

Companion Animal Hospital Exotic Animal Care



The Green Iguana, *Iguana iguana*, is a large lizard species that is generally not suited to most captive situations. They grow to a large size, have special dietary requirements that may not be easy to meet, require an environment with tropical heat and humidity, and some individuals (particularly males) can be quite aggressive. Despite all of this, when well cared for they can make excellent companion animals. Green Iguanas are quite intelligent, can learn to recognize people, and even be “toilet-trained.”

A giant lizard, adult male iguanas can reach a total length of 2.3 m (7 ft), although more than 2/3 of their total body length is their strong and muscular tail, and weigh up to 8 kg (18 lb). Females are typically not as long or as heavy as males. They may easily live 20-25 years of age with good care and preventative medicine.

Green Iguanas are native to parts of Central and South American, such as Mexico, Surinam, El Salvador, Colombia, and have been introduced to Florida and Hawaii in the United States. They are considered “threatened” by CITES (Convention of International Trade of Endangered Species) due to habitat loss. Most iguanas found in pet shops are imported from iguana “farms” in Central and South America.

1. Environment: Enclosure

There are many suitable reptile terrariums available on the market today; however most are only suitable to house a juvenile iguana. Most commercial terrariums are made of glass with screen paneling for ventilation, but an aquarium with a securely-fastened screen lid is also a suitable as temporary housing. These lizards are surprisingly adept climbers when young, and a secure lid will keep them inside and other pets out. A minimum 230 L (60 gallon) enclosure is considered adequate for a baby iguana, up until about 6-12 months of age.

Older iguanas generally require a custom-built enclosure. While some owners will modify a room in the home for their iguana, this often presents many difficulties: Achieving tropical heat and humidity is much easier in an enclosure compared to a whole room (and may cause significant damage to the home), and these two environmental factors cannot be neglected. For arboreal¹ lizards, a minimum standard enclosure size is dependent on their total body length: 1 ½ x in length, at least 1 x in height, and 1 x in width. For fully-grown adult iguanas, this means the enclosure must be at least 3 m long by 2 m tall by 2 m wide. This size is important to allow for such a large-bodied lizard to move around safely, and to allow for thermoregulation.

¹ Arboreal: Living predominantly in trees.

Custom-built enclosures may be made from many materials, although a mix of wood, screen, and acrylic glass is common to allow for a sturdy structure, adequate ventilation, and good visibility. There are many great how-to guides available online and in care books for terrarium construction.

Green Iguanas, like most reptiles, do best when housed alone because of their territorial nature. We do not recommend housing Green Iguanas together at any time. While baby iguanas may be gregarious in the wild (this is likely a behaviour to help reduce an individual's chances of being eaten by a predator), they quickly become more territorial as they mature. While wild Green Iguanas are somewhat social and may often be seen congregating around a valuable resource (such as food or a great basking spot), captivity is not the wild: Wild iguanas have a comparatively limitless habitat to retreat to if confronted by an aggressive conspecific² while pet iguanas do not. Being housed with other iguanas is a significant source of stress (which is not always obvious in captive reptiles), and iguanas are capable of inflicting deep bite wounds on each other.

2. Environment: Heating

Reptiles are ectothermic: They rely on external heat to maintain their bodies at a preferred temperature. All reptiles need an external heat source so that they may thermoregulate by shuttling within a heat gradient in their enclosure. Basically, when a reptile is too cool he will move to somewhere warm, and when he is too warm he will move somewhere cooler. Reptiles will move around in the gradient throughout the day to try to stay at a target body temperature.

To create a thermal gradient in the enclosure, a primary heating device should be placed on one end. In some homes, a secondary heating device may be necessary to maintain temperatures warm enough. The primary heating device can be a heat lamp left on during the day. Heating pads make excellent secondary heating devices if needed at night. Ceramic heat emitters and radiant heat panels may also be used for nighttime heating as they do not produce light. Red coloured incandescent bulbs, sometimes called "infrared" bulbs, should not be used for nighttime heat as reptiles certainly see the red light, contrary to what they often advertise.

The temperatures required by Green Iguanas are 40 °C (104 °F) at the basking spot, and 25 °C (77 °F) or lower in the cool end during the day, and no cooler than 20 °C (70 °F) at night.

