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### GREEN IGUANA CARE

Thomas H. Boyer, DVM, DABVP-Reptile & Amphibian Practice  
9888-F Carmel Mountain Road, SD, CA, 92129  
858-484-3490 [www.pethospitalpq.com](http://www.pethospitalpq.com) [www.facebook.com/pethospitalpq](http://www.facebook.com/pethospitalpq)

**Introduction** - The green iguana, *Iguana iguana*, is a large, diurnal, semi-arboreal, sedentary leaf eating lizard found from Mexico into Brazil. Most problems in iguanas are a direct result of poor care. The following are some general guidelines to help you properly care for your iguana and avoid problems.

**Natural History** - Iguana habitat is generally found within 50 meters of water. Iguanas prefer to sleep on branches overhanging water. If disturbed at night they drop into the water for escape. Iguanas bask for about four hours in the morning to raise their body temperature for foraging. Once warm, they leave their tree for foraging on the ground and in nearby trees and shrubs. Studies in Panama found iguanas ate leaves, fruit, and flowers of select herbs, shrubs, trees, and vines in short frequent feeding bursts concentrated from late morning to early afternoon. Most plant species in the diet were abundant, but the lizards exerted effort to eat less common species and seasonally available foods. Although a wide variety of plant species were eaten, stomach contents typically consisted of one or two species, and researchers speculate that dietary diversity is accomplished over a period of days rather than daily. Until recently it was assumed younger animals were partially insectivorous to facilitate rapid growth, but now it is believed iguanas are herbivorous throughout life, although they occasionally eat carrion, cannibalize small iguanas, and ingest insects while consuming foliage. It is likely they will raid bird nests if the opportunity arises. Growing iguanas achieve faster growth rates by selecting diets higher in digestible protein (most likely calcium as well) and maintaining higher body temperatures which is believed to increase digestive efficiency. During midday iguanas are immobile the majority of their time, perhaps resting and conserving energy. They typically bask for another two to three hours in the afternoon. Several hours before sunset they return to their sleeping trees and remain there until sunrise.

Recent studies indicate that iguanas are not territorial except during breeding season. Outside the breeding season (which is the majority of the year) iguanas are solitary animals and prefer to apart from one another. In Venezuela, breeding season begins in early November. Males select sites within their home range that exhibit the largest concentration of females. Initially territorial defense is intermittent but as November wears on the males become increasingly aggressive. Males decrease foraging, loose weight and begin regularly patrolling their territorial boundary. Male combat consists of short wrestling matches with biting of the extremities. Small individuals from both sexes are excluded from these territories except for nighttime roosting.

Once territories are established male behavior falls into one of three types. Pseudofemales are small adult males that don't display, head bob, or attempt to mate. Rodda believes other iguanas of both sexes mistake pseudofemales for females. Peripheral males are medium adult males that stay at the periphery of territorial male's territory. Peripheral males sneak forced copulations on females by intercepting foraging females or by forays into the territorial males territory. Territorial males are generally large iguanas that viciously defend specific areas with females present.

Females become receptive to breeding in late November or early December. As their bodies fill with developing follicles they cease foraging and remain in trees all day

long. A female dominance hierarchy, based on size, develops within territories, perhaps in an attempt to keep non-resident females out of their males territory. Females may be mated by several males and switch territories. Males usually mate once per day. After breeding season territorial males begin feeding as territorial patrolling and male aggression wanes.

**Oviposition** - Females eat less and less as the eggs develop. DeVosjoli states that normal captive females will go off feed for three to five weeks prior to oviposition. Females in Panama lay clutches of 23 to 60 eggs (the average is 40) from late January to mid-March during the dry season. In Costa Rica and Mexico, eggs are laid in March and early April. Larger females lay larger clutches. In captivity females tend to produce less eggs than their wild counterparts. Hatchlings appear in 90 days at the start of the rainy season. Under artificial incubation at 80.6 to 95°F eggs hatch in approximately 93 days.

Females nest solitarily or in groups and can travel several kilometers to reach nest sites. In Panama, iguanas prefer to nest on small islands, beaches and open savanna. Researchers have found complex burrow systems shared by multiple females that are re-used annually.

It is tempting to speculate that a lack of suitable nesting areas is one reason females often fail to lay in captivity. Werner and Miller felt that nesting substrate was less important than just having somewhere to dig down into or under.

In captivity, nest boxes can be constructed many ways. DeVosjoli recommends a tall, rectangular, plastic, kitchen trash can, laid on its side and filled with 50% potting soil and 50% sand. A hole can be cut in the lid big enough for the iguana to crawl through. A large rectangular plastic storage box (roughly 2 x 2 x 3 feet long) also works well. Frye and Townsend recommend a medium-sized dog house with a removable lid and a 30 cm board nailed across the entrance. The inside can be filled with a mixture of slightly moistened sand and sphagnum moss. Alternatively a kitty litter box filled with suitable substrate can be enclosed within a cardboard box with a small entrance cut at one end. Another simple design is a large diameter clay or PVC pipe (15 to 20 cm wide and 100 cm long) with a removable seal at one end. The closed half of the pipe can be filled with suitable substrate. Nest boxes should be placed in the warmest corner of the cage as soon as the female is sexually mature or exhibits signs of gravidity such as eating less, increasing abdominal size, restlessness, pacing and digging. It is probably better to have the nest box present year round.

**Sexing** - Mature iguanas are easy to sex because the ventral femoral pores are larger in males. Mature males have hemipenial bulges at the ventral tail base, larger scales on the face and dorsal spinous crests, larger dewlaps and jowls and grow larger. In addition males from Central America develop a bronze orange color dