Exotic Pet PRACTICE

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SCIENTIFIC ARTICLE

Routine Avian Plasma Chemistry Profile

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

Plasma biochemical profiles are routinely used to evaluate the avian patient. These profiles are usually modifications of those used to assess the health of domestic mammals. Although the sample volume can limit the number of tests that can be performed, modern blood biochemical analyzers use microtechniques that allow chemistry panels to be performed on small sample volumes. Plasma (usually obtained from lithium heparinized blood) is preferred to serum because a larger sample volume can be obtained with plasma and because avian serum frequently clots after harvesting, causing further reduction of the sample volume or plugging of the sample port of the analyzer.

The establishment of normal reference values for a given species of bird depends on age, gender, environment, nutritional status, and physiologic status of the bird. Also, it is often difficult to compare results from one laboratory with those obtained from another because of the variations in methodology. Because it is difficult to guarantee that a given population of birds represents healthy birds of that species and published reference values may vary among laboratories, most avian practitioners use decision levels. Decision levels are threshold values that help the clinician decide whether to treat the patient or conduct further diagnostic tests. The decision is based on these levels for each individual test; if the value is outside the threshold limit, the clinician may either treat or retest. These decision levels vary with clinicians and are obtained by reference to published values and the experience of the clinician. It is usually best to obtain a normal set of reference values for the individual bird during health for comparison to values obtained during illness.

A number of plasma enzymes are commonly used in avian blood biochemistry panels. Aspartate aminotransferase (AST) is commonly used to detect the presence of liver disease in birds. However, this enzyme is not tissue specific and its tissue distribution varies among species. Normal plasma AST activity for most birds is less than 275 IU/L. Increases in plasma AST activity occur with liver and muscle injury. A marked increase, such as AST activity greater than 800 IU/L, with a biliverdinuria or biliverdinemia suggests severe hepatic injury.

Increases in plasma creatine kinase (CK) activity is specific for muscle injury or marked exertion. Normal plasma CK activity of birds ranges between 100 and 500 IU/L. Muscle injury can occur with traumatic injury, systemic infections, and intramuscular injections. Plasma CK activity is frequently evaluated with plasma AST activity in the detection of hepatic insult. Increases in plasma AST activity with normal plasma CK activity suggest hepatic disease; however, because the half-life of CK is shorter than the half-life of AST, caution should be used to avoid an incorrect diagnosis of liver disease during the recovery from muscle injury. Serial testing should help in the diagnosis of liver disease where AST activity would continue to increase; a decreasing activity supports muscle injury or resolving hepatocellular disease.

Plasma alanine aminotransferase (ALT) and lactate dehydrogenase (LDH) are nonspecific enzymes that display increased activity with liver and muscle injury. Normal plasma ALT activity in most birds is less than 50 IU/L, and the test appears to be more useful in the detection of liver disease in carnivores; however, it appears to be no better than plasma AST for detecting liver disease. Normal plasma LDH activity of birds is higher and is usually less than 1,000 IU/L. Plasma LDH activity increases with hemolysis, muscle injury, and insult to the liver. Plasma LDH activity changes more rapidly than that of AST and ALT. There appears to be no advantage in using LDH over AST in the evaluation of liver disease in birds.

Plasma glutamate dehydrogenase and sorbitol dehydrogenase are liver-

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Routine Avian Plasma Chemistry Profile

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specific tests for birds. Unfortunately, these tests are not available from most veterinary laboratories.

Plasma alkaline phosphatase (AP) and γ-glutamyl transferase activities are often used to detect hepatobiliary disease in mammals. However, avian plasma AP activity is primarily derived from osteoblastic activity and increases occur with skeletal growth, fracture healing, lytic bone lesions, and nutritional secondary hyperparathyroidism. High plasma AP activity occurs in hens during active egg production. Plasma γ-glutamyl transferase activity does not predictably increase in birds with hepatobiliary disease.

The concentration of fasting bile acids has been used to detect the presence of liver disease in birds. The common bile acid of mammals, deoxycholic acid, is missing in the bile of chickens and perhaps other birds; therefore, assay methods used for mammals may not be applicable to birds. Small concentrations of bile acids are present in the plasma of birds fasted for 12–24 hours; increases suggest abnormal bile acid uptake, storage, and excretion by the liver or decreased hepatic perfusion. Normal fasting plasma bile acid concentration in birds is greater than that reported for mammals. For example, normal fasting bile acid concentrations of African grey parrots (*Psittacus erithacus*) range between 18 and 71 μmol/L, and normal dog concentrations are near 0–10 μmol/L.

