

Exotic Pet

P R A C T I C E

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SCIENTIFIC ARTICLE

Obesity in Pet Birds

Part 1

Jerry LaBonde, M.S., D.V.M.

Obesity is one of the most common problems found in pet birds. The effect on the bird's health is often insidious, and the cause is often multifactorial rather than just a nutritional problem. This condition may be promoted by the idea that bigger and fuller-looking birds are healthier birds.

Obesity is defined as an increase in body weight beyond the limitation of skeletal and physical requirements as a result of excessive accumulation of body fat. For pet birds, a working definition is a weight exceeding the optimum by 15% or more.

Characteristics of Obesity

The determination of the degree of obesity in a bird is subjective. Visually observing the bird to determine obesity may be difficult because contour feathers cover fat deposits. The amount of subcutaneous and abdominal adipose deposition correlates with the bird's weight and is the most effective method to determine the degree of obesity. Each bird should be judged individually, rather than compared to a breed standard. Excessive fat deposition will be observed in the pectoral, axillary, and abdominal regions. As the degree of obesity progresses, fat deposits become more pronounced around the feet and the submandibular region. An increase in bald areas can be seen because of feather tract separation. The breast and abdominal feathers will often show a cleavage down the midline. Bronzing of feathers can often be observed. Many obese birds will have a hypercholesterolemia and increases in plasma triglyceride and free fatty acids.^{1, 2}

Predisposing Factors of Obesity

Predisposing factors contributing to an obese condition can be categorized as primary and secondary factors (Table 1).^{3, 4, 5, 6, 7}

Primary factors include age, breed and genetic predilection, inappropriate nutrition, reproductive status, environmental temperature, lack of adequate

exercise, and psychological state of the bird. Breeds of pet birds prone to obesity include budgerigars, cockatiels, cockatoos (especially rose-breasted ones), Amazon parrots, and canaries. In chickens, genetic lines have been developed to promote high body fat content. The trend now is toward a leaner bird because of consumer preference. The genetic control appears to be an autosomal dominant trait. This may explain why some breeds are prone to obesity.

Inappropriate nutrition, in combination with breed predilection, is the most common cause of obesity in pet birds. Older birds or female birds in early breeding season have a greater tendency toward weight gains. Birds that have been raised in cooler environments without diet change have lower body fat content.

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Intestinal Candidiasis in an African Hedgehog (*Atelerix albiventris*)

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Wryneck

Table 1.—Predisposing Factors of Obesity

Primary	
1. Breed	5. Reproductive status
2. Genetic predilection	6. Environmental temperature
3. Inappropriate nutrition	7. Lack of adequate exercise
4. Age	8. Psychological state of bird
Secondary	
1. Metabolic Dysfunction	2. Viral (chickens—adrenal & herpes)
a. Pancreatic hormones	3. Iatrogenic (medroxyprogesterone)
b. Thyroid	
c. Hypothalamic control	

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Obesity in Pet Birds

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Environmental constraints such as wing clipping, small cages, and inadequate exercise facilities encourage fat accumulation and sedentary lifestyle. Birds that are caged inadequately with minimal social stimulation have tendencies towards obesity.

Secondary predisposing factors are related to metabolic dysfunction, disease, and iatrogenic causes. Some of these factors would include pancreatic disorders, thyroid dysfunction, and diabetes mellitus. In chickens, viral-induced hepatic lipidosis has been documented.³ The most common iatrogenic cause of obesity in pet birds is medroxyprogesterone acetate.

Diet Related to Fat Metabolism and Utilization

The complex relationship of genetics, hormonal regulation, lipid metabolism, and the dietary utilization of fats has been researched extensively in poultry.^{8, 9, 10, 11} There are aspects to this area of avian physiology that are still not fully understood. Absorption of animal or vegetable fat in birds averages 80% to 90%. The increase in adipose is due to an increase in number of adipocytes (hyperplasia) or in cell size (hypertrophy). Adipocyte hyperplasia continues up to 3–4 months of age. After that period, the increase in adipose tissue is primarily the result of hypertrophy. Hypertrophy of adipocytes is not always related to nutrition alone, nor has nutrition alone been determined to have a persistent effect on adiposity in adult chickens.

