices offer a full complement of laboratory diagnostic testing, sophisticated diagnostic imaging techniques, emergency medical procedures, and intensive care techniques tailored for birds. Availability of isoflurane anesthesia and improved anesthesia monitoring techniques have improved anesthesia safety. Avian-specific surgical techniques, including advances in orthopedics and microsurgery, have expanded procedures that can be safely performed in birds. Therapeutic techniques have been developed, and pharmacokinetic-based dosage regimens are available for a number of antimicrobials.

Several atlases are available to aid in interpretation of radiographs, and ultrasound and computed tomography are available at specialty care centers. Development of more accurate diagnostic tests and vaccines has reduced morbidity and mortality rates associated with infectious diseases.

### **The Impact of Avian Research**

Information creating advances in avian medicine has come from research completed by veterinary practitioners and academicians. Much of the impetus and funding for avian projects has been supplied by grass roots organizations, such as national companion bird associations (eg, American Federation of Aviculture, Midwest Avian Research Expo, and the International Aviculturist Society), bird clubs, private donors, and the Association of Avian Veterinarians. Veterinary colleges and industry have also provided support. Avian research has been a team effort, and bird owners, aviculturists, and veterinarians share equally in its success.

Early research focused on clinical pathologic and other diagnostic techniques. By the mid-1980s, techniques for performing CBC and serum biochemical analyses on small amounts of blood were perfected.<sup>4</sup> Reference values were established for different species and ages of psittacine birds.<sup>5,6</sup> Hormone response tests were also developed to diagnose thyroid and adrenal insufficiencies.<sup>7</sup> Disease syndromes common to certain types of birds (eg, hypocalcemia in African grey parrots) were also characterized.

During the 1970s and early 1980s, microbial infections caused by gram-negative bacteria, yeast, and *Aspergillus* were common and often fatal. Antimicrobials were available, but successful treatment was hampered by lack of appropriate dosage guidelines. Drug disposition varies among species, and dosage guidelines extrapolated from experience with poultry or small animals were often unsuccessful. Today, pharmacokinetics of more than 5 classes of antimicrobials have been modeled in at least one companion psittacine species, and specific dosage guidelines are available for psittacine birds.<sup>8</sup> This research has greatly improved the success of treating microbial infections and reduced mortality rates associated with these diseases.

Chlamydiosis, also known as psittacosis, is a bacterial disease that deserves special mention. A common cause of disease in psittacine birds, it is also transmissible to people. Infection in people results in a flu-like syndrome, pneumonia, and rarely, death. Because of the risk to people, public health officials would often quarantine infected and exposed birds and mandate that they be treated with chlortetracycline-medicated mash. The mash was unpalatable, and many birds refused to eat it. Bird owners were reluctant to have their birds tested for this zoonotic disease because of the debilitating effects of treatment. Research on improved methods of diagnosis and treatment has reduced the impact of this disease. Although imperfect, diagnostic tests, including serologic examination, antigen capture, and a polymerase chain reaction test for bacterial DNA, have been developed to screen birds for

infection.<sup>9</sup> A number of treatment options have been researched and found to be superior to use of chlortetracycline-medicated diets.<sup>10</sup> Veterinarians can now choose from safer and more effective treatment regimens that include injectable, oral, or food-based administration of doxycycline. Psittacosis has not been eliminated, but its incidence has been reduced, and bird owners are no longer reluctant to have their birds undergo diagnostic testing and be treated.

Some of the greatest success stories of the past 20 years include research to control viral diseases. During the 1970s and 1980s, birds died by the thousands from infections caused by Pacheco's herpesvirus, poxvirus, polyoma virus, and beak and feather disease. These viruses threatened the existence of many captive-bird collections. Research teams, including those at veterinary medical colleges at the University of Georgia, University of Florida, and Texas A&M University, identified agents of disease, characterized how viruses are spread, developed diagnostic tests to identify infected birds, and in some cases, developed vaccines to prevent infection.

Viral disease research has reduced the impact of these diseases.<sup>11</sup> Poxvirus used to be common in Amazon parrots but is now rare, because importation was stopped and a vaccine was created. Pacheco's herpesvirus infections still develop, but outbreaks can be controlled by treatment with acyclovir and vaccination. Many birds, especially cockatoos, died of beak and feather disease. The cause of this disease, a circovirus, was not identified until 1988. Discovery of the virus led to development of a highly accurate polymerase chain reaction test. Use of this test has allowed avian veterinarians to cull infected birds from collections, greatly reducing the incidence of beak and feather disease. Polyoma virus, first identified in 1981, causes mortality in juvenile psittacine birds. It can now be diagnosed by use of a polymerase chain reaction test and controlled by vaccinating juvenile and adult birds.

### **Future Research Directions**

Many areas of avian medicine still need scientific investigation. Birds still die of infectious diseases, and proventricular dilatation disease is a leading cause of companion bird mortality. Because birds can shed the disease agent without evidence of clinical signs for long periods of time, proventricular dilatation disease is easily spread among birds in close contact. Researchers at the University of Georgia have identified a potential agent, but more work is urgently needed to develop a diagnostic test and find ways to control this insidious disease. We also need simplified methods to control chlamydiosis (psittacosis). A vaccine or less complicated methods of treatment would allow all birds in the pet trade to be protected or treated, reducing the risk of infection to birds and people.

Research in avian nutrition is also needed. Formulated diets have improved avian nutrition, but little published scientific information is available to guide nutritional decisions. Nutritional research will likely reveal that different parrot species have different optimal nutritional requirements. Specialized diets

need to be developed to address common problems such as obesity and hepatic lipidosis.

Other speakers at this forum addressed avian behavior. The complex social interactions between birds and between birds and their owners are just beginning to be understood. Scientific investigation of behavioral problems, such as feather picking, aggression, and chronic egg laying, is also sorely needed.

A good foundation has been established for tackling avian medical problems. Research teams willing to investigate companion avian problems are located at a number of veterinary colleges. Avian practitioners have the mind-set to explore new areas of medicine rather than wait for others to do it for them. The partnership created between bird owners, the pet industry, avian practitioners, and avian researchers will ensure that important problems are addressed. The incredible birds that we choose as companions deserve the very best that we can offer.

### References

1. Clubb SL. Laws and regulations affecting aviculture and the pet bird industry. In: Altman RB, Clubb SL, Dorrestine GM, et al, eds. *Avian medicine and surgery*. Philadelphia: WB Saunders Co, 1997;45-53.

2. Gehrke BC. Results of the AVMA survey of US pet-owning households on companion animal ownership. *J Am Vet Med Assoc* 1997;211:169-170.

3. Harris JM. Companion avian bond. In: Roskopf WJ, Woerpel RW, eds. *Diseases of cage and aviary birds*. Baltimore: The Williams & Wilkins Co, 1996;71-74.

4. Campbell TW. *Avian hematology and cytology*. Ames: Iowa State University Press, 1988.

5. Clubb SL. Hematology and biochemistry. In: Ritchie BW, Harrison GJ, Harrison LR, eds. *Avian medicine: principles and application*. Lake Worth, Fla: Wingers Publishing, 1994;1332-1336.

6. Roskopf WJ, Woerpel RW. Clinical experience with avian laboratory diagnostics. *Vet Clin North Am Small Anim Pract* 1984;14:249-286.

7. Lothrop C, Harrison GJ, Schultz D, et al. Miscellaneous diseases. In: Harrison GJ, Harrison LR, eds. *Clinical avian medicine and surgery*. Philadelphia: WB Saunders Co, 1986;525-536.

8. Flammer K. Antimicrobial therapy. In: Ritchie BW, Harrison GJ, Harrison LR, eds. *Avian medicine: principles and applications*. Lake Worth, Fla: Wingers Publishing, 1994;434-456.

9. Fudge AM. Avian chlamydiosis. In: Roskopf WJ, Woerpel RW, eds. *Diseases of cage and aviary birds*. Baltimore: The Williams & Wilkins Co, 1996;572-585.

10. Flamer K. Chlamydia. In: Altman RB, Clubb SL, Dorrestine GM, et al, eds. *Avian medicine and surgery*. Philadelphia: WB Saunders Co, 1997;364-379.

11. Ritchie BW. *Avian viruses, function and control*. Lake Worth, Fla: Wingers Publishing, 1995.

## Twenty years of progress in avian anesthesia and surgery

Robert B. Altman, DVM

Avian medicine (excluding poultry) has a very short history, compared with other subdisciplines of veterinary medicine. References to avian anesthesia and surgery were rare in the literature until the late 1940s.

During the mid- to late-19th century, most articles regarding the care and treatment of caged and aviary birds were written by nonveterinarians and published in books such as *The American Bird-keepers Manual*,<sup>1</sup> *The American Bird Fancier*,<sup>2</sup> and *The Bird Food Company's Book of Cage Birds*,<sup>3</sup> all of which were produced by the Philadelphia Bird Food Company. The first reference to surgery being performed in caged and aviary birds can be found in a 1943 edition of *Stroud's Digest*.<sup>4</sup> This report described orthopedic and splinting procedures and was originally written in 1939 by Robert Stroud, the bird man of Alcatraz. Stroud had previously published material on canaries in 1931<sup>5</sup> and 1933.<sup>6</sup>

In 1947, Irving E. Altman wrote an article<sup>7</sup> describing splinting techniques for fractures in birds that are still in use today. To my knowledge, this was the first report of surgeries performed on pet birds written by a

veterinarian. During the 1940s and early 1950s, Altman and Alan Bachrack started and fostered the practice of caged bird medicine and surgery. Because of the ban on the importation and sale of psittacine birds imposed by the federal government in 1942, most avian house pets kept in the United States at that time were canaries or finches. When the ban on psittacine birds was lifted, breeding and sale of budgerigars in the United States became a booming business, and the price of budgies was high. Within a few years, the market was flooded and the price plummeted to just a few dollars per bird, making it affordable for every family to own a "parakeet." The rapid influx of budgies dramatically increased the need for medical and surgical care of these birds.