Plasma cholesterol concentration of normal birds range between 100 and 250 g/dL. Increases in plasma cholesterol concentration can be associated with lipemia, hepatic disease, hypothyroidism, and high dietary fat intake. Low cholesterol concentrations occur with starvation, maldigestion, malabsorption, and end-stage liver disease.

Total plasma protein concentration by the biuret method range between 2.5 and 4.5 g/dL in normal birds. Hyperproteinemia is associated with dehydration and inflammatory diseases. Hens become hyperproteinemic during folliculogenesis. Hypoproteinemia occurs under the same conditions as low cholesterol concentrations.

The normal plasma glucose concentration of birds ranges between 200 and 500 mg/dL. Plasma glucose concentration remains stable during 1- to 5-day fasting in birds. Hypoglycemia occurs with septicemia, prolonged starvation, severe liver disease, and enterotoxemia. Hyperglycemia occurs with catecholamine release (such as occurs with exertion and excitement), glucocorticosteroid excess, and diabetes mellitus. Diabetes mellitus in birds has a variable pathophysiology and is associated with glucose concentration greater than 800 mg/dL (often resulting from glucagon excess).

Uric acid is the primary nitrogenous waste product of birds. Of the blood's uric acid, 90% is removed by tubular secretion in the kidneys and is largely independent of the hydration status of the bird. The plasma uric acid concentration of most normal birds is less than 15 mg/dL and is often used to evaluate birds for renal disease. Uric acid evaluation is not a sensitive test; therefore, normal values do not guarantee the absence of renal disease. Testing uric acid concentration is not specific to renal disease, and concentrations above 15 mg/dL can also be associated with gout, starvation, and severe tissue necrosis. Postprandial hyperuricemia also occurs in normal birds, especially carnivores, after the ingestion of a high-protein meal.

Normal plasma urea nitrogen concentrations of noncarnivorous birds are less than 5 mg/dL; carnivores tend to have slightly higher normal values. Plasma urea nitrogen testing is of limited diagnostic value in birds. However, because urea excretion is via glomerular filtration and dependent on hydration, an increase in the plasma urea nitrogen concentration suggests prerenal azotemia in some species, such as pigeons.

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ROUNDTABLE

Behavioral Enrichment for Small Exotic Pets

Q. Is environmental enrichment needed for small exotic pets? If so, why?

Dr. Suedmeyer: *Any captive animal should have environmental or behavioral enrichment, which helps to provide for mental and physical well-being. Our zoo has developed numerous programs of enrichment for animals, and we have observed virtually all animals utilizing some form of enrichment items.*

Dr. Tynes: *Absolutely! All animals kept as pets deserve more than the barren isolated existence that most cages offer. Until proven otherwise, I believe that animals living in enriched enshrinements are healthier both physically and psychologically. "Because it is the humane thing to do" should be a good enough reason to provide enrichment for our pets.*

Dr. Morrisey: *In order to stimulate and elicit the natural behaviors seen in the wild, behavioral enrichment should be a part of every captive animal's husbandry.*

Q. What types of enrichment do you prescribe?

Dr. Suedmeyer: *We use various food item "treats," PVC pipes of various sizes for hiding, enclosure "furniture" (branches/hay/stuffed burlap bags), frozen "popsicles" containing favored food items, PVC pipes with capped ends and drilled holes, allowing animals to work to find food, etc.*

Dr. Tynes: *This varies with the species of pet, but the type of enrichment is limited only by the imagination. I suggest that clients try to mimic the pet's environment in the wild. As an example, a hedgehog forages at night while covering a large amount of territory; I recommend providing a safe wheel for it to use for running. Environmental enrichment for rodents can be as simple as providing a wide variety of textured objects for them to shred. Anything an animal can chew, explore, or manipulate can qualify as environmental enrichment.*

Dr. Morrisey: *Enrichment can be as easy as providing substrates for digging or chewing or as elaborate as balls, wheels, and complex enclosures.*

Q.What happens to the pet that does not receive enrichment?