Monitoring the thermal gradient is critical: Use a thermometer both at the animal's basking spot as well as at the cool end of the enclosure. It is not only important to ensure that your pet can get warm enough based on the species' preferred body temperature, but also that the cool end allows for proper cooling when needed. Hyperthermia, or an excessively high body temperature, can kill a reptile or amphibian within minutes, and ensuring that your thermal gradient is appropriate at both ends is critical. We recommend the usage of either a digital

² Conspecific: Member of the same species.

thermometre with a probe that may be placed at the appropriate spot, or a noncontact infrared temperature “gun” that can be pointed at any location in the enclosure. Note that some thermometres are not very accurate and may be misleading when monitoring temperatures. “Stick-on” LCD and dial thermometres are generally quite inaccurate and we do not recommend their use.

3. Environment: Lighting

These lizards need a broad spectrum light source that provides UV-B radiation to allow for normal calcium metabolism, and UV-A to help with prey identification. Please see our handout on lighting for reptiles for more information.

4. Environment: Substrate and cage furnishings

Substrate is the medium covering the floor of the enclosure. Generally, it is safest to use a substrate that cannot be accidentally eaten, such as ceramic or slate tile, reptile-safe carpeting, or even newspaper. Inappropriate and/or dangerous substrates that are commonly associated with gastrointestinal impaction include calcium carbonate sand, playsand, crushed walnut shell, crushed corn cob, wood chips, wood shavings, gravel, and coconut husk. Some soil mixes can be used to help increase the enclosure humidity as they retain moisture; however Green Iguanas are notorious for eating anything that may resemble something edible. If you choose to use a substrate that may be eaten, please monitor your iguana closely to ensure that he or she is not eating it. Fatal gastrointestinal impactions may occur, even with substrates that are marketed as “safe” and “digestible.”

Reptiles need hiding spots so that they may hide to feel secure, but the size of the Green Iguana makes most commercially-available caves and other hides too small. Using branches and false plants to create visual barriers so that your iguana may hide from view is important for their sense of security. The minimum number of hides is two: One in each the warm and cool ends of the enclosure. This allows the iguana to hide in both ends of the gradient for thermoregulation.

As iguanas are arboreal, offering them branches and shelves is important to both allow for thermoregulation (reaching the basking spot) and exercise. Branches or shelves should be wide enough to accommodate the iguana’s body width.

Allowing your iguana to free-roam the home for part of his or her day is a great way to keep your iguana socialized, and can provide good exercise. Iguanas can seriously harm themselves if their free-roaming area is not “iguana-proofed.” Please see the Green Iguana Society’s list for iguana-proofing a room for guidelines: <<http://www.greenigsociety.org/igproof.htm>>

5. Nutrition

Green Iguanas are strict herbivores, more specifically folivores as they eat mostly plant foliage in the wild. In captivity, a balanced diet of fruits and vegetables consisting mostly of high-calcium, leafy greens is suitable for iguanas. Please see our handout on feeding herbivorous lizards for further information.

As these lizards are diurnal, they should ideally be fed in the morning so that they may forage all day when they are normally active. Green Iguanas need to be fed daily.

If your iguana is allowed to free-roam, it is important to restrict access to plants that may be toxic. Captive iguanas do not instinctively “know” if a plant is safe to eat, as they are not in their natural habitat.

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Some iguanas refuse to drink from a water dish but we still recommend offering a dish of fresh water in the enclosure in case the iguana is thirsty. Offering Green Iguanas a regular soak in the bathtub or other container is a good habit to help keep them hydrated and aid with shedding. Iguanas will often defecate when placed in warm water, so this can be a way to “toilet-train” them and help keep the enclosure clean. Please be certain to appropriately disinfect the bathtub after it has been used by your lizard.

6. Health

Good husbandry helps prevent most health problems in reptiles. As ectotherms, their immune system function is directly affected by both stress and their ability to thermoregulate, so proper environmental temperatures are critical. There are some other common health problems that you can avoid with the right precautions.

Parasites are unfortunately very common in captive reptiles due to overcrowded, stressful conditions and poor hygiene in pet stores and some breeding operations. Many parasites that affect Green Iguanas have a direct life cycle, meaning that they require no other species to help transmit them. Parasites like this tend to accumulate in captive reptiles and cause disease. Fecal testing is required to determine what kind of parasites your iguana may have so that the appropriate medication can be prescribed.

These lizards may drop their tails when grabbed, a defensive behaviour called caudal autotomy. The self-amputated tail will twitch with the purpose of distracting a predator so that the lizard may escape. Young Green Iguanas are more likely to autotomize their tail; this necessitates gentle handling. Adult iguanas cannot autotomize their tail as it is important for balance and defense, but it may be physically broken. Never grab a lizard by the tail.