Bachrack practiced in Philadelphia and was an amateur magician of renown. When giving lectures on the care and treatment of pet birds, he would often perform magic tricks. During one such lecture at an AVMA meeting in the 1950s, he placed a live bird on a table, covered it with a towel, and smashed the towel with his hand. He removed the towel, produced what looked like a crushed bird, and then, to the audience's astonishment, "miraculously" produced the unscathed bird. The first reference to avian anesthesia of which I

From Avian, Exotic, and Surgical Consultants Inc, 2662 NW 41st St, Boca Raton, FL 33434.

am aware was made during one of Bachrack's lectures in the late 1940s.

During the mid-1950s, Ted Lafeber joined the ranks of this select group of veterinarians practicing and sharing their expertise in avian medicine and surgery. These 3 veterinarians are considered the fathers of medicine and surgery for pet birds.

Prior to, and at the beginning of, the 20th century, most minor veterinary surgical procedures were performed without anesthesia. In the 1930s and 1940s, ether, which was administered by use of an open face-mask system, offered veterinary surgeons the opportunity to perform longer and more complicated procedures. However, the open face-mask delivery system made it difficult to control depth of anesthesia in patients and resulted in a mortality rate that discouraged most practitioners from attempting surgical procedures. In addition, ether posed risks to operating room personnel, because gas scavenging systems were not available, and ether was combustible.

In the early 1950s, sodium pentobarbital became available. This drug induced longer periods of anesthesia but also resulted in long recovery periods. Mortality associated with administration of sodium pentobarbital was high, because prolonged fasting after surgery in birds is associated with rapid depletion of glycogen and life-threatening hypoglycemia. It was discouraging to surgeons to successfully complete a difficult procedure, watch the bird recover from anesthesia, leave the bird on its perch for the night, and discover a dead bird the following morning. This common event discouraged many veterinarians from performing surgery on birds.

In 1956, Charles Gandall, a veterinarian at the Bronx Zoo, introduced a combination anesthetic<sup>7</sup> containing chloral hydrate, sodium pentobarbital, propylene glycol, and ethyl alcohol as a replacement for sodium pentobarbital. This injectable anesthetic was safer and more reliable than sodium pentobarbital, and its administration was associated with a shorter recovery period. In 1957, Sanger and Smith wrote an article<sup>8</sup> on general anesthesia of birds. To my knowledge, this was the first article that gave an overview of avian anesthesia as performed during that period. Four years later, Grono wrote a report<sup>9</sup> describing methods of anesthesia for budgerigars.

In 1961, a vaporizer<sup>b</sup> was designed that was the first practical and relatively accurate delivery system to be used with ether. The unit was used in conjunction with a self-inflating resuscitation bag<sup>c</sup> and a nonrebreathing valve. Ether was mixed with room air, using the vaporizer, and though the mixture was combustible, it did not have the explosive properties of ether combined with oxygen. The same year, Arnall wrote an article<sup>10</sup> on anesthesia and surgery of caged and aviary birds, which appears to be the first comprehensive report on avian anesthesia.

Methoxyflurane was not often used in the United States until 1962, when it was introduced<sup>d</sup> for use with the previously described vaporizer. Glass marbles were added to the vaporizer jar to increase vaporization surface area. Methoxyflurane was not explosive and could be used safely in combination with oxygen. This sys-

tem proved to be the safest method thus far of anesthetizing birds and decreased anesthetic mortality to an almost acceptable rate.

During this period, technology had not yet been developed to allow comprehensive presurgical evaluation of avian patients, and little attention was paid to anesthetic support. A great deal needed to be learned about the anatomy and physiologic characteristics of passerine and psittacine birds. Sometime in 1965 or 1966, vaporizers developed for anesthetizing human patients were used with methoxyflurane and oxygen to anesthetize birds. Although cumbersome, these units permitted more accurate control of gas concentrations and further reduced anesthetic death rates.

Halothane,<sup>e</sup> although available in the United States in 1962, did not come into favor until a few years later. It gradually replaced methoxyflurane as the anesthetic of choice for birds. Induction and recovery times associated with halothane were shorter, and mortality rates during and after surgery were lower. In 1970, Whittow and Ossorio wrote an article<sup>11</sup> that discussed the use of the inhalation anesthetics methoxyflurane and halothane for anesthetizing birds.

Beginning with the 1964 edition, *Kirk's Current Veterinary Therapy*<sup>12</sup> included a short chapter on anesthesia of caged birds; this chapter has been updated every 2 years. *Diseases of Cage and Aviary Birds*,<sup>13</sup> edited by Margaret Petrak and published in 1969, was the first textbook devoted to medical care of caged birds and was the first textbook with an entire chapter devoted to anesthesia. This book appears to have triggered the beginning of an outpouring of articles and books on avian medicine and surgery. Many authors contributing information on avian anesthesia were zoo veterinarians. In 1973, one-half of a volume of *Veterinary Clinics of North America*<sup>14</sup> was devoted to caged birds and included the first chapter on avian anesthesia written by a veterinary anesthesiologist (Alan Klide).

Throughout the 1970s, numerous articles were written on the use of ketamine hydrochloride, ketamine in combination with other agents, and halothane as anesthetics in caged birds. In 1975, Arnall<sup>15</sup> described the stages of anesthesia and techniques for monitoring avian patients under the influence of gas anesthesia.

In 1980, an article<sup>16</sup> that stressed the importance of preanesthetic clinical evaluation, routine endotracheal intubation, and cardiac and body temperature monitoring throughout the anesthetic period was published. Support of avian surgical patients by IV administration of fluids and whole blood was stressed.

Petrak's second edition of *Diseases of Cage and Aviary Birds*<sup>17</sup> was published in 1982, and Harrison's *Clinical Avian Medicine and Surgery*<sup>18</sup> was published in 1986. More recent reference texts, such as *Avian Medicine: Principles and Application*,<sup>19</sup> *Avian Medicine and Surgery*,<sup>20</sup> and *Diseases of Cage and Aviary Birds*,<sup>21</sup> all contain comprehensive chapters on avian anesthesia and surgery.

Formation of the Association of Avian Veterinarians in 1980 was a major step toward dissemination of information on avian anesthesia and surgery.

Sharing of information was initially accomplished via annual conferences and newsletters and, later, through the *Journal of Avian Medicine and Surgery*.

Probably the most important event in the progress of avian anesthesia was Greg Harrison's introduction of isoflurane as an anesthetic agent for caged birds at the 1985 annual meeting of the Association of Avian Veterinarians. Not only did isoflurane substantially decrease the number of anesthetic accidents, but it made long, complicated surgical procedures possible.

Technologic advances and new techniques have also moved veterinary anesthesia and surgery forward. Air sac cannulation was introduced by Whittow and Ossorio as early as 1970,<sup>11</sup> and intraosseous cannulation for fluid administration was described by Ritchie in 1990.<sup>22</sup>

Use of monitoring devices, such as electronic thermometers, pulse oximeters, and cardiac monitors, has helped to increase survival of avian patients. The availability of radiosurgery, which I introduced to avian veterinarians during the early 1980s, has resulted in veterinarians being able to perform more complicated procedures in shorter periods of time with greater success. Magnification, microsurgery, and endoscopy have only been commonly used in avian practice during the last decade, but are important adjuncts to avian surgery. Because board-certified veterinary surgeons have become interested in avian surgery, surgical techniques have improved and surgical procedures have become more sophisticated.

Anesthesia and surgery on pet birds was almost unheard of until the late 1960s. Growing interest and expertise in avian medicine by a few pioneering practitioners and zoo veterinarians throughout the 1970s and early 1980s resulted in formation of a unifying special-interest organization and a dramatic increase in exchange of information during the late 1980s. The key to successful development and application of avian surgical techniques appears to have been the introduction of isoflurane as an anesthetic agent. It is anticipated that the practice of avian medicine and surgery will continue to grow rapidly as technologic advances are made.

<sup>1</sup>Equi-Thesin, Jen-Sal Labs, Kansas City, Mo.

<sup>2</sup>Ethaire, Evsco Pharmaceuticals, Oceanside, NY.

<sup>3</sup>Ambu-bag, Ambu Inc, Linthicum, Md.

<sup>4</sup>Metofane, Pitman-Moore Company, Indianapolis, Ind.

<sup>5</sup>Halsan, Fort Dodge Laboratories, Fort Dodge, Iowa.

## References

1. Mann J. *The American bird-keeper's manual*. New York: WD Ticknor, 1848.
2. Browne DJ. *The American bird fancier*. New York: C M Saxon, 1850.
3. The Philadelphia Bird Food Company. *The bird food company's book of cage birds*. Philadelphia: The Philadelphia Bird Food Co, 1884.
4. Stroud R. *Stroud's digest on the diseases of birds*. Minneapolis: LG Marcus and R Stroud, 1943.
5. Stroud R. *Diseases of canaries*. Kansas City, Mo: Canary Publishers Co, 1931.
6. Stroud R. *Diseases of canaries*. Kansas City, Mo: Canary Publishers Co, 1933.
7. Altman IE. Fractures of the legs of birds. *Veterinary excerpts* 1947;7:88-94.
8. Sanger VL, Smith HR. General anesthesia in birds. *J Am Vet Med Assoc* 1957;131:52-55.
9. Grono LR. Anesthesia of budgerigars. *Aust Vet J* 1961;37:463-464.
10. Arnall L. Anesthesia and surgery in cage and aviary birds. *Vet Rec* 1961;73:139-142.
11. Whittow GC, Ossorio N. A new technique for anesthetizing birds. *Lab Anim Care* 1970;20:651-656.
12. Friedburg K. Anesthesia of parakeets and canaries. In: Kirk RW, ed. *Current veterinary therapy*. Philadelphia: WB Saunders Co, 1964:406-408.
13. Gandal CP. Surgical techniques and anesthesia. In: Petrak M, ed. *Diseases of cage and aviary birds*. Philadelphia: Lea & Febiger, 1969:217-231.
14. Klide AM. Avian anesthesia. *Vet Clin North Am Small Anim Pract* 1973;3:175-186.
15. Arnall L. Anesthesia. *Bird diseases*. Arnall L, Keymer IE, eds. Neptune City, NJ: TFH Publishing, 1975:395-399.
16. Altman RB. Avian anesthesia. *Compend Contin Educ Pract Vet* 1980;2:38-42.
17. Petrak M, ed. *Diseases of cage and aviary birds*. Philadelphia: Lea & Febiger, 1982.
18. Harrison GJ, Harrison LR, eds. *Clinical avian medicine and surgery*. Philadelphia: WB Saunders Co, 1986.
19. Ritchie BW, Harrison GJ, Harrison LR, eds. *Avian medicine: principles and application*. Lake Worth, Fla: Wingers Publishing, 1994.
20. Altman RB, Clubb SL, Dorrestein GM, et al, eds. *Avian medicine and surgery*. Philadelphia: WB Saunders Co, 1997.
21. Roskopf WJ, Woerpel W, eds. *Diseases of cage and aviary birds*. Baltimore: The Williams & Wilkins Co, 1996.
22. Ritchie BW, Otto CM, Latimer KS, et al. A technique of intraosseous cannulation for intravenous therapy in birds. *Compend Contin Educ Pract Vet* 1990;12:55-59.