Dr. Suedmeyer: *In the past we have seen constant stress in animals when they did not have hiding places. Decreased food consumption and an unthrifty appearance have also been noticed. Rarely, we have observed self-mutilation and stereotypical behaviors.*

Dr. Tynes: *Most animals deprived of enrichment are more prone to develop behavioral and medical disorders.*

Dr. Morrisey: *Obesity, self-barbering, or self-mutilation may be seen.*

Q. Can a pet receive too much enrichment? How is this possible, and what are the effects of this?

Dr. Suedmeyer: *I have noticed this only occasionally, usually with treat items that increased the weight of the animal to a point beyond what was considered normal. Sensory overload could occur, as could providing items that are too large, which might frighten the animal.*

Dr. Tynes: *It is possible but unlikely under usual circumstances. Any animal continuously exposed to novel stimuli without the time to adjust to particular novelty may become stressed and therefore more likely to become ill. We should consider an animal's natural habitat and environment.*

Dr. Morrisey: *Too much enrichment can result in overstimulation which can result in stress, leading to deleterious effects on most body systems. An example of this is the nocturnal species whose owner interacts with it during the day.*

FROM THE LITERATURE

Avian Sedation

Intramuscular administration of midazolam induced sedation in pigeons. A dose of 6 mg/kg induced peak sedation approximately 10 minutes after administration. Heart and respiratory rates were not significantly affected. Flumazenil administered at 0.1 mg/kg IM resulted in rapid reversal (antagonism) of the sedation induced by midazolam. Midazolam (reversed with flumazenil) can be used to perform diagnostic and therapeutic procedures.

Day T, Roge C: Evaluation of sedation in quail induced by use of midazolam and reversed by use of flumazenil. *J Am Vet Med Assoc* 209:969–971, Sept 1, 1996.

Editor's Note: I routinely use isoflurane for performing minor diagnostic procedures (venipuncture, radiology) on birds. The bird is placed in an induction chamber, and isoflurane is administered in increasing increments until anesthesia occurs; the anesthesia is maintained by means of a face mask. The authors have used midazolam and flumazenil in quail, raptors, and pet birds for sedation. These injectable drugs may offer a better alternative than general anesthesia when the need for performing minor procedures arises. Doses for pet avian species were not determined in this study.

HOW I ...

Handle Avian Phone Emergencies

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

When talking to a bird owner who has called your clinic, one of the more difficult tasks is determining the urgency of the situation. Any time clients call with concerns about their birds they should be scheduled for an appointment; the dilemma is determining whether the problem can wait for an appointment or if it should come in as an emergency. Birds are unique in their manifestations of and responses to disease. They are notorious for "hiding" their illnesses, and usually by the time the owner notices something is wrong the bird is unable to compensate for its disease and is quite ill.

Most concerned callers fall into one of three categories. First is the well-informed, experienced bird owner. These people can usually recognize whether the bird is exhibiting an emergency case. The second group includes novice bird owners who are eager to learn all they can about their birds. They have been told that a bird can die at the first sneeze, or they have read about a disease and are sure their bird has it. These people should not be put off because getting them into the clinic to educate them on clinical signs of illness is important. However, these calls are usually not emergencies. The third group of callers are the unobservant or uninformed owners. These people usually call after the bird has been on the bottom of the cage for 3 days or after they have been trying to treat the bird themselves for 2 weeks. A large number of these cases are emergencies.

Asking key questions and getting a detailed and thorough history will help determine how serious the bird's condition is. The following questions should be asked of each owner:

1. What is the age and species of the bird, and how long has the owner had it?
2. How acute are the signs of illness?
3. What is the bird's mental status?
4. Is the bird weak and unable to perch?
5. Have the bird's droppings changed, and are there as many as usual?
6. Is this the only bird showing clinical signs of illness?
7. Have any new birds recently been added to the flock?
8. Have there been any recent changes in the bird's environment, including exposure to any gasses or airborne toxins?
9. Describe the bird's environment and diet.
10. Is the bird currently receiving any medication?

Some of the more critical clinical signs that necessitate an emergency visit are ataxia and an inability to perch. Any form of hemorrhage, beak fractures, or potential long bone fractures should be seen as soon as possible. Any bird that is fluffed, depressed and on the bottom of the cage, or having severe respiratory distress should be treated as an emergency. Regurgitation not related to sexual behavior indicates a very ill bird. A bird that has potentially been clawed or bitten by a cat should be brought in right away because of the possibility of shock or sepsis. Any ingestion of a foreign body constitutes an emergency as well.