Reproductive problems are common in sexually mature female iguanas, and it is not entirely understood why. Female Green Iguanas do not need to mate or even be exposed to males to produce eggs, which are infertile. They may cycle and produce eggs yearly. Pre- and

postovulatory stasis, commonly called “egg-binding,” involves the mature follicles or eggs ceasing development, effectively becoming “stuck.” A number of further complications occur such as low blood calcium, or even a generalized infection if the follicles or ova burst. There may be many factors contributing to this, such as inadequate calcium supplementation during egg production (the early stages of which may be difficult to detect), stress, other concurrent disease, or even the lack of an appropriate site to lay eggs. If you are concerned that your iguana may be producing eggs, we recommend an exam by the veterinarian, potentially with bloodwork and/or x-rays to determine if any medical interventions are necessary.

7. Further reading

Our caresheet has only scratched the surface of Green Iguana care. We strongly recommend that iguana owners continue learning about their companion animal as they are a complex species.

- **Green Iguana Society:** <<http://www.greenigsociety.org/>>
A very helpful website run by volunteer iguana owners with a number of excellent articles and lists that discuss various aspects of iguana care.
- **Green Iguana: The Ultimate Owner’s Manual** by James W. Hatfield III (2004):
This book’s title is no joke: Probably the most comprehensive and well-researched (and entertaining) read on Green Iguanas available today.
- **The Iguana Den:** <<http://www.iguanaden.org/>>
Another comprehensive website run by volunteers with a great collection of iguana care information.
- **Melissa Kaplan’s Iguana Care, Feeding, and Socialization:**
<<http://www.anapsid.org/iguana/icfs/>>
A comprehensive document on iguana care.
- **Iguanas for Dummies** by Melissa Kaplan (2000):
Another excellent title on iguana care.

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Lighting for Reptiles and Amphibians

Some reptiles and amphibians require broad spectrum lighting that includes ultraviolet A and ultraviolet B radiation (wavelengths found in natural sunlight). Providing this special lighting in captivity is critical for the health of many common companion species.

1. What is ultraviolet light?

Ultraviolet light is invisible to the human eye, but important to many members of the animal kingdom. There are three classifications of ultraviolet light:

- **Ultraviolet A:** UVA is also called long wave or "black light" ultraviolet radiation. This class of UV is important in regulating natural cycles in some reptiles, such as brumation ("hibernation") and reproduction.

Many species of reptile (Fleishman et al. 1993), insects (Salcedo et al. 2003) and birds (Cuthill et al. 2000) can see UVA light. It is important in helping to see members of the same species or even prey. It has been demonstrated that reptiles provided with UVA light generally do better in captivity, with increased levels of natural activities, greater reproductive success, and better appetites (Klaphake et al. 2004).

UVA is produced by the sun, by broad spectrum fluorescent bulbs and black lights (Gehrmann 2006).

UVA is definitely beneficial to diurnal species (species active during daylight hours). It may be most important in visually-oriented species, like members of the iguana (Iguanidae), agama or dragon (Agamidae) and true chameleon (Chamaeleonidae) families of lizards, as well as in turtle and tortoise species.

- **Ultraviolet B:** UVB is also called medium wave ultraviolet radiation, and is essential in vitamin D₃ production (the "sunshine vitamin"). Vitamin D₃ allows the body to use calcium from the diet. Some species can use vitamin D₃ from dietary sources (animal matter), but many species either cannot absorb dietary D₃ or do not encounter vitamin D₃ in their natural diet.

It is uncertain whether reptiles can see or detect UVB. It is produced by the sun, and by some broad spectrum artificial lighting (Gehrmann 2006).

UVB is important to provide for most diurnal lizards, chelonians and some amphibians. Herbivorous (plant-eating) animals absolutely need UVB lighting as they cannot use dietary vitamin D₃. Without UVB lighting, calcium deficiency occurs and manifests as many health

problems, including the metabolic bone diseases (a group of pathologies related to calcium metabolism).

There is a growing amount of research suggesting that species that we have not traditionally recommended UV-B lighting for can benefit from exposure. For example, some studies (Acierno et al 2008, Hedley and Eatwell 2013) have demonstrated that snakes can certainly use UV-B lighting. More investigation is needed to determine the health benefits of providing broad spectrum lighting to these species, however in the meantime it may be safest to allow for lighting that is as natural as possible for these captive snakes.