Forum continued on next page

# Emerging trends in pet bird diets

Ronald B. Reid, BA and William Perlberg, BS

More than 60% of households in the United States keep pets as companions. Among these special family members are more than 60 million cats, more than 50 million dogs, and more than 12 million birds.<sup>1</sup> With the pleasure of owning a pet comes the responsibility to keep them happy, well maintained, and healthy. Providing proper nutrition is extremely important.

Pets have provided companionship for thousands of years. However, serious study of their nutritional requirements probably did not begin until 50 to 75 years ago. The overwhelming popularity of dogs and cats encouraged many industrial firms and universities to study nutritional requirements of these pets. Companies, such as Ralston Purina, Nestle, Heinz, Mars, and others, evaluated and improved diets and continue to do so. During the past 10 to 15 years, the focus of animal nutritional research has been expanded to include the dietary requirements of exotic avian species.

Since 1942, one of the major activities of the National Research Council (NRC)'s Committee on Animal Nutrition has been collection of validated, established data describing nutritional requirements of certain species of animals, including several different types of pets (eg, dogs, cats, hamsters, rabbits). The NRC produces reports, published in peer-reviewed journals, that summarize available data on the nutrient requirements of animals in various species categories and provide information on how to apply these data to best meet nutritional needs of these species. Among the NRC recommendations are minimum and maximum values for protein, fat, fiber, trace nutrients, and micronutrients. These NRC publications are revised from time to time to ensure that they contain up-to-date information.

Data published as a result of the efforts of the NRC are usually accepted by regulating agencies as actual dietary requirements that must be met before a manufacturer can make a label claim that a product is a nutritious food for a particular species. For dogs and cats, nutritional trials that include growth, lactation, and maintenance periods are necessary to substantiate that manufactured foods are nutritionally complete. Because of this, our pets probably receive far better nutrition than we do.

Whereas a wealth of nutritional information exists for dogs, cats, and certain rodents, no NRC publication exists that describes nutritional requirements of ornamental or companion birds. The Association of Avian Veterinarians and the Pet Food Committee of the American Association of Feed Control Officials are attempting to establish and document nutrient require-

ments for pet birds. Protocols are currently in preparation or under review for feeding trials. Most published research on nutritional requirements of avian species involves birds that currently have a place in the food chain, such as chickens and turkeys. With the increase in popularity of pet birds, many companies, including ours, spend considerable time in the development of nutritious, attractive, and palatable diets for these species.

Because of substantial physiologic differences between avian and mammalian species, nutritional requirements differ. Birds are "warm-blooded" and have a high body temperature (40 to 42 C [105 to 108 F], varying with species) and heavy musculature for flight. To maintain body temperature and convert food quickly to energy for flight, their metabolic rates are high.

Birds' anatomy is also quite different from that of mammals. Birds do not have the well-defined salivary glands that mammals possess, and they do not chew their food. Seeds and other foods are swallowed quickly in anticipation of flight from a predator. Mammals chew their food and begin the digestive process by introducing an enzyme into the food from the salivary glands. Birds have shorter digestive tracts than do mammals, and food has to be converted quickly. Mammals have a well-defined stomach that allows retention of food in the digestive system for a longer time. Food passes quickly through birds. These differences require that the bird's digestive system be capable of converting food to energy rapidly. The higher body temperature of birds also aids in metabolic efficiency by increasing the efficiency of digestive enzymes.<sup>2</sup>

Energy requirements vary from species to species.<sup>3-6</sup> Nevertheless, it is generally accepted that, on a body-weight basis, birds consume large amounts of food, compared with other species. For example, a parakeet allowed out of its cage for extended periods consumes approximately 25% of its body weight per day. A dog or a cat that lives indoors and engages in a normal amount of exercise only consumes approximately 1 to 2% of its body weight per day.

Early formulated diets were developed on the basis of ornithologists' observations of birds' eating habits in feral environments. Ornithologists classified birds according to their observed eating habits and not according to nutritional needs. Classifications included flesh eaters (birds of prey), fruit eaters (lories, toucans, mynah birds), and seed eaters (parrots, finches, canaries, budgerigars).<sup>7</sup> Many large psittacine birds were forest birds that fed on nuts, seeds, berries, fruits, nectar of flowers, insects, and larvae. Ornithologists concluded that these components made up nutritionally complete diets for each species. These observations were extended, by chance or design, to develop diets

From L/M Animal Farms, Hartz Division, 10279 State Rte 132, Pleasant Plain, OH 45162 (Reid) and Hartz Mountain Corporation, 400 Plaza Dr, Secaucus, NJ 07094 (Perlberg). The speaker was Mr. Reid.

for most birds kept as pets. It is not clear whether these diets were nutritionally adequate or maximized birds' well-being or life spans.

Early diets for birds consisted of seeds without supplementation and, often, caused low-grade malnutrition with concurrent vitamin, mineral, and amino acid deficiencies. These deficiencies shortened the life span of pet birds. Nutritional deficiencies can lead to immune dysfunction and cause birds to be susceptible to infectious disease, obesity, and metabolic or biochemical derangements.

As a result of captive breeding, we are no longer dealing with wild birds, *per se*, and we recognize the fact that a diet composed of more than seeds is necessary for longevity. Diets based on poultry formulations can also cause problems in pet birds. Poultry diets are formulated for maximal growth, optimal carcass composition, or egg production. Studies conducted on cockatiels<sup>6</sup> have revealed that these diets are insufficient for pet birds.

Diets consisting of seeds alone with no other supplements have been used for many years to feed pet birds. We now recognize that a diet consisting only of whole seeds can lack, or provide improper amounts of, essential nutrients (eg, inappropriate calcium-to-phosphorus ratios; insufficient levels of essential amino acids, such as lysine or methionine; insufficient vitamin and mineral content).<sup>9</sup>

Seeds can be used as the primary food source for many birds, especially smaller, exotic birds such as canaries, finches, parakeets and cockatiels. Manufacturers must ensure that essential nutritional components (seeds and additives) are properly introduced into the blend. Newer diets incorporate pelleted feed that is attractive to birds. For birds that do not accept pellets, proper impregnation of dehulled seeds with nutrients is necessary.

Most birds kept as pets dehull seeds before swallowing. Putting nutrients onto the hulls of seeds can defeat the purpose of supplementation.<sup>8</sup> When birds remove and discard hulls, they also remove most of the nutrients with which hulls have been impregnated. Proper supplementation requires that hulls be removed from seeds and then vitamin/mineral nutrients be impregnated into seeds' kernels. This creates a "mini-vitamin pill" that can be incorporated into the seed blend.

Care must be taken to ensure that diets are fresh. As seeds age, they deteriorate, losing palatability (caused by oxidation of fats) and nutrients. Most manufacturers recommend that supplements include fresh fruits, vegetables, and sources of calcium, such as cuttlebone and mineral beak treats. This is particularly important for seed-based diets. Some newer seed blends include dried fruits and vegetables that serve as valuable sources of essential nutrients.

Whereas quantity of protein in the diet is important, protein quality is critical. Proportions of different amino acids affect protein quality. Several amino acids are essential in birds' diets. The ratio of essential-to-nonessential amino acids also affects protein quality. Some seeds contain high-quality protein yet are low in lysine and methionine. By using the proper blend of

seeds and supplements, balanced amino acid intake is assured.

Attempts to fortify seed diets by use of pellets, powders, or liquid additives have not always been successful. Although label claims have improved, birds are not guaranteed to actually consume all dietary components. No matter how well formulated diets appear, unless consumed by birds, they are of little value. Whereas many birds do adapt to different diets, some will not accept pellets readily and must be weaned onto the diet slowly or maintained on seed if too much weight is lost.

We are now seeing new trends in avian diets. With the development of pelleted and extruded diets, selectivity is removed from birds' eating habits. Pelleted and extruded diets offer many advantages over conventional diets, including increased stability and consistent composition. These diets have been a great advance in feeding pet birds. Pelleted diets for larger pet birds were developed as deficiencies were identified in larger psittacine birds.

Trends for pelleted and extruded diets include different colors and shapes. Birds have keen eyesight, and the color of food may influence their choices. Texture and food preparation also affect acceptance. Food choices are influenced by early eating habits, imitation of other birds, and current diet.

Where are we today? Birds on seed diets may be converted to pelleted and extruded diets supplemented with fresh fruits and vegetables. Many birds hesitate to try new foods, and owners may fear that their birds may starve to death during conversion. This may cause owners to return birds to their previous, possibly inadequate, diets.<sup>3</sup> Dietary changes must be accomplished by slowly increasing the proportion of the nonseed component. Some birds, such as budgerigars, may never be fully converted to consuming a strictly pelleted diet.

Today, it is common to offer a combination diet of pellets, seeds, and fruits. However, studies have shown that when this choice of feed is available, individual birds can become selective and seed consumption can predominate. Nutritional deficiencies may result. Again, it is necessary to conduct feeding trials to verify the nutritional value of a basic diet.

Although pelleted and extruded diets are gaining popularity, one must be aware of differences that exist between formulated diets. One should not determine the actual feeding value of foods solely on the basis of results of laboratory analyses. Pet foods with similar claims for nutritional adequacy and being a "complete" or "total" diet may produce different results in feeding trials versus chemical analyses. Claims that a given formula is a "complete diet" should be confirmed in feeding trials, using the species of bird for which the food is intended.

Because of the popularity of pelleted diets, new nutrition-related problems have become evident. It has been suggested that low fiber in these diets may interfere with normal development of musculature of the gizzard.<sup>10</sup> Some experts in avian nutrition now recommend supplementing pelleted diets with fresh fruits and vegetables to increase fiber consumption.