Lipolytic or antilipogenic agents involve a number of hormones and cause a complex interaction in birds. Some of these agents include glucagon, growth hormone, epinephrine, norepinephrine, triiodothyronine (T₃), and avian pancreatic peptide. Lipogenic or antilipolytic agents that increase fat in adipocytes because of hepatic lipogenesis include insulin, cortisol, and glucocorticoids. Glucagon in birds primarily acts on carbohydrate metabolism, increasing gluconeogenesis. Glucagon is a potent lipolytic agent in birds. An increased secretion of insulin can result in increased plasma triglycerides, increased plasma phospholipids, very low-density lipoproteins, and a decrease in free amino acid concentration.¹² These changes result in enhanced hepatic lipogenesis and less-effective protein utilization. Treatment of chickens with T₃ effects an increased secretion of glucagon and decreased insulin levels.

Central nervous system controls via the hypothalamus also play a major role in metabolic regulation in the bird. In one study, the basomedial hypothalamus was inactivated in chickens.⁹ Observed results were hyperphagia; obesity; transitory diabetes insipidus; hypothyroidism; involuted thymus and adrenal cortex; and increased liver fat, plasma triglycerides and free fatty acids. Chickens selected for increased body weight resulted in diminution of hypothalamic satiety mechanisms. An increased photoperiod may stimulate food gathering behavior.

Nutritional requirements in pet bird species are not yet determined, but research in chickens and psittacines lends some useful information.^{8, 10, 11, 13, 14} The energy to protein ratio (E:P) in an avian diet has been a good guideline in understanding the metabolic needs of the bird.¹⁴ Birds fed an isocaloric diet with a high protein concentration (25%) became thin. Fat utilization and dry matter digestion decreased as protein levels increased. Conversely, birds fed a high-energy, low-protein diet had an increase in body fat. Low-protein diets stimulated birds to overconsume energy to meet the protein needs. Therefore, widening the E:P ratio resulted in increased lipogenesis and fatter birds.

Inappropriate diets, such as all-seed diets, can result in an improper nutrient balance, a low mineral content, and an unhealthy E:P ratio. A

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PRACTICE

Shawn Messonnier, D.V.M.

TIP

Gastrointestinal Tumors in Hedgehogs

Tumors of the gastrointestinal tract occur with some frequency in hedgehogs (*Erinaceus spp.*). These are most common in hedgehogs as they age and usually occur in pets 3 years of age and older. Gastrointestinal neoplasia should be suspected in any hedgehog that has anorexia, lethargy, dyspnea, and a palpable abdominal mass, especially if the animal is at least 3 years of age. Anesthesia may be needed to carefully palpate the abdomen; I prefer isoflurane. It is easy to perform radiography on anesthetized pets and to evaluate findings detected on palpation. If disease is present, the prognosis ranges from guarded to poor. Many of these pets have had no prior veterinary care and are seen in the terminal stage of the disease after extensive tumor growth and metastasis. If detected early, surgical removal may be an option depending on the organ involved and extent of tumor development.

ROUNDTABLE

Management of the Bird with Mycobacteriosis

Q. What species of birds are commonly afflicted with mycobacteriosis?

Dr. Campbell: All birds are believed susceptible to infection with *Mycobacterium avium-intracellulare* complex; diseases caused by *M. tuberculosis* and *M. bovis* are rare in birds.

Common pet species that may be susceptible to mycobacteriosis include Amazona (Amazon parrots), Pionus (pionus parrots), Brotogeris (parakeets, especially grey-cheeked parakeets), and Psittacula (parakeets such as the rose-ring parakeet).