- **Ultraviolet C:** UVC, or short wave ultraviolet radiation, is produced by the sun but filtered by our atmosphere. Some lights will produce UVC radiation very close to the bulb surface. It is germicidal and used in air and water disinfection systems. Exposure to UVC radiation is harmful to the skin and eyes, and does not need to be provided to reptiles or amphibians in captivity.

2. Types of broad-spectrum lights

There are several types of commercial bulb available to provide your companion animal with broad spectrum lighting. Select a bulb according to the animal you have, and the type of enclosure you are using.

- Linear fluorescents are suitable for enclosures with a lot of floor space, as well as for long animals that have a large body area that needs UV exposure. Examples of brands include: **Exo Terra Repti Glo** by Hagen, **Iguana Light** and **Reptisun** by Zoo Med, **Desert Series 50** and **Tropical Series 25** by Zilla.



- Compact fluorescents are limited in their "spread" (place them horizontally towards the basking area, to increase surface area exposed) but have a greater relative irradiance closer to the bulb, so they are more suitable for small enclosures.

Examples of brands include:

Exo Terra Repti Glo by Hagen, **Reptisun** by Zoo Med, **Desert Series 50** and **Tropical Series 25** by Zilla.



- Mercury vapour lamps are only suitable for very large enclosures. They produce a large amount of heat as well as visible light, UVA and UVB (Baines et al. 2006). Users must be very careful to avoid thermal burns, always test the environmental temperatures before introducing your pet to the enclosure when using a mercury vapour lamp.

Examples of brands include:

PowerSun UV by Zoo Med, **Exo Terra Solar Glo** by Hagen.



3. Using broad-spectrum lighting

Keep the following points in consideration when lighting reptile or amphibian enclosure:

- Always research recent current care information about what kind of lighting your species needs. Reptile and amphibian care and medicine is a field that is constantly evolving.
- Never allow a glass or plastic barrier to occlude your broad spectrum light. Glass and plastic filter 99-100% of UVB radiation, even if visible light may pass through (Baines et al. 2006).
- The amount of UV produced decreases with distance from the bulb. Most bulbs are effective at a distance of less than 30 cm (12") from the basking spot (but read the manufacturer's recommendations). However, because bulbs may also produce small amounts of harmful UVC radiation near the bulb's surface, keep a minimum distance of 10

cm (4") (Baines et al. 2006).

- Screen or mesh covers or enclosures will physically block some UV from reaching the animal (Baines et al. 2006). If you have mesh or screen between your broad spectrum bulb and the animal, ensure that your pet can get relatively close to the bulb, or add a reflector to increase how much UV is projected to the basking spot.
- Reptiles and amphibians are never in direct sunlight for the entire day. Always ensure that your pet can choose a location as a shelter from UV light exposure.
- Replace the light every 6-12 months, or according to the manufacturer's recommendations. The UV output of a bulb decreases over time, even if the light is still producing visible light (Klaphake et al. 2003).
- Consider using "high output" bulbs (with an 8.0 or 10.0 rating) with species that would be exposed to a lot of UV light (like desert animals) or in large enclosures, and mid-range output bulbs (5.0) with other species or in smaller enclosures. Low output bulbs (2.0) are probably useless in terms of UVB output.

Thank you for your trust in taking care of your reptile companion. If you have any questions or concerns about his or her care at home, please call the hospital to speak with our staff.

4. Sources and further reading

- Acierno, MJ, MA Mitchell, TT Zachariah, MK Roundtree, MS Kirchgessner, D Sanchez-Migallon Guzman. 2008. Effects of ultraviolet radiation on plasma 25-hydroxyvitamin D3 concentrations in corn snakes (*Elaphe guttata*). *American Journal of Veterinary Research*, 69(2):294-297.
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Herbivores are animals that eat plants, and folivores are a special subset of herbivores that eat mostly leaves and other foliage. Captive folivores require special attention to their nutrition, as many common produce items available in grocery stores for human consumption do not match the nutrition that a wild animal obtains from eating hundreds if not thousands of different plant species.

Common folivorous species of reptile in captivity include the Green Iguana (*Iguana iguana*), Spiny-tailed Agamas (*Uromastix sp.*), Chuckwalla (*Sauromalus obesus*); and adult Bearded Dragons (*Pogona vitticeps*) are mostly folivorous.