Not all clients are able or willing to bring their birds in to the clinic. In these cases, the best you can do is provide good home nursing instructions. If the bird is weak and depressed, the owner should remove all perches or move the bird to an aquarium. This gets the bird on a flat surface to rest, and it does not spend energy trying to perch. Easy access to water and whatever foods the bird is likely to eat should be provided. The environmental temperature should be increased to 85°F to 90°F (29.4°C to 32.2°C) by using a heating pad or a desk lamp, and distractions or stress kept to a minimum. If it won't stress the bird, the owner can try hand-feeding Gatorade, Pedialyte, or honey and water. Gerber brand mixed vegetable baby food, warmed, can also be offered. If there is minor bleeding or a broken blood feather, have the owner apply pressure and pack the area with flour or corn starch. Cuts and abrasions can be cleaned with hydrogen peroxide or povidone-iodine (Betadine).

Of course, it is difficult to accurately assess a bird's condition over the phone. Because of this, all clients should be encouraged to bring their birds in for an examination. The argument that the trip to the hospital may stress the bird is a poor excuse. The only way you can help is to get the bird examined and provide the necessary treatment.

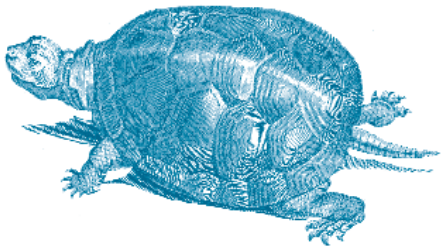
FROM THE LITERATURE

Treatment of Abscesses in Chelonians

Many subcutaneous abscesses are easily lanced and drained with manual restraint. Aural (tympanic) abscesses can often be treated by making a curved incision along the ventral margin of the tympanum from the 3 o'clock to 9 o'clock positions. The starting and finishing points are then connected with a straight incision, which results in removing the ventral third of the tympanum. This leaves a nice window for drainage and flushing. Culture and sensitivity tests of the abscessed material (or preferably of the walls of the abscess) can be performed. The abscess is flushed with diluted povidone-iodine (Betadine). Daily flushing for 5–7 days usually results in resolution; systemic antibiotics are rarely needed unless the abscess is refractory to treatment or concurrent disease is present. The incision in the tympanum heals well once the abscess is resolved.

Mader D: Surgical techniques in turtles and tortoises. *Veterinary Product News* Sep/Oct:28–29, 1995.

Editor's Note: For me, the hardest part in treating aural abscesses is securing the pet's head and keeping it extended; anesthesia or sedation can be used if needed. Aural abscesses are common in pet turtles, and surgical treatment is generally very rewarding. Dietary vitamin and mineral deficiencies must also be corrected. Practitioners should always consider using analgesia. The need for systemic antibiotics will vary with each individual case.



CASE REPORT

Fibrosarcoma in a House Rabbit

Valarie V. Tynes, D.V.M.

A 5-year-old intact male French lop rabbit (*Oryctolagus cuniculus*) was brought in for examination because of multiple skin nodules that had been present for more than a year. The owner reported that the growths had begun to appear slowly and new growths continued to appear, but they did not change much in size once noticed. The rabbit was housed indoors and had free access to the entire apartment when the owner was home. The remainder of the time it was confined to a wire cage in one room of the apartment. The owner kept the rabbit indoors except for occasional, supervised trips outdoors when she allowed it to graze on the lawn. Since the appearance of the growths the rabbit continued to eat, drink, and behave normally. There did not appear to be any pruritus associated with the condition, and no hair loss was evident.

Physical examination revealed numerous growths visible under the skin and evenly distributed over the rabbit's body from head to rump. The masses ranged in size from 4 to 15 mm and were firm. No other abnormalities were apparent during the physical examination. The rabbit was anesthetized by means of isoflurane gas in an anesthetic chamber and maintained with a face mask. One of the masses was removed from the lateral side of the right thigh. The mass was fixed in formalin and submitted for histopathology.

The histopathology report indicated that the mass was a benign dermal fibroma but warned that, although atypical, it could represent viral fibromatosis or non-viral fibromas occasionally seen in association with internal neoplasia. Biopsies of other masses were recommended; however, the owner chose to postpone any further diagnostic tests.