Dr. Morrisey: Mycobacteriosis can occur in any species, but *Brotogeris spp.* such as grey-cheeked parakeets, Amazon parrots, canaries, and other softbills, together with mynahs, are most commonly affected in my experience.

Q. What are the clinical signs seen in birds with mycobacteriosis?

Dr. Campbell: Signs are variable and non-specific. Many birds show chronic weight loss despite maintaining a normal appetite. Some birds exhibit poor plumage and body condition, whereas others show no signs prior to death. Signs are often related to location of the lesions created by the organisms (birds with intestinal granulomas show diarrhea, etc.).

Dr. Morrisey: *Mycobacterium avium* primarily affects the gastrointestinal system and liver. It can cause weight loss despite a ravenous appetite, voluminous feces with whole seeds, or frank diarrhea.

Thickened bowel loops and a distended abdomen may be found. The skeletal system may be affected causing signs such as shifting leg lameness, wing droop, or sensitivity upon palpation. The air sacs, spleen, and skin can also be affected. *M. genavense* is a more recent isolate in birds and can affect the skin and other organs.

Q. How is mycobacteriosis diagnosed?

Dr. Campbell: Antemortem diagnosis is difficult. Presumptive diagnosis is made from cytological preparations made from tissue. Wright's

stained specimens reveal numerous bacterial rods that exhibit negative staining associated with macrophagic inflammation with multinucleated giant cell formation. Acid-fast staining will reveal the bacterial rods. Definitive diagnosis is based on cultures of the organism. Cytologic samples are obtained from needle aspirates, endoscopy, or biopsy. Radiographs may reveal granulomas. The skin tuberculin test appears useful in galliform birds with some degree of accuracy. A positive titer indicates exposure but may not identify active disease.

Dr. Morrisey: Positive culture is the golden standard for diagnosis, but the organism can be difficult to grow and can take months before a culture is called "negative." Acid-fast staining of the feces or of biopsies of internal organs can be helpful. Multiple fecal samples should be evaluated as the organism can be shed intermit-

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WHAT'S YOUR DIAGNOSIS ???

A 5-year-old male potbellied pig was seen for anuria of 24 hours duration. The pig had been diagnosed with urolithiasis 3 years before; the uroliths had been removed by cystotomy.

Physical examination revealed a moderately lethargic pig. Appetite had decreased. The rest of the examination findings were unremarkable.

Questions

1. How would you proceed?
2. What are possible causes for the anuria?

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Management of the Bird with Mycobacteriosis

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tently. False positives can occur but are rare. Other diagnostic aids include leukocytosis with a monocytosis and a polyclonal gammopathy on electrophoresis. Bone lesions may be visible radiographically as sclerosis and periosteal proliferation.

Q. Do you recommend euthanasia or treatment of the bird with mycobacteriosis?

Dr. Campbell: I recommend euthanasia in confirmed cases for two reasons. First, there is no guarantee that drug therapy will successfully eliminate the organism from the bird (the organisms can often develop resistance to the drugs), and second, infected birds are

potentially shedding organisms that can be transmitted to other birds and people. While human mycobacteriosis is rarely associated with *M. avium*-intracellular unless immunosuppression is present, one cannot guarantee that an immunosuppressed person (sick individual, child, elderly person) won't come in contact with an infected bird.

Dr. Morrisey: Euthanasia should be considered as the disease is zoonotic, although zoonotic transmission has not been well documented. Recent information suggests that human infections with *M. avium* may be caused by a different subspecies than avian infections with this organism. Owners should be warned about the zoonotic potential and time and financial considerations with respect to treatment.

Q. What is the current recommended treatment for avian mycobacteriosis?

Dr. Campbell: A variety of human antimycobacterial drugs are available to treat birds. As stated, I do not usually treat these birds.

Dr. Morrisey: Treatment should employ 3–5 medications concurrently to decrease resistance that is common with single agent therapy. Possible medications include rifampin, ethambutol, isoniazid, ciprofloxacin, streptomycin, azithromycin, and clarithromycin. Pharmacokinetics have yet to be worked out in any avian species.