Herbivorous animals require a diverse diet of nutrient-rich vegetables and fruits to stay healthy. Individual plants are very limited in what nutrients they have compared to animal prey; herbivores need to take in a wide variety of vegetation to acquire all the nutrients they need. Many fruits and vegetables that are popular in the grocery store produce section are not suitable for herbivorous reptiles. There are some important aspects of herbivore nutrition to consider when forming a diet plan.

1. Calcium and phosphorus

These two mineral nutrients have a close relationship, and issues with calcium balance is one of the most common causes of illness in pet reptiles. Many fruits and vegetables have very poor calcium content and a very high phosphorus content, resulting in an inverted calcium-to-phosphorus ratio (Ca:P). This is the proportion of calcium and phosphorus in any food, an important value to consider as these two mineral nutrients have a close relationship. The target dietary Ca:P for herbivores is 1.5-2.0:1. This means that not only do we need to meet a minimum amount of calcium in a diet, but the amount of calcium needs to be one and a half to twice as much compared to phosphorus.

Any plant-eating lizard's diet should contain plenty of high-calcium, low-phosphorus vegetables, like collard greens, dandelion greens, turnip greens, escarole, and mustard greens. Foods that are high in phosphorus should be fed in limited quantities.

2. "Anti-nutrients" in food

There are many naturally-occurring plant chemicals (phytochemicals) that interfere with normal absorption or use of nutrients. In small quantities, these are not harmful, but when anti-nutrient dense foods make up the bulk of an animal's diet there can be serious health

consequences. Some notable “anti-nutrient” phytochemicals include the following:

Glucosinolates: Several chemicals in this group interfere with the metabolism of dietary iodine, acting as goitrogens. Goitrogens suppress thyroid gland function, and are named for an enlargement of the thyroid gland in some affected species called “goiter.” Glucosinolates are found in particularly high concentrations in many cruciferous vegetables (plants in the genus *Brassica*). Foods that contain significant amounts of glucosinolates include bok-choy (Chinese cabbage), broccoli, Brussels sprouts, cabbage, cauliflower, kale, rutabaga, spinach, and turnip.

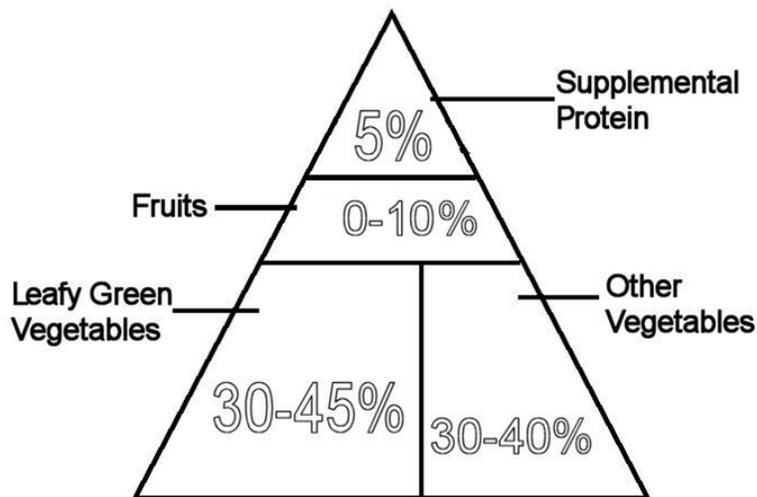
Oxalates: Oxalates are found in many plants, particularly of the genus *Oxalis*. They bind to dietary calcium, inhibiting it from being absorbed. Foods high in oxalates include beets and beet greens, broccoli, carrot, cilantro, kale, pears, spinach, strawberries, Swiss chard and tomatoes. Note that oxalates found in plants that are commonly considered irritating oral tissue (and toxic to some animals) contain oxalates in a specific structure, called raphide crystals. Some herbivores can eat these plants, however always verify with the veterinary team before introducing plants to your lizard’s enclosure.

Phytates: A phosphorus-storing compound in plants, phytates will bind to calcium, zinc, iron and other minerals so that the body cannot use them, and also interferes with protein digestion. Legumes and grains are typically high in phytates.

Tannins: These phytochemicals chemicals render protein unusable to the body. Foods containing significant levels of tannins include bananas, carrots, grapes, onions and spinach.

3. Building a balanced diet

To create a balanced diet for a herbivore, we separate different fruits and vegetables into functional groups based on what they provide in the diet.



The following pyramid works well to help plan a daily diet for most herbivorous lizards.