Products are being introduced for hand feeding young birds. Foods are also being developed for various life stages (eg, grower-breeder diets, maintenance diets). Careful feeding studies are required to determine how nutrient requirements for immature birds differ from those of adults in terms of energy, protein, fat, and micronutrients.

As do other species, birds consume foods for energy. Too high a caloric intake, however, can reduce consumption and reduce intake of other essential nutrients. Many seed diets contain too much fat for sedentary birds (eg, too many sunflower seeds). Captivity reduces competitive and environmental stress and locomotion. Energy needs, therefore, are reduced. Current formulated and seed diets take these factors into account.

What does this mean for manufacturers of pet bird diets and for veterinarians and others concerned with the care and feeding of pet birds? As the popularity of birds increases, manufacturers must become more responsive to birds' dietary needs. Diets need to be carefully formulated. Formulations must be developed on the basis of sound, scientific principles, and diets must undergo feeding trials. Manufacturers need to encourage and support in-house and independent research programs. Veterinary schools and referral centers must promote teaching and research in avian

nutrition in their institutions, and practicing veterinarians must improve their (and their clients') understanding of the care and feeding of pet birds.

## References

1. American Pet Products Manufacturers Association. 1996-1997 APPMA national pet owners survey. Greenwich, Ct: APPMA, 1997;165-196.
2. McDonald SE. Anatomical and physiological characteristics of birds and how they differ from mammals, in *Proceedings. Annu Conf Assoc Avian Vet* 1990;372-389.
3. Taylor EJ, Nott HMR, Earle KE. The nutrition of the canary (*Serinus canarius*). *J Nutr* 1994;124(Suppl):S2636-S2637.
4. Kamphues J, Meyer H. Basic data for factorial derivation of energy and nutrient requirements of growing canaries. *J Nutr* 1991;121(Suppl):S207-S208.
5. Earle KE. Calculations of energy requirements of dogs, cats, and small psittacine birds. *J Small Anim Pract* 1993;34:163-173.
6. Kirkwood JK. Energy requirements for maintenance and growth of wild mammals, birds, and reptiles in captivity. *J Nutr* 1991;121(Suppl):S29-S34.
7. Nott HMR, Taylor EJ. Advances in our understanding of the nutrition of pet birds. *Wien Tierarzt Mschr* 1994;81:135-140.
8. Roudybush TE. Growth, signs of deficiency, and weaning in cockatiels fed deficient diets, in *Proceedings. Int Conf Avian Med* 1986;333-340.
9. Ullery DE, Allen ME, Baer DJ. Formulated diets versus seed mixture for psittacines. *J Nutr* 1991;121(Suppl):S193-S204.
10. Lumcij JT, Zijp MNM, Schippers R. The acceptance of a recently introduced extruded parrot food in The Netherlands. *Israel J Vet Med* 1996;51:161-164.

## Perspectives on pet bird welfare from the pet industry

N. Marshall Meyers, LLB

Although pet birds have been a part of our social fabric for centuries,<sup>1,3</sup> the pet bird industry is a relatively new phenomenon. During the late 1880s, a small pet store in Omaha (Geislars) imported 100,000 birds. In 1926, a young immigrant began importing canaries from the Hartz Mountains, and an industry was born. Today, pet bird ownership is common, with approximately 6 to 8% of US households owning one or more birds. According to the most extensive demographic study<sup>4</sup> of pet birds conducted to date, the US pet bird population ranges from 35 to 40 million. Other studies<sup>5,6</sup> indicate that the bird population approximates 13 million.

The pet bird industry, like the entire pet industry, is undergoing tremendous change. Consolidations and mergers are happening in virtually every segment of the industry. Traditional channels of distribution are becoming commingled, mass merchandisers and superstore chains are expanding their product lines

and companion animal departments, and the industry is witnessing a reduction in the number of traditional pet stores. Distribution of pet birds continues to be difficult, because no large national distributors exist. Breeders and importers sell pet birds at every level of distribution, including wholesale, retail stores, and directly to breeders and other consumers.

With the advent of pet superstores and increased involvement of mass merchandisers, the pet industry is experiencing a resurgence of interest in birds as pets. Increased exposure to new, innovative products and the availability of a variety of affordable species are stimulating slight growth. Industry data indicate annual growth of approximately 5%. A saturation point, however, may have been reached for certain species, primarily amazons, macaws, and cockatoos.

Notwithstanding emotionally charged campaigns against the pet bird trade, the pet industry has long been concerned about the welfare of pet birds. This has been demonstrated through development of innovative wellness care products, improved colony housing techniques and protocols, and attempts (often ignored) to

From Pet Industry Joint Advisory Council, 1220 19th St NW, Ste 400, Washington, DC 20036.



attain government assistance in ensuring humane treatment of birds.

Although the pet industry is indebted to a number of early pioneers who worked with the industry, such as Drs. Theodore Lafever, Robert Altman, Margaret Petrak, Jack Gaskin, Susan Clubb, Greg Harrison, David Graham, Kevin Flammer, and Walter Roszkopf, historic distrust displayed by many in the veterinary community toward the pet industry has done little more than exacerbate a schism that need not exist. Contrary to popular belief, it makes no economic, let alone public relations, sense for one to knowingly and willfully sell sick, diseased, or dying birds. Commercial establishments, such as retail pet stores, are in the public eye and are easy targets for negative press or disenchanted consumers.

### **Pet Products**

Prior to discussion of a number of issues directly involving capture, breeding, transport, quarantine, and sale of pet birds, a few comments regarding the pet industry's advances in care products are warranted. Throughout the years, consumers have witnessed important advances in the design of myriad products benefiting their pet birds. Innovative products include, but are not limited to, improved habitats and cage designs, incubators and brooders, bedding, identification systems, socialization devices, foods and nutritional supplements, vaccines, miticides, species-specific books, consumer magazines dedicated to avian care, and protocols for hand-rearing, treatment of disease, and husbandry. Concern about public health issues, primarily psittacosis, led to development of medicated foods and drugs to treat and prevent zoonoses.<sup>7</sup> This was the first avian research project funded by an industry association rather than individual product manufacturers. Although the origin of these treatments can be traced to the early 1950s, when the pet bird industry established preexport quarantine facilities, research is ongoing.

Pioneering work by Drs. Susan Clubb and Jack Gaskin led to a number of advances in bird welfare, including vaccines (reovirus, Pacheco's, and parrot pox), ability to determine antibiotic concentrations, methods for dealing with infectious and parasitic diseases, and development of treatment protocols, breeding strategies, and husbandry regimens for colony-housed birds.

### **Avian Import Program**

Whereas the avian import quarantine program was designed to prevent introduction of exotic Newcastle disease to the United States, the program was fraught with problems when it came to ensuring humane husbandry and adequate veterinary care. Despite pleas from the pet industry, the USDA was reluctant to allow prophylactic procedures or adopt industry-sponsored design changes to enhance the welfare of birds during quarantine. The USDA usually recommended depopulation when the slightest signs of Newcastle disease appeared. As a result, rejection of imported birds and quarantine-associated mortality reached unacceptable levels.

By 1984, 913,653 birds were imported, of which 250,000 birds (primarily cockatiels) were captive-bred. Because of increases in captive breeding, market saturation, and antitrade initiatives, only 287,631 birds were imported the year prior to implementation of the **Wild Bird Conservation Act (WBCA)**. In fiscal year 1997, 124,804 birds were imported.

Although advances were made in avian medicine as a result of postquarantine research, the USDA hindered implementation of several much needed procedures intended to substantially reduce mortality during quarantine. Industry requests to implement uniform colony housing standards, minimum ventilation standards, maximum cage-stocking densities, minimum sanitation standards, use of appropriate disinfectants, waste disposal during quarantine, minimum food and water requirements, ELISA testing for chlamydia, and prophylactic and disease treatments during quarantine that would not interfere with testing for Newcastle disease were rejected.

The US Fish and Wildlife Service import procedures also exacerbated the process. Imported birds were often retained at airports rather than transferred to quarantine stations, where shipments and accompanying paperwork could be inspected and verified during the 30-day quarantine. Instead, shipments were held at airports while inspectors checked paperwork, opened containers to inspect birds, or simply arrived late to clear shipments. At some ports, inspectors still find it difficult to inspect shipments during normal business hours, so shipments have to wait until overtime pay rules come into effect.

Despite the initial reluctance of the USDA to approve certain husbandry reforms, pet industry initiatives did reduce quarantine mortality and morbidity from approximately 25 to 9.5%. Several major importers reported that less than 4% of birds were lost during transport and quarantine; for many parrot species, losses were less than 2%. These results were clearly attributable to improved shipping standards and better husbandry being provided during quarantine. Unfortunately, the situation did not improve quickly enough to stave off antitrade campaigns of some veterinarians, humane organizations, and environmental activists.

### **Wild Bird Conservation Act**

Recognizing that the status quo was not acceptable from an environmental or humane standpoint, representatives from organized pet industry and the American Federation of Aviculture actively participated in the Cooperative Working Group on Bird Trade convened by the World Wildlife Fund. This group represented an attempt to develop a rational, pragmatic management framework for trade of wild birds that met criteria for sustainable use and ensured humane capture, conditioning, and transport.<sup>8,9</sup>

Unfortunately, a humane organization represented in that community bolted in the eleventh hour to introduce legislation calling for total prohibition rather than rational management of a renewable resource. The schism widened, and hope for a cooperative initiative with the animal welfare and environmental communi-

ties evaporated. Ultimately, the WBCA of 1992 became law.

The pet industry supported, and continues to support, restructuring of existing regulations governing importation of wild-caught birds so that recommendations developed at the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) can be implemented. Incentives (including habitat conservation incentives) can be provided to range states that desire to rationally use natural resources in conformance with sustainable use criteria, and a management system can be established that includes monitoring and export and import control components. Fundamental to the WBCA is a requirement that regulatory mechanisms address humane treatment and welfare of birds during capture and transport.<sup>10,2</sup>

What has the WBCA accomplished during the 5 years since it was passed? Captive breeding has increased in the United States. International trade in captive-bred and wild-caught CITES-listed pet birds<sup>b</sup> that involves the United States has virtually been shut down; however, trade flourishes among other parts of the world. Regulations governing importation of captive-bred birds have not been finalized by the US Fish and Wildlife Service, Congressional appropriations have been virtually nonexistent, the US-mandated mechanism governing sustainable use regimes for harvesting wild-caught birds are a *de facto* trade ban for the United States only, and range state assistance is nonexistent.