What's Your Diagnosis???

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Answers

1. Because of the previous diagnosis and treatment of urolithiasis, it was suspected that uroliths had once again developed, that were now causing an obstruction. The pig was anesthetized by means of a face mask with isoflurane, and anesthesia was maintained with 3% isoflurane and 1 L of oxygen/min by face mask. Radiographs of the caudal abdomen did not demonstrate the bladder; fecal-filled loops of intestines were visualized. Ultrasound findings were unremarkable as well.
2. Causes of urinary disorders in potbellied pigs include renal failure and cystitis/obstruction.

The bladder was catheterized, and a positive contrast study was done with use of fluoroscopy. A filling defect, suggestive of a urethral polyp, was visualized cranial to the urethral diverticulum. The polyp significantly affected urinary flow.

A guarded prognosis was given; surgical access to this area is difficult and often unrewarding. Bypassing the polyp required an extrapelvic urethral anastomosis. The owners opted for euthanasia.

Urolithiasis has been reported in potbellied pigs. Clinical signs are similar to those seen in other domestic pets. Obstruction is a sequela. Catheterization of the bladder may relieve the obstruction. Cystotomy can also be performed. Other urinary system disorders in potbellied pigs

include cystitis, nephritis, and pyelonephritis. Leptospirosis and infection by kidney worms (*Stephanurus dentatus*) may also cause urinary signs. Cystitis and associated nephritis may cause polyuria or stranguria; rectal prolapse may occur as a result of the stranguria. In domestic swine, blockage of the male urethra from urinary calculi is not common. In potbellied pigs, it may occur more frequently as the urethral diameter is much smaller.¹

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reverse in calcium-phosphorous ratio has also resulted from this kind of diet. These imbalances can result in an obese, malnourished bird. Psittacines fed only seed have greater consumption rates than birds fed a more varied diet. High-fat diets have been implicated in the dilution of fat-soluble vitamins and the formation of insoluble soaps.^{8, 10, 15}

In Part 2 (to appear in the November issue of Exotic Pet Practice), we will look at pediatric considerations, medical problems, and the relationship of diet to obesity.

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HOW I ...

Treat Ivermectin Toxicity

Shawn Messonnier, D.V.M.

Two box turtles were evaluated for ivermectin toxicity. The owner had taken the turtles to another veterinarian who diagnosed "some type of worms" and treated both pets with a single injection of ivermectin (dose unknown, but I suspected 200-400 µg/kg).

Both turtles were weak and anorectic. Some movement was detected, but head withdrawal was not evident.

Due to costs, the owner chose to treat only one of the animals. The weaker turtle (the smaller of the two) was given intracoelomic fluid therapy (lactated Ringer's solution at 15-25 ml/kg/day in divided doses) and maintained in an 80°F incubator. The pet was stronger

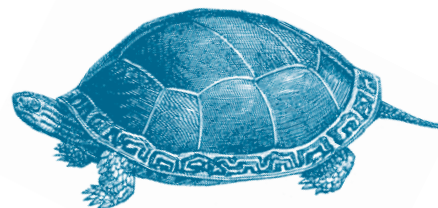
after 2 days of therapy but had not made a complete recovery; it was discharged because of the costs of continued treatment. The bigger turtle had improved some with home treatment, which consisted of warming and fluid soaks given 2-3 times daily. A 1 week follow-up call indicated both turtles had improved, were more mobile, and had resumed eating.

Ivermectin is toxic to turtles and tortoises, supposedly because of a decreased blood-brain barrier for avermectins. Treatment is largely symptomatic and is extrapolated from reports of canine and feline toxicity. Other compounds, including fenbendazole, are preferred for de-wormings.

Fenbendazole may be effective given orally or percloacally.^{1,2}

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Client Teaching Guide

Sugar Glider

CARE SHEET

Jerry LaBonde, M.S., D.V.M.