Staple food items that provide important nutrients are marked with an asterisk (*). Every category of the diet needs at least one staple vegetable (two or three per category is better). Ideally, feed 2-4 items from each category, daily (except fruit, which does not need to be fed

daily for most species).

Leafy Green Vegetables (30-45%): Dark, leafy green vegetables that are high in calcium should be the bulk of the diet.

*Arugula, bok choy, *collard greens, *dandelion greens, endive, *escarole (chicory), kale, *mustard greens, nappa cabbage, parsley, Swiss chard, rapini, romaine lettuce, *turnip greens, *water cress.*

Other vegetables (30-40%): Other vegetables help round out the nutritional content of the diet. Pick at least one green vegetable and one red, orange or yellow vegetable to feed daily.

**Acorn squash, *butternut squash, *cassava (yucca root), carrot, *green beans, *kabocha squash, parsnip, pumpkin, *okra, spaghetti squash, *snap peas, *snow peas, sweet potato, *wax beans, zucchini.*

Fruits: Fruit availability is often seasonal in the wild, and should not be a large part of the captive diet. It does not need to be fed daily. It can be fed to add colour and flavour to the diet, but its high water content can also dilute the nutrients of the rest of the diet. Fruits marked with an (*) are more suitable than others on the list.

*Apple, apricot, banana, bell pepper (any colour), berries, cherries (pitted), dates, *figs, kiwi, *mango, melon, *papaya, peach, pears, plum, *prickly pear cactus pads (de-spined and skinned).*

Supplemental protein: Strict herbivores (such as Green Iguanas) need plant-based protein. Animal protein (meat, poultry, fish, egg, insects and other invertebrates) should never be fed to these animals. Diets with animal protein can lead to serious health problems like kidney failure— but we do not know how much is needed to do the damage! The best readily available source of plant protein is ground alfalfa hay. It is also very high in calcium. High-quality alfalfa hay can be ground into a powder with a coffee bean grinder or food processor, which can then be sprinkled on the salad. Note that alfalfa sprouts have a very poor nutrient content compared to mature hay and they cannot be used as a substitute.

Omnivorous species like Bearded Dragons may be fed insects as the supplemental protein portion of their diet. Please note that Bearded Dragons require more supplemental protein as growing juveniles (up to 50% of their diet!), but become mostly vegetarian as adults.

The Green Iguana Society has prepared a useful Food Information Chart that breaks common fruits and vegetables down into categories based on how often they can be fed. This tool is very useful for not only Green Iguanas, but other herbivorous species:

Green Iguana Society Food Information Chart: <<http://www.greenigsociety.org/foodchart.htm>>

4. Preparing the salad

Salad can be prepared weekly and stored in a container in the fridge. Chop leafy green vegetables into pieces smaller than the size of your lizard's head. Shred tough vegetables with a food grater. Fruit can be added when the salad is served to the lizard, as leaving it in the refrigerator with the rest of the salad often results in a soggy, unappealing mess.

Supplements (such as ground alfalfa powder) should be added to the salad just before offering it to your lizard. Even with an excellently varied diet, supplements are strongly recommended to ensure that your reptile is getting balanced nutrition.

It is recommended that every meal with naturally poor calcium content be dusted with a calcium supplement. Calcium carbonate is the most common supplement form, and there should be no added phosphorus or vitamin D₃.

We do not recommend regular use of a calcium supplement with vitamin D₃, but provide broad spectrum lighting (including UV-B) instead. Most reptiles and amphibians can manufacture their own vitamin D₃ from this special artificial light that replaces sunlight, and this is the safest way to provide vitamin D₃ (please see our handout on lighting for reptiles and amphibians). Oral vitamin D₃ supplements can be used cautiously; over-supplementation causes vitamin toxicity which will lead to organ failure and death. There is very little data available on minimum vitamin D₃ requirements and how much is required to cause toxicity in the thousands of reptile and amphibian species. Note that no toxicity can occur from using UV-B lighting, and is much safer than "guessing" at oral D₃ supplementation. Note that some species, like Green Iguanas, cannot absorb oral vitamin D₃ effectively.

A general multivitamin and mineral supplement can help ensure that your pet is not missing any micronutrients (nutrients that are needed in small quantities, and may not be found in every meal). Like with vitamin D₃-containing supplements, over-supplementation can cause toxicities.

Unfortunately, there are many products available in the pet industry that do not offer a guaranteed analysis of the nutrient content. Please consult with our hospital staff for product recommendations.