Interestingly, US-sanctioned management regimens must provide for conservation of species at optimal levels. Affected species include pest species that are, in some instances, being exterminated or subjected to rigorous population reduction programs. These programs can scarcely be described as humane in their execution. Are firebombs, shotguns, or poison humane?

### **Transportation Standards**

The pet industry, recognizing that quarantine morbidity and mortality, as well as shipping conditions, were not acceptable, has worked closely with veterinarians and the airline industry to address transportation welfare issues. For more than 20 years, *Pet Industry Joint Advisory Council* (PIJAC), as the pet industry's representative, has participated as an observer in the *International Air Transport Association's Live Animals Board*, a trade association that adopts uniform regulations designed to ensure humane transport. Industry input has resulted in improved container design, establishment of preshipment conditioning standards, and development of handling standards for acceptance, transport, and arrival. More importantly, pet industry involvement has alerted carriers that the industry expects humane handling. Evaluation of animal transport is an ongoing process that could greatly benefit from increased input from the veterinary community.

These cooperative efforts have resulted in significant decreases in transportation-related mortality for bird shipments. Studies conducted in Belgium,

Denmark, France, Germany, the United Kingdom, and the United States have revealed a decline in mortality from 7.2% in 1982 to 1.4% in 1996. Incidence of mortality was lowest for psittacine species and large birds; in fact, the mortality rate of these species has remained consistently at 1% or less for approximately 10 years. Despite such a positive outcome, disinformation campaigns, conflicts among aviculturists and certain members of the veterinary and environmental communities, and well-orchestrated, cause-driven campaigns have resulted in airline embargoes and adoption of WBCA regulations that severely limit, if not virtually paralyze, importation of captive-bred and wild-caught CITES-listed species. As stated previously, this approach has done nothing to enhance welfare in nations that export birds to countries other than the United States.

Humane transportation is also part of the CITES agenda. Attempts to adopt resolutions imposing trade bans on species experiencing undefined high mortality rates have met with heavy opposition and ultimate defeat. Statistically reliable data on mortality and morbidity rates related to shipment, as well as causes thereof, are simply not available. To ascertain causes of mortality by species, country of export, exporter, airline, season of the year, routing, container design, and stocking density, PIJAC successfully argued that problem shipments must be evaluated. Furthermore, PIJAC believes that remedial measures should be implemented prior to instituting a total ban. Such an approach takes into account anomalies identified when problems are the result of isolated incidents. Hopefully, revised procedures will be instituted before the next *Conference of the Parties* in 1999. This is a perfect opportunity for the pet industry, the veterinary community, and the welfare community to work together constructively to identify problems, isolate causes, and implement remedial measures to ensure humane transport.

### **Educational Initiatives**

Because more than half of pet bird owners turn to pet stores for advice on how to care for their birds and information on new products,<sup>3</sup> the pet industry is continuing to explore new ways to disseminate adequate and accurate information. As part of a long-term commitment to enhance professionalism within pet stores, the industry has established 2 certification programs covering the following 6 basic animal types commonly maintained in pet stores: avian, canine, feline, freshwater fish, reptile, and small mammal. These programs are reviewed and updated at least annually and are designed and critiqued by a panel of leading veterinarians who are knowledgeable regarding the species and appropriate regimens for colony husbandry and health management.

The educational initiatives of PIJAC are designed to provide guidelines for proper caging, perch size and lengths, recognizing signs of illness, and nutrition. Such training helps pet store personnel educate prospective pet bird owners about appropriate, healthy care for their birds.

The *Certified Avian Specialist Program* targets

store owners and managers for advanced training. This program, taught by experienced avian veterinarians, is designed to provide supervisory personnel with adequate information to manage avian colonies in a pet store environment. Avian and reptile seminars of PIJAC are well attended by practitioners and veterinary technicians.

Completion of a certification program entails successfully completing the seminar module and a home study module. The course of study covers 5 areas of avian husbandry and health care, including receiving birds, health maintenance and nutrition, disease and disorder recognition, treatment and prevention, and first aid emergency treatment. The program provides practical advice as well as techniques for ensuring well-run and healthy aviaries. Topics addressed include the following:

- Intake examinations by qualified store personnel
- Isolation procedures for sick animals
- Housing requirements
- Nutrition
- Health maintenance and husbandry plans
- Sanitation procedures
- Emergency procedures
- Storage of veterinary supplies
- Use and maintenance of health records
- Disease and disorder recognition, prevention, and treatment
- Administration of medications
- Acceptance and rejection standards

Central to the success of these programs is involvement of veterinarians who work with the store on an ongoing basis. To ensure adequate husbandry practices, promotion of animal health, and disease prevention, PIJAC urges pet stores, breeders, and avian importers and wholesalers to use the services of consulting veterinarians. Use of written protocols for husbandry, handling, maintenance, and veterinary care is recommended by PIJAC to ensure that all parties understand their respective roles and to reduce the likelihood of disputes. Protocols should address the following areas:

- Receiving
- Examinations
- Quarantine period
- Prophylactic procedures
- Sanitation
- Feeding and watering
- Caging
- Disease screening
- Disease control

Earlier this year, PIJAC launched its **Animal Care Handler (ACH)** program, an in-store video training program for entry level and inexperienced pet store personnel about species of birds normally sold by pet stores. Many retailers are using this program to train all staff members, whether or not they handle birds, so they are knowledgeable about pet birds' basic needs. This helps these employees effectively deal with customer inquiries or product sales.

The ACH Program, which currently consists of 4 videos and a detailed resource guide, addresses the following issues:

- Receiving and examining birds, including rejection policies, recognizing signs of illness, and in-store treatments
- Maintaining birds, including sanitation procedures
- How to handle birds, including how to clip wing feathers and tame birds, as well as explanations of products needed to ensure health, comfort, control, and adequate housing and nutrition
- How to sell birds, including merchandising, sales approaches, and educating consumers

The ACH program also includes supervised on-floor training, during which the trainee is required to perform certain functions to demonstrate his or her understanding of the materials. Once the candidate passes a series of quizzes and a more comprehensive final examination, the candidate is certified as an ACH for the animal group studied.

Both programs contain daily and weekly sanitation and maintenance procedures and include admonitions against diagnosing, prescribing, or recommending medical treatments to others. Materials addressing health problems are designed to educate handlers about commonly encountered diseases or conditions, incubation periods, clinical signs, and treatments. In most instances, the recommended treatment is to consult a veterinarian. Staff members at a number of animal shelters are using PIJAC's reference manuals for inspecting pet stores and managing their own shelter colonies.

Plans call for expansion of the video series to encourage professional evaluation of what birds need rather than what we perceive as being essential for them. Education is required to lessen inappropriate anthropomorphic responses that result in inappropriate husbandry practices. Also, PIJAC is developing a training video and supplemental print materials on "How to inspect a pet store" to assist stores and inspection agencies in meeting minimum standards for maintaining companion pets under colony housing conditions and is exploring the feasibility of making educational programs available via the Internet. The success of each of these initiatives is dependent on acceptance by, and involvement of, the veterinary and animal welfare communities.

### **Looking to the Future—Is There One?**

Breaking down barriers of distrust among veterinarians, humane societies, environmental organizations, and the pet bird industry is critical to improving pet bird welfare. Although this will not be achieved easily, particularly because certain segments have competitive agendas, the pet industry wants to work toward cooperative programs.

The pet industry has much to offer, especially in terms of practical, pragmatic experience, knowledge of problems encountered, and exposure to millions of birds. It should not be forgotten that most bird owners do not use the services of veterinarians and that avian

practitioners usually only see birds with problems, often when these birds are in extremis. The veterinary community needs to be educated in colony housing techniques (or flock management) so that they are familiar with common practices.

Hopefully, this will assuage the often ill-conceived notion that all pet store birds suffer from malnutrition. This belief became established as a result of veterinarians examining malnourished birds that their clients had purchased from stores months before the examination. Instead of ascertaining whether their clients had provided nutritionally complete diets during the time that these clients had owned their birds, veterinarians would credit the birds' condition to improper management by pet store personnel. In many cases, pet store personnel had properly maintained the bird and had recommended a nutritionally complete diet that the owner did not follow. A concerted effort is required to avoid judgements made on the basis of limited, and often, inaccurate, unscientific information.

Advances in avian husbandry during the past 20 years have clearly benefited pet bird welfare. Inclusion of courses in avian medicine in veterinary school curricula, coupled with an increase in the number of veterinarians in avian practice, will lead to further advances in the following areas of bird welfare:

- Nutrition
- Breeding strategies and techniques
- Humane transport
- Therapeutics
- Wellness promotion
- Geriatric medicine
- Identification systems
- Genetic analysis
- Socialization
- Behavioral problems, including self-mutilation and aggressiveness
- Handling of unwanted birds

The pet industry, through The Pet Care Trust, is helping to fund Branson Ritchie's work on proventricular dilatation in parrots, Kevin Flammer's study on doxycycline-medicated drinking water to control chlamydiosis in cockatiels, and Susan Orosz's work examining environmental enrichment and behavior in Amazon parrots; however, the industry, practitioners, veterinary schools, and humane community need to explore ways to enhance the limited liaison that currently exists and expand educational opportunities for

gaining expertise in avian medicine and pet bird welfare. Educational opportunities should include exposure to, and understanding of, the pet industry.

Because only 11% of bird-owning households currently seek veterinary advice,<sup>6</sup> meaningful dialogue and liaison would provide an opportunity for the veterinary community, the humane community, and the pet bird industry to jointly develop and disseminate educational materials targeting not only the pet industry but also veterinarians, the humane community, and pet bird owners. In addition, PIJAC is currently evaluating mechanisms for industry facility accreditation. To ensure its success, veterinary inspection and verification would be an integral part of the program. Finally, to those pioneering avian veterinarians that have gone out on a perch, the pet industry is indebted.