There was no change in the rabbit's condition for 18 months, at which time the rabbit was brought in for the evaluation of a large mass that appeared "suddenly" in the dewlap. The mass was firm and measured approximately 5 × 10 cm. Surgical removal was scheduled immediately, and again anesthesia was induced and maintained with isoflurane. A single incision was made over the mass, and blunt dissection revealed that it was poorly circumscribed and deeply attached to the underlying structures. The right jugular vein was involved and had to be ligated. Complete removal was not possible because abnormal tissue extended into the thoracic inlet. A partial excision was performed. Subcutaneous tissues were closed by using 2-O polyglyconate suture material (Maxon) in a simple interrupted pattern. The skin was closed by using 4-O Maxon in a subcuticular pattern. A second biopsy was taken from one of the existing growths. Both masses were sent to the laboratory for histopathologic examination.

The rabbit was discharged with trimethoprim/sulfamethoxazole oral pediatric suspension (15 mg/kg q12h for 10 days).[1]

The histopathologic report indicated that the smaller mass was a fibropapilloma and that the larger mass was a fibrosarcoma. The pathologist stated that these tissues were "consistent with the lesions of rabbit fibromatosis (Shope fibromatosis) and that the prognosis was fair because these growths are usu-

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Client Teaching Guide

Reptile CARE SHEET

Wm. Kirk Suedmeyer, D.V.M.

The Burmese Python (*Python molurus bivittatus*)

- **Namesake:** Asian species (Burma, India)
- **Place of Origin:** Native to India, Ceylon, East Indies
- **Adult Length:** 18–22 ft; these snakes can grow rapidly, attaining 6 ft in length in their first year.
- **Average Life Span:** 10–15 years
- **Activity:** These snakes are generally active and mostly ground dwelling, although they will climb short distances.
- **Food**
  - In captivity, most do well on mice, rats, rabbits, chickens, and guinea pigs.
  - Most individuals are best fed once to twice every 10 days.
  - All are best fed dead food, to avoid injury from live prey.
- **Cage Temperatures**
  - Optimum air temperature during the day is 85°F to 95°F (29.4°C to 35°C).
  - Optimum air temperature at night is 75°F to 80°F (23.8°C to 26.6°C).
  - A temperature gradient should be provided so that the snake can move to slightly cooler or warmer temperatures.
- **Cage Humidity:** Optimum is approximately 60%. Observation of shedding is a good way to judge the humidity; snakes should shed in one piece if the humidity is adequate.
- **Reproduction**
  - This python lays eggs. The female generally curls around the eggs and incubates them by "twitching" her muscles, raising the temperature of incubation by 1°F to 2°F.
  - Generally easy to breed in captivity, as long as enough room is provided for both adult snakes.
- **Common medical problems**
  - Upper respiratory infections, caused in part by abnormally low cage temperatures
  - Anorexia (not eating)
  - Obesity
  - Temperament problems—generally darker phase animals are more aggressive.
  - Necrotic stomatitis
- **Veterinary Recommendations:** Yearly physical examinations, along with a fecal examination for internal parasites.
- **Ranking as a Reptile Pet (scale: 1 = best, 10 = worst):** Gentleness, 3; Ease of maintaining, 2; Medical problems, 3; Longevity, 3; Price, 5; First-snake recommendation, 2.

Fibrosarcoma in a House Rabbit

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ally of a low grade malignancy and metastasis is uncommon."

Two months later, the rabbit was brought in with tumor regrowth in the area of the dewlap. On physical examination, a mass, almost as large as the previous one, was again palpable. Surgical removal of this mass was performed by the same technique as before. Although multilobulated and closely attached to the jugular vein, this mass was somewhat easier to dissect from other structures than the previous one.

Within 2 weeks, tumor regrowth was apparent and in spite of a worsening prognosis, the client expressed interest in further treatment and was referred to a radiologist. The tumor was again removed and radiation therapy begun.

A total of 12 radiation treatments were given, twice weekly, to equal a total dose of 6,000 rad. The rabbit exhibited few side effects throughout treatment but 2 weeks after cessation of radiation therapy became lethargic, quit eating, and died within 24 hours. The owner declined to have a postmortem examination performed.

It is not known if this rabbit was actually infected with the Shope fibroma virus. If so, the clinical picture was somewhat unusual. The Shope fibroma virus is a member of the pox virus group and is believed to be spread primarily by arthropod vectors. Wild cottontail rabbits act as the reservoir. A house rabbit, living in the city, would be unlikely to be exposed to this virus. Tumors induced by the virus usually regress within 1–2 months, leaving the animal immune to the virus. This animal had small fibrotic growths present for about 4 years without suffering any illness. Metastasis, malignant behavior, and subsequent fatalities are rare, although some variation in the behavior of different strains of the virus has been observed. Studies have also shown that the immunological status of the host may affect the disease caused by the virus.[2] If the original lesions on this rabbit were indeed caused by infection with the Shope fibroma virus, the rabbit's immunity may have protected it from contracting more severe disease until age led to a weakened immunological status and malignant transformation of 1 or more of the small masses.