Petaurus breviceps

✓ Description

Small arboreal marsupials originating in Australia, Indonesia, and New Guinea. Nocturnal in nature, prefer communal living in the wild but are best kept in pairs. May not do well solitary unless they get a lot of attention from the owner. Gliders need to be handled frequently when young to develop trust and a bond to their owner. They enjoy riding on a shoulder or hiding in a shirt pocket.

✓ Housing

Minimum cage size should be 18" x 18" x 20". A cage 36 inches high is preferred. Fresh or nontoxic wood branches with bark should be offered for climbing and chewing. Cotton ropes and nondestructible bird toys can be used as well. A sleeping "nest" can be made from pine or plastic with a hole large enough for the glider. Bedding should consist of shredded paper towels or noncolored newspaper. A 6-inch exercise wheel can be offered for play. Optimal temperature range is 50°F to 90°F (10°C to 32°C).

✓ Diet

Sugar Gliders are omnivorous with a proper diet consisting of 75% vegetables and fruit and 25% protein. Fruit and vegetables should be offered on an open plate so the glider can pick and choose its food. Some examples are apples, pears, peaches, grapes, kiwi, melons, mango, banana, sweet potato, corn, green beans, shredded carrot, and raisins. A bag of frozen mixed vegetables is an easy source of vegetables for the diet. Protein can be provided from dry cat food, canned dog food, hard boiled egg, insects, chopped chicken, yogurt, cottage cheese, and an occasional unsalted peanut or sunflower seed. Water should be offered from a water bottle, but most of their water is acquired from the diet.

✓ Breeding

Breeding is year round and usually begins at 7–14 months of age. Females cycle approximately every 29 days, and have a 16 day gestation period. The young usually leave the pouch at 70 days and leave the nest around 110–120 days. Litter sizes average one to three babies.

✓ Medical Problems

Health concerns for sugar gliders include overgrown incisors (resulting from a lack of bark to chew on), injuries from improper caging, herniated or inverted pouch, cataracts (in offspring that either were pulled from the pouch too soon or came from overweight mothers), and acute onset hind leg paralysis (possibly due to nutritional imbalance).

CASE REPORT

Intestinal Candidiasis in an African Hedgehog (*Atelerix albiventris*)

Terry Campbell, D.V.M., Ph.D.

An adult male hedgehog was brought in with a history of anorexia and depression. He had a foul odor and exhibited blood in his stool. The duration of illness was approximately 1 week. The hedgehog was housed in a 10 gal aquarium with newspaper bedding. He was fed a diet of commercial dog and cat food with a periodic supplement of cheese and yogurt. There were no other pets in the household.

Physical examination revealed a thin, weak hedgehog that weighed 161 g. Some of the spine would easily exfoliate with handling. Although the history indicated blood in the feces, the fresh feces in the cage appeared grossly normal. A blood sample for a blood profile was not attempted because of the animal's critical condition. Although the hedgehog had a history of anorexia of 2 days' duration, he readily consumed mealworms (*Tenebrio molitor*) when they were offered.

The cytology of the Wright's stained fecal smear revealed numerous narrowly-based budding yeast

and hyphae. A presumptive diagnosis of an intestinal candidiasis was made based on this finding and treatment with itraconazole (2.5 mg/kg PO BID) was initiated. Trimethoprim-sulfamethoxazole (30 mg/kg PO BID) was also initiated as treatment for opportunistic bacterial pathogens until the results of microbial cultures and sensitivities could be obtained.

The results of the microbial cultures of the feces 3 days later revealed no *Salmonella* sp., *Campylobacter* sp., or other significant bacterial isolates; however, there was a moderate growth of *Candida albicans*.

During the 24 hours following the initiation of treatment of intestinal candidiasis, the hedgehog's overall appearance and attitude had improved. He began eating cat food and mealworms normally and was discharged to the care of his owner. Two days later, the owner found the hedgehog dead in his cage. He apparently had been doing well during the time before his death. A complete necropsy was performed, and the findings were unremarkable except for mild pulmonary conges-

tion and splenic hemosiderosis. There was no evidence of a yeast infection in the digestive system on necropsy.