<sup>1</sup>Depending on species, preexport mortality estimates ranged from 0 to 2% for cockatoos to 5% for Indian species to 10 to 60% for certain African finch species, some of which were subjected to extermination programs. Many estimates were not buttressed by scientific methods.

<sup>2</sup>CITES-listed species include species subjected to scientific review (Appendices I and II) and species that are listed by a country to facilitate its own aims. Species in Appendix III are not subject to scientific scrutiny, review, or adoption by the parties to the Treaty; these listings are made unilaterally.

## References

1. Beck AL, Katcher AH. *Between pets and people: the importance of animal companionship*. West Lafayette, Ind: Purdue University Press, 1996.
2. Beck AL, Katcher AH. Bird-human interaction. *J Assoc Avian Vet* 1989;3:152-153.
3. Beck AL, Meyers NM. Health enhancement and companion animal ownership. *Annu Rev Public Health* 1996;17:247-257.
4. Kaytee Products Inc. *Kaytee educational series*. Vol 1. Chilton, Wis: Kaytee Products Inc, 1988.
5. American Pet Products Manufacturers Association. *1996/1997 national pet owners survey—revised*. Greenwich, Conn: American Pet Products Manufacturers Association, 1997;2-3, 165, 168.
6. American Veterinary Medical Association. *US pet ownership and demographics sourcebook*. Schaumburg, Ill: AVMA, 1997;115.
7. Schachter J, Bankowski RA, Sung ML, et al. Measurement of tetracycline levels in parakeets. *Avian Dis* 1981;23:295-302.
8. The Cooperative Working Group on Bird Trade. *Findings and recommendations*. Washington, DC: World Wildlife Fund, 1990.
9. Thomsen JB, Edwards SR, Mulliken TA. *Perceptions, conservation and management of wild birds in trade*. Cambridge, UK: Traffic International, 1992.
10. Morgan D. *International trade in wildlife—a review of sustainable use*. Peterborough, UK: Joint Nature Conservation Committee, Department of the Environment, 1991.

# Captive management of birds for a lifetime

Susan L. Clubb, DVM

Animal welfare issues typically address immediate concerns of proper housing, husbandry, nutrition, and veterinary care. We must also consider long-term welfare and how veterinarians can influence quality of life for pet birds during all stages of their lives. This report focuses on psittacine birds, because they are the species of birds most often referred for veterinary care.

Passage of the Wild Bird Conservation Act of 1992 dramatically changed the welfare of birds destined for US markets. It curtailed importation of wild-caught birds listed in the appendices of the Convention on Trade in Endangered Species of Fauna and Flora (CITES). But it also dramatically changed many aspects of the pet bird industry in the United States. It forced the US pet trade to rely on birds bred in captivity in the United States. As anticipated, American aviculturists responded with increased production to fill the demand for pet birds previously supplied by importers of wild-caught and captive-bred birds.

Although international trade of birds and corresponding humane and welfare concerns are no longer major issues in the United States, the domestic welfare of birds must still be considered. Issues, such as long-term management of birds, need to be addressed. The US pet bird market is geared toward companion birds that are usually tame and have the ability to talk or mimic. Our education process has emphasized to the public that these birds, which are primarily hand-raised, make the most desirable pets. In part, such education was an attempt to shift the pet-buying market from wild-caught birds to captive-bred birds.

## Disposable Pet Birds

The disposability of pets, including birds, is a problem that is encountered often in our mobile society. Birds are donated daily to zoos around the country. Unfortunately, many pet birds are given up within a few years of being brought into their owners' homes. Sexual maturity and resultant behavioral changes are inevitable in pet birds. Bonding (pair formation) with a single person, displaced aggression, sexual frustration, and destructive behavior are among behavioral changes that may render birds undesirable companions.

Numerous reasons are cited for giving up pet birds. Typical reasons include not having enough time to spend with the bird, wanting the bird to have a better home, arrival of a new family member (eg, wife, baby), or complaints from neighbors. Actual reasons for getting rid of a pet bird may be unexpressed and include the bird's screaming, aggression (biting certain members of the family and bonded to a single person), feather-plucking or self-mutilation, or messiness. In many cases, owners simply do not have accurate

expectations when they purchase parrots or have not been properly educated and made aware of normal psittacine behavior. Owners often are not aware that destroying fruit or foliage is normal behavior for wild birds, that screaming at dawn and dusk is socially important behavior for wild social parrots, and that biting may be a normal fear response or a means of expressing territoriality. These behaviors may be intensified in poorly managed, neglected, or sexually mature parrots.<sup>1</sup>

What are the alternatives for owners experiencing behavioral problems in pet birds, especially behavioral problems induced by sexual maturity? Owners may elect to retain the bird and tuck it away in a garage or corner to avoid the annoyance and effectively compound the problem, or they may seek the assistance of a veterinarian or animal behaviorist. Many behavioral problems can be corrected by positive-reinforcement training, gaining the trust of the bird, and behavior modification. Often, behavioral problems are unsuccessfully addressed as medical problems. Owners may elect to provide a mate or companion for the bird and allow it to breed. Or they may sell, donate, or trade the bird to another person as a pet or breeder.

## Life Stages of Parrots

To better manage parrots, it is necessary to consider their life stages. Parrots' life stages include the neonatal and juvenile, adult reproductive, and postreproductive stages. The neonatal and juvenile stage is a time when pet quality is highest. Young parrots are typically tame, affectionate, responsive, and playful. Some parrots retain these qualities, especially if they have been well managed and given adequate time and attention on a one-on-one basis. For many birds, however, this stage is short, and as sexual maturity approaches, their temperaments and behaviors change.

The adult reproductive stage is the longest period of the bird's life. During this time, birds may display behaviors considered undesirable for pets. An examination of breeding and medical records from Parrot Jungle and Gardens indicated that the reproductive life span of macaws ranges from 4 to 35 years of age. Maximum production was found to take place between 8 and 26 years of age. The maximum life span of macaws that had lived at the park all or most of their lives was 55 years. Longevity and breeding life span of other psittacine species has not been well documented even for small, highly domesticated species. This information may be important for effective management of pet bird populations.<sup>2</sup>

Working with old macaws and other old birds revealed that birds in the postreproductive stage are quieter and calmer than younger birds. Many older birds could be returned to use as pets, especially if they were initially tame. For larger psittacine species, the

From Parrot Jungle and Gardens, 11000 SW 57th Ave, Miami, FL 33156.

length of this period may exceed that of the neonatal and juvenile stage.<sup>2</sup>

The quality of pet birds can be influenced by the care extended to them during the neonatal and juvenile stage of life. Birds may be parent-reared, partially parent-reared and partially hand-reared, parent-reared with handling in the nest, hand-reared in virtual isolation, or hand-reared in groups. Long-term consequences of various rearing practices are controversial, but no reliable data is available to clarify the effects. Until definitive surveys or studies are available, conclusions drawn will be conjecture. It is often reported by lay behaviorists that certain training or behavior modification techniques applied during the reproductive stage of life will maintain qualities that make birds good pets. Many birds display behavioral changes only during the natural breeding season and remain manageable pets during other times of the year. As birds mature, placement in breeding programs may be the answer for many pets with undesirable, sexually induced behavioral changes.

Socialization is another important issue. We often substitute human socialization for socialization with other parrots in an attempt to create a better pet. If the only social contact the bird has is human beings and the bird is neglected, problems often ensue. Most species of parrots are highly social creatures and this must be considered, especially when birds are kept as single pets.

Neonates should be prepared for their ultimate use. Many people believe that birds destined for use as breeding stock should not have close contact with human beings and should be parent-raised. A controversy is currently raging in the United States and Europe concerning hand-rearing of certain species, such as male moluccan cockatoos (*Cacatua moluccensis*). It is believed by many, but unsupported by scientific data, that male moluccan cockatoos will not be successful breeders if they are hand-reared. However, anecdotal evidence aptly illustrates that hand-reared birds of many species can breed successfully. For species for which wild populations are declining, this may be an important issue.

### Retirement

The postreproductive stage of birds' lives may be a time of stressful relocation and disposal. It is not easy to recognize when birds are mature or old. Exact determination, or even accurate estimation, of age is impossible for many birds. Old birds retain the color intensity of their plumage with proper care. Other subtle differences, such as changes in color and quality of the iris, changes in skin and beak texture, posture, and the appearance of the gonads can be used to recognize old birds. Many wild-caught birds currently being used as breeders are probably nearing retirement age. In coming years, we may be faced with a "baby boomers reaching retirement age" scenario similar to that facing human beings in the United States.

Selling "used" birds is another issue that needs to be examined. Retired breeders, birds that are given up as pets, or birds that are deemed unsuitable to be kept as pets are often traded, sold, or auctioned at bird fairs,

shows, sales, and auctions. These birds are often misrepresented, may be diseased, and are typically sold to novice collectors or breeders. Because of the potential resale value of culled breeder birds, owners or breeders may be reluctant to give these birds up for adoption and rehabilitation as companions. These birds may be cycled from one breeder to another. Certainly some birds that have not bred successfully for one breeder may become productive when moved to another facility.

Retirement sanctuaries, parrot rescue organizations, adoption centers, and facilitators may be able to provide homes for many birds. One such facility is owned and operated by Robert and Elizabeth Johnson in Loxahatchee, Fla. In a series of large flight aviaries maintained at their home, a population of 77 macaws and numerous other parrots coexist with adequate space to fly and interact in a highly social environment. The Johnsons believe that spatial requirements for each bird are at least 1,000 ft<sup>3</sup>/lb of bird (eg, an Amazon parrot would require an enclosure measuring 10 ft × 10 ft × 10 ft). Space prevents overcrowding and reduces aggression; however, in any communal enclosure, aggression is always a potential problem. While watching these birds in their spacious enclosures, the Johnsons have observed many social behaviors. They have observed that juveniles do not usually form permanent bonds but instead develop a series of bonds. When birds get older, they choose one bird to be their mate. Birds flock when young and during nonbreeding season, but during breeding season they part, establish a territory, and become protective of that territory. Birds' relationships are often serially monogamous. These captive birds are allowed to make decisions rather than being subdued and are allowed to interact socially. Certainly, this concept of parrot keeping provides the optimum captive environment for the bird, but it is impractical for the average owner. Consideration of increased space, freedom, and flight, however, may enhance quality of life for many pet birds.