References

1. Hillyer EV, Quesenberry KE: *Ferrets, Rabbits and Rodents: Clinical Medicine and Surgery*. Philadelphia, WB Saunders, 1997.
2. Febvre H: The Shope fibroma virus of rabbits, in: Dalton (ed). *Tumors Induced by Viruses: Ultrastructural Studies*, vol 1. New York, Academic Press, 1962.

Routine Avian Plasma Chemistry Profile

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The normal plasma calcium concentration of birds ranges between 8 and 11 mg/dL and can be as high as 30 mg/dL in egg-laying hens. Hypocalcemia occurs with alkalosis, hypoalbuminemia, and secondary nutritional hyperparathyroidism. Hypercalcemia results from hyperalbuminemia, hypervitaminosis D_3, and osteolytic bone lesions.

Normal plasma phosphorus concentrations range between 5 and 7 mg/dL. Hypophosphatemia occurs with starvation, malabsorption, and hypovitaminosis D_3. Hyperphosphatemia occurs with hemolysis, hypervitaminosis D_3, severe renal disease, and excess dietary phosphorus.

The normal plasma sodium concentration of birds ranges between 130 and 160 mEq/L. Hyponatremia occurs with diseases affecting the kidneys, salt gland, and gastrointestinal tract. Hypernatremia results from excessive dietary salt intake, increased water loss, decreased water intake, or dysfunction of the salt gland.

The normal plasma potassium concentration of birds ranges between 2 and 4 mEq/L. False elevations in plasma potassium concentration occur with hemolysis or failure to quickly separate the plasma from the cells. Hyperkalemia is associated with acidosis, renal failure, and severe tissue necrosis. Hypokalemia occurs with alkalosis, chronic diarrhea, prolonged anorexia, and use of potassium-poor fluid therapy.

The plasma chloride concentration provides the least information in the evaluation of birds. Normal plasma chloride concentration ranges between 100 and 120 mEq/L in healthy birds. Hypochloridemia is rarely reported in birds, and hyperchloridemia indicates dehydration or salt loading.

Suggested Reading

1. Hochleithner M: Biochemistries, in Ritchie BW, Harrison GJ, Harrison LR (eds): *Avian Medicine: Principles and Application.* Lake Worth, Fla, Wingers, 1994, pp 223–245.
2. Lewandowski AH, Campbell TW, Harrison GJ: Clinical chemistries, in Harrison GJ, Harrison LR (eds): *Avian Medicine and Surgery.* Philadelphia, WB Saunders, 1986, pp 192–200.
3. Lumeij JT: Avian clinical biochemistry, in Kaneko JJ, Harvey JW, Bruss ML (eds): *Clinical Biochemistry of Domestic Animals,* ed 5. San Diego, Calif, Academic Press, 1977, pp 857–879.

Answer by Shawn Messonnier, D.V.M.

Do you recommend pro-motility drugs in rabbits with gastric hypomotility?

I routinely use metoclopramide (0.2–0.5 mg/kg SC) in rabbits that have gastric hypomotility. These rabbits are typically brought in for varying degrees of anorexia and lethargy. We formerly called all of these cases "hairball" problems; we now know that most rabbits do not have true hairballs. I do like to take a radiograph to rule out total obstruction before using the metoclopramide. If only stasis is present, I will typically treat the rabbit with a single injection of metoclopramide and subcutaneous fluids (usually a bolus of 50–100 mL of lactated Ringer's solution) and have the owners force-feed the rabbit. If the animal does not respond within 24–48 hours, I may try cisapride (0.1–0.5 mg/kg PO), but I re-radiograph the pet first. If the animal is treated early and aggressively, surgery can usually be avoided unless a true hard obstruction is present, which is rare. If the owner refuses radiography, I point out the dangers of perforation if an obstruction is present. (I may even decide not to use the metoclopramide if I have any doubt or if anorexia has been present for longer than 24 hours.)

Readers: We welcome your questions, practice tips, and case reports. Please submit any materials to Tania Banak, Mosby, Inc., 11830 Westline Industrial Drive, St. Louis, MO 63146; tania.banak@mosby.com; (800)325-4177; fax (314)453-4191.

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