It appears that the itraconazole therapy was successful in the treatment of the intestinal candidiasis. Itraconazole was chosen over nystatin because of the hyphae present on the fecal cytology. The hyphae suggests the potential for systemic infection and itraconazole would provide a systemic treatment whereas nystatin would not. The cause of the intestinal candidiasis is not known. *Candida albicans* can be a normal inhabitant of the digestive system of many animals and is a potential opportunistic pathogen. Intestinal candidiasis in animals is usually associated with predisposing conditions such as immunosuppressive disorders, malnutrition, and prolonged use of antibiotics or corticosteroids. In this case, malnutrition is a possible consideration. A diet lacking insectile material fed to insectivorous animals may lead to malnutrition in these animals, and malnutrition can predispose them to infections from opportunistic pathogens.

FROM THE LITERATURE

Wryneck

Wryneck (torticollis) is commonly seen in rabbits brought to the exotic animal practitioner. Signs include head tilt, rolling, nystagmus, and circling. Differential diagnosis includes otitis, *Pasteurella multocida* infection, and infection with *Encephalitozoon cuniculi*. Clinical signs, when associated with *E. cuniculi* infection, may result from an inflammatory response caused by the rupture of brain cells by multiplying organisms. Since organisms may not be found once signs occur, treatment should be directed at reducing inflammation with use of a high dose of prednisolone (11 mg/kg IM once, or followed by a second dose in 48 hours). Antibiotics are ineffective and not necessary. *E. cuniculi* is a coccidial infection spread by urine contact with mucous membranes.

Feaga WP, Wry neck in rabbits, in Letters to the Editor, *J Am Vet Med Assoc*, 210:480, Feb 15, 1997.

Editor's Note: Wryneck is commonly seen in practice. Part of the diagnostic plan can include serological testing for *E. cuniculi*. Treatment of wryneck should probably include both antibiotics (*P. multocida* is more likely the cause) and corticosteroids in the event that *E. cuniculi* is the cause of the signs. In my experience, rabbits infected with *P. multocida* usually recovered within 3–7 days. Those infected with *E. cuniculi* have not recovered in my practice, nor have they shown temporary improvement with relapse.



Answer by Shawn Messonnier, D.V.M.

How do you administer fluids to sick reptiles?

While fluids can be administered intravenously to certain reptiles, such as iguanas and other lizards, I routinely administer fluids to reptiles using the subcutaneous and intracoelomic or epicoelomic routes. Additionally, I believe in using several warm water soaks given daily to hospitalized reptiles. The patients seem to improve "psychologically" from the warm water baths, and the soaks often encourage the animals to eliminate. Also, some reptiles may be able to absorb water percloacally or through the oral cavity, as water "wicks" along the scales of the patient. While there are recipes for "Reptile Ringer's solutions," I have not had problems using simple lactated Ringer's solution or lactated Ringer's with D5W. During discharge instructions, or for owners who decline to hospitalize the pet, I recommend continued daily soaks for the reptile in warm water, warning owners to carefully monitor the pet so it doesn't drown.

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Readers: Please submit any questions to Tania Banak, Mosby–Year Book, Inc., 11830 Westline Industrial Drive, St. Louis, MO 63146; tania.banak@mosby.com; fax (314) 453-4191.

UPCOMING MEETINGS

Atlantic Coast Veterinary Conference, Taj Mahal Resort Hotel, Atlantic City, NJ; October 14–16. (201) 379-1100; fax: (201) 379-6507.

Association of Reptile and Amphibian Veterinarians, Houston, TX; October 20–24. Dr. Shawn Messonnier will be speaking. (610) 892-4812.

American Association of Zoo Veterinarians, Houston, TX; October 26–30. Contact Wilbur Amand, V.M.D., Exec. Dir./AAZV, Media, PA; (610) 358-9539; fax: (610) 892-4812.



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