### Neutering

Neutering domestic species to enhance their quality as pets is common practice. Techniques for neutering pet birds, however, have not been well developed. Close proximity of ovaries and testes to adrenal glands and the aorta and the rich vascular supply of gonads make neutering hazardous. Altman<sup>3</sup> recently reported successful radiosurgic ablation of ovaries and testes of pigeons. Regeneration of testicular tissue may be a problem after use of many orchidectomy techniques.<sup>3,4</sup> These techniques need further study and refinement.

### Life Span

Life spans of most psittacine species have not been accurately determined. A recently published reference text<sup>5</sup> cites "suggested" life spans for a number of species (Table 1); however, this information was not determined on the basis of hard data. Longevity studies, especially of long-lived species, can be difficult, because bird populations rarely remain stable. The previously cited study of longevity of macaws was possi-

Table 1—Suggested life spans of selected companion birds

Species	Maximum age	Average age
Budgerigar	18	6
Agapornis	12	4
Neopherma	10	5
Cockatiel	32	5
Rainbow lorikeet	15	3
Rosella	15	3
Eclectus parrot	20	8
Galah	20	5
Sulphur-crested cockatoo	40	15
African grey parrot	50	15
Pionus parrot	15	5
Macaw	50	15
Conure	25	10

ble because they were housed long-term in a zoo environment.

### Identification of Birds

Numerous systems exist for identification of birds, the most common being leg bands. Parrots imported after 1979 were required to be marked by open leg bands while in quarantine. It is widely accepted practice for breeders to band captive-bred birds with closed bands. Veterinarians often remove these bands from birds because of safety concerns. Microchips are a safe, but underused, means of identification of pet birds. Whereas it is difficult to maintain lifetime records for birds that change hands, it is virtually impossible to maintain records for those that are not identified. It is vital that birds in avicultural collections be identified for accurate maintenance of medical, reproductive, and genetic information. Identification of birds should be a priority for the veterinary community. Without identification, tracing birds and obtaining information on longevity, reproductive life span, and production will be impossible.

### The Science of Avian Behavior

In recent years, lay behaviorists have become prominent in the pet bird and avicultural communities. Some students of avian behavior use positive reinforcement, attempts to win the confidence of birds, and true understanding of parrot behavior in their consultations. Others offer conflicting information or use misguided techniques that center on subduing parrots or changing parrots' behavior from that which is normal. Methods derived from results of scientific studies and professional observations are not available. The veterinary profession has not adequately addressed this important aspect of companion bird medicine. Some

veterinary behaviorists are initiating studies of avian behavior modification, the effects of rearing techniques, and of pet avian-owner relationships.

### Recommendations

How can we, the veterinary community, work with the pet industry to help parrots retain their "parrot-ness" while being kept as companion animals? Relationships between birds and their owners are influenced by many things that can be controlled by owners, such as quality and quantity of time spent with their birds, training or conditioning, feeding and housing, and veterinary care. Of course, this relationship is also influenced by the age, personality, and behavior of individual birds.

The veterinary community, working in concert with the pet industry, can enhance the welfare of birds in many ways. Education of pet owners, aviculturists, members of the pet industry, and veterinarians is important. Sound scientific study of the life stages of companion birds is needed to determine how birds can best be managed during each period. In particular, the postreproductive life stage needs to be examined to understand how birds in this stage may be valuable resources. Veterinary behaviorists must make a concerted effort to provide scientifically based recommendations for dealing with behavioral problems. We need to systematically identify birds so that valuable medical, genealogic, and historical data may be maintained.

Alternative arrangements for unwanted pets and retired breeders, other than repeated passage from one expectant breeder to another, must be found. Retirement sanctuaries, adoption facilitators, and behavioral modification may provide solutions for many unwanted birds.

### References

1. Perry RA. The avian patient. In: Ritchie B, Harrison G, Harrison L, eds. *Avian medicine, principles and application*. Lake Worth, Fla: Wingers Publishing, 1994;26-44.
2. Clubb SL. Breeding life span of macaws. In: Schubot RM, Clubb KJ, Clubb SL, eds. *Psittacine aviculture, perspectives, techniques and research*. Loxahatchee, Fla: Avicultural Breeding and Research Center, 1992;25-1-25-5.
3. Altman RB. Neutering male psittacine birds, in *Proceedings*. Eur Assoc Avian Vet 1997;23-26.
4. Bennett A, Harrison G. Soft tissue surgery. In: Ritchie B, Harrison G, Harrison L, eds. *Avian medicine, principles and application*. Lake Worth, Fla: Wingers Publishing, 1994;1096-1132.
5. Davis C. Behavior. In: Altman RB, Clubb SL, Dorrestein GM, et al, eds. *Avian medicine and surgery*. Philadelphia: WB Saunders Co, 1997;96-100.

*Forum continued on next page*

# Adding value to nature through macaw-oriented ecotourism

Charles A. Munn, PhD

**L**arge macaws are uniquely qualified to play the role of ambassadors for the great tropical wildernesses of Latin America. No other species of neotropical vertebrates are so colorful, diurnal, predictable, photogenic, and tractable.<sup>1</sup> Macaws connect ecotourists with complex tropical forests by serving as the link between the developed urban world and the rain forest. In addition, macaws, Amazon parrots, African grey parrots, and cockatoos are the only large tropical vertebrates that live in a considerable number of homes in the developed world. They are in a unique position to represent rain forests in the otherwise almost entirely artificial world of modern industrial society. As one of this Forum's speakers, Liz Wilson, so aptly said, "they are fragments of the rain forest living in our homes."

Veterinary research and techniques are integral to empowering macaws to represent tropical forests. The importance of veterinary medicine in neotropical conservation is that parrot owners wish to know how to keep their intelligent pets in good health. Veterinary researchers need to establish blood biochemical reference ranges and study physiologic and behavioral characteristics in the wild so that these baseline data can be applied to treatment of captive parrots. For instance, Wildlife Conservation Society (WCS) studies<sup>2</sup> of macaws have revealed that feather plucking does not exist in the wild; this indicates that the stresses of captivity cause this syndrome. Furthermore, efforts to increase wild populations of endangered species of parrots require advanced veterinary skills for successful results. Programs to increase wild populations of parrots should use double clutching (taking the first clutch and ensuring that adults lay eggs again), rescue of the last-hatched nestling from the second clutch,<sup>2</sup> and managed release of these hand-raised or puppet-raised nestlings into the wild to join wild populations. If only 1 or 2 birds of a species exist in the wild, then release of captive-bred young (as opposed to assisted fledgling of nestlings from wild nests) may be necessary. I believe that disease risks force us to acknowledge that release of captive-bred parrots for conservation purposes is justified only as a last-ditch approach for such species as the Spix's macaw, which appears to be down to just 1 bird (a male) in its wild range in Brazil.

Two key tropical forest regions on the earth have large numbers of species of medium and large, extremely attractive parrots that can serve as emissaries of the value of tropical forests through parrot-oriented ecotourism: Central and South America (together called the "neotropics") and Indonesia and countries just east and south of that archipelago nation (an area I refer to as the "Indonesian realm"). The immense

tropical regions of Africa and mainland Asia have few species of parrots, although the African grey parrot could serve as an ambassador for some parts of equatorial Africa.

I believe that properly implemented ecotourism projects in the neotropics and the Indonesian realm could help save 10% of the total forest area, which could save perhaps 85 to 90% of the biodiversity of these 2 critical regions. Other attractive vertebrate species, such as monkeys, cats, tapirs, giant otters, spectacled bears, toucans, hornbills, and pheasants, also could and should be used as emissaries for each of these areas, but large parrots would be more tractable, colorful, and predictable and deliver more conservation impact per dollar of investment. I believe that large, colorful parrots are going to be the environmental heavyweights when it comes to saving large tracts of tropical wildlands through locally-owned ecotourism operations.

One area that is ripe for ecotourism is the Amazon basin, which includes the largest remaining tropical forest on Earth. The Amazon watershed is roughly the size of the 48 contiguous states of the United States and, despite dramatic reports of Amazon destruction, more than 80%, and perhaps closer to 85%, of the basin is still covered by primary forest. The rate of destruction is very high and should be of concern to us all, but the point is that most of that forest is still left.

Ninety-two percent of the land of the Amazon basin is composed of naturally poor soil with extremely low fertility. Only the remaining 8% contains soil that is good for agriculture, and even this good soil is not as deep and rich as most good soil in the breadbasket of the United States. While working for the WCS, I have attempted to find parts of this 8% of the Amazon basin that have primary forest, few or no human occupants, and good accessibility. All of this land is located within the relatively narrow floodplains of rivers that originate in the Andes (ie, the main Amazon tributaries that flow out of southeastern Colombia, eastern Ecuador, eastern Peru, and northern Bolivia). These floodplains have rich soils, because they receive regular doses of fresh silt composed of ground-up bedrock of the Andes, which, at only 15 million years old, is the youngest (and largest) major mountain chain in the tropics. The bedrock of the Andes is almost entirely sedimentary in origin, because what is now the Andes was once at the bottom of rivers, lakes, and oceans. When the Nazca tectonic plate crashed into South America (a process that continues today), the Andes began their rise.

Peru has more rivers of Andean origin that flow into the Amazon than any other country. In fact, Peru, which covers terrain that is 3.2 times the size of

From the Wildlife Conservation Society, International Program, Bronx, NY 10460.



California, boasts a rain forest that is 2 times the size of California. Ninety percent of this rain forest is intact. No more than 1 to 1.5 million people inhabit this rain forest, and most of these people live in 1 of 2 cities with populations of more than 100,000 people (Iquitos and Pucallpa, both of which have populations of about 300,000) or in other smaller cities and towns located in central eastern Peru near the foot of the Andes. Most Peruvian rain forest is extremely isolated and nearly uninhabited.

Bolivia is 2.5 times the size of California, and 60% of its land is composed of lowland wet and dry forest. This forest is 90 to 95% intact, although fine mahogany has been removed selectively from more than 95% of this region. The population of the Amazon region of Bolivia is less than 1 million people, and most of these people are concentrated in 4 small cities. Most of Amazonian Bolivia is uninhabited or extremely lightly inhabited.

Ecuador and Colombia are not as promising for conservation as Peru and Bolivia, because their shares of the Amazon are much smaller, their human population is much higher per unit area, and their economies and governments are less stable and more unpredictable than those of the latter 2 countries. For these reasons, it seems prudent to concentrate conservation work in the accessible, essentially uninhabited corners of the Peruvian and Bolivian Amazon, where macaws and other large parrots are still abundant or at least sufficiently common to use successfully as emissaries for ecotourism projects.

Having introduced the WCS approach to adding value to tropical nature, it is important to point out that most of what is marketed as "ecotourism" is not "ecologic" in the slightest. In fact, most ecotourism projects around the world destroy the areas that their participants claim to love and protect. This does not mean that properly implemented ecotourism cannot protect valuable areas; rather, it means that many existing projects referred to as ecotourism are not designed so that they create a positive conservation feedback loop.

The main reason why most existing ecotourism is not ecologic and does not protect wildlands but instead hastens their destruction is that local communities that make a living in tropical wildlands normally do not own these projects but, at best, are poorly paid employees. The owners usually are investors from the closest capital city or from other parts of the developed world. These owners invest in "ecolodges" with the primary aim of making money rather than protecting nature. Most governments allow too many different companies to compete to see which one can pump the most tourists through a particular natural area; this results in inexorable environmental degradation. In addition, as the number of tourists reaches the high thousands or low tens of thousands per year, poor members of local communities become bitter as they watch outside investors make money by showing the rest of the world natural areas that were their traditional tribal or community lands.

Members of the WCS have observed the rapid progression of tourism from pseudoecologic to predatory

in many parts of the world but, most notably, in Kenya, Machu Picchu, the Galapagos, southeastern Peru, and parts of Amazonian Ecuador. Left to its own devices, market forces will destroy any spectacular wild area that is not protected by nonprofit public interest groups working actively to safeguard nature from over-exploitation. Similarly, nonprofit public interest groups need to find ways to integrate members of local communities into ownership positions in local ecotour companies so that these communities can actively protect key natural areas. From a conservationist's perspective, members of local communities make the best owners of ecotourism companies, not because community members are better people than outside investors, but because they tend to safeguard their economic futures by not exploiting their surroundings. Outside investors have no such interest. They tend to squeeze economic value out of an area and move their investment to other regions when the area becomes degraded. Members of local communities often have traditional, emotional, or religious links to their homelands and are less likely to degrade their homeland and move to other regions. In addition, members of local communities do not have the financial resources to move to nearby areas as do wealthy investors from the capital or from abroad. If members of the community do not benefit directly from tourism (which, when properly conducted, is the least direct and least harmful way to create jobs), then they will degrade wilderness areas by engaging in traditional, destructive activities, including agricultural development, timber extraction (accompanied by subsistence hunting), market meat and skin hunting, or parrot trapping. Members of local communities who do not become ecotourism partners inevitably come into conflict with wildlife that is the basis of ecotourism development; therefore, these individuals must be included in the direct benefits of ecotourism if conservation of biodiversity is to be successful.

In the WCS projects that I direct in Peru, Bolivia, and Brazil, a conscious effort is always made to involve local families or communities as owners or partners in macaw-oriented ecotourism. This approach has resulted in 12 joint ventures between local conservation partner groups in these countries and members of local communities or families living in target wilderness areas. Each of these projects includes a macaw or parrot component as the keystone in project development and marketing. In each case, families or members of communities who used to destroy parrots and forest are now working to conserve these birds, because they realize that it is more fun and profitable to show off tropical nature (and to charge over and over again to see the same wildlife) than it is to catch or shoot wildlife to eat or to sell as meat or live birds.

One lesson that I have learned in 22 years of conservation work in Peru and 10 years of work in Bolivia and Brazil is that the WCS should not spin off ecotourism operations so completely that these operations become totally independent and impossible to keep on track environmentally. If ecotourism ventures begin to operate independently from conservationist organizations, their managers often forget about conservation

concerns and adopt typical nonconservationist tourism philosophies. The net result can be additional degradation or destruction of wilderness areas.

Making sure that ecotourism operations initiated by nonprofit conservationist groups do not get off track requires that nonprofit groups themselves do not get off track. The WCS has found that conservation groups in tropical countries often are taken over or dominated by nonconservationist, destructive elements within their boards or staff. To avoid takeovers, the WCS encourages its in-country partner groups to select hardcore conservationists as board members and to have bullet-proof bylaws that prevent takeovers and provide a mechanism by which delinquent board members may be exposed and removed.

Another issue that the WCS has raised recently with the avicultural community is that, of 50 species of New World parrots that are endangered or threatened, about half are large enough, colorful enough, or have sufficient language capability to command commercially interesting prices in the caged bird and avicultural trade; other species are too small or too uniformly green. The former group includes large macaws and most Amazon parrots, whereas the latter includes many small genera of primarily green and brown parrots that are not proficient in speech or mimicry.

The reason commercial prices of parrot species are of interest in conservation and aviculture is that many aviculturists try to justify their hobby as a conservation activity, claiming that they are helping to conserve large macaws and Amazon parrots by breeding them in captivity. These individuals claim that they are rescuing these large parrots from forests that are about to be destroyed. In fact, the parrots that really need backup populations in captivity to survive possible deforestation of their habitats in Central and South America are the small, commercially worthless species that typically survive in wild forest. Because of their lack of commercial value, aviculturists are not willing to breed these rare parrots. In contrast, large, commercially valuable species are normally trapped (for trade) or hunted (for colorful feathers or meat) into extinction decades before their forest habitat is in danger of being destroyed. Aviculturists often contribute to the demand for these commercially valuable parrots and have directly or indirectly eliminated them from large tracts of wild forest that otherwise are healthy and could support a large number of these parrots. Only 1 Spix's macaw is left in the wild, not because it has insufficient wild habitat to support a viable population but because of ruthless trapping by specialized macaw trappers contracted by rich aviculturists in large Brazilian cities and in Europe and Asia. The dry forests of northeastern Brazil have more than enough wild habitat and food to support at least 500 Spix's macaws and perhaps as many as 1,000 or more birds. Large parrots can be preserved most economically by protecting them in their natural habitats (ie, where added expenses for salaries, electricity, and food are not incurred).

The diet of wild parrots may be of more direct interest to veterinarians than information on appropriate methods of conservation. Most large macaws living

in the rich Amazon forest (where there are often 600 species of trees and 100 species of vines in a square mile of forest) eat a surprisingly large number of species of seeds of legumes and euphorbs. They often eat 30 to 40 species of seeds, fruits, nectar, and leaves throughout the year and typically eat 3 to 6 species at any given time. Legume and euphorb species are famous for having seeds rich in protein and poisonous defensive compounds, which probably is the reason why many wild parrots in the Amazon eat clay. Gilardi<sup>1</sup> showed that captive parrots fed a diet laced with a nontoxic compound (which was similar to toxic compounds from these seeds) used clay to adsorb the compound and prevent it from entering their bloodstream. When not fed clay with the compound-laced diet, the compound reached a high concentration in the parrots' blood.

Another topic of interest to avian veterinarians is the natural behavior of wild birds and how this behavior is, or is not, expressed in captive birds. One of my fellow speakers at this symposium, Greg Harrison, has spent considerable time observing the behavior of wild parrots in Peru, Bolivia, and Brazil, and he has indicated to me that his personal observations have enriched his understanding of normal and abnormal behavior in captive parrots. I would recommend that specialists in parrot behavior follow his example and observe parrots' behavior in the wild to allow them to better understand the behavior of parrots in captivity.

Having described my passion for, and views on, conservation, what are my views on parrot ownership? I want people to keep owning parrots, because parrots offer me a way to connect with people who previously did not think extensively about the wilderness that is parrots' natural habitat. Fifteen years ago, I was not supportive of keeping birds in captivity for fun and profit, but my perspective has evolved to the point where I no longer have a problem with bird ownership as long as it is practiced responsibly and humanely. I view aviculture and ownership of parrots as a worthwhile and rewarding hobby that should be encouraged as long as captive birds are humanely cared for and wild populations of parrots are not harmed. I am opposed to any attempts to outlaw bird ownership or aviculture, although I am strongly in favor of controlling trade in wild parrots, because this trade continues to drive many large parrots closer and closer to extinction.

The WCS is in favor of the Wild Bird Conservation Act, because it outlaws imports of parrots from range countries that cannot guarantee that birds are harvested sustainably and responsibly. Contrary to certain propagandists, US government biologists who implement and interpret this law are looking for positive examples of sustainable, humane, and responsible parrot production and trade so that they can show that they are not antitrade, just antiextinction and anti-cruelty. As it happens, range countries have yet to develop even a partially credible proposal for sustainable and humane parrot trade.

The WCS believes that establishing numerical quotas for particular countries is not appropriate. Sustainable, humane parrot trade should, at least ini-

tially, involve harvesting only the last-born nestling before it starves (as so often happens) or double clutching. Arbitrary quotas encourage trappers to take adult birds (ie, the breeding population that is the basis of sustainable reproduction of chicks) and to destroy trees to obtain chicks.

As stated previously, parrots are little fragments of the rain forest—fragments that allow us to take the forests into our hearts within our homes. Veterinarians can help protect and enjoy parrots, not only by keeping them in excellent health, but by visiting study sites and observing and understanding the behavior of wild parrots in their natural habitat. Visiting rain forest sites to observe parrots could be justified as a business expense, as long as parrot populations are high enough to make regular observation possible. Veterinarians and their staff can educate clients in proper parrot stewardship and promote pragmatic approaches to

conservation by distributing information about ecotourism. Veterinarians have unique access to parrot owners and aficionados and, therefore, have more power to effect positive changes in the environment and lives of captive and wild parrots than do most individuals.

---

Gilardi, J. *Ecology of parrots in the Peruvian Amazon: habitat use, nutrition, and geophagy*. PhD Thesis, Department of Zoology, University of California, Davis, 1996.

---

## References

1. Munn CA. Macaw biology and ecotourism, or "when a bird in the bush is worth two in the hand." In: Beissinger SR, Snyder NFR, eds. *New world parrots in crisis: solutions from conservation biology*. Washington, DC: Smithsonian Institution Press, 1992;47-72.
2. Munn, CA. Macaws: winged rainbows. *Natl Geogr* 1994;185:118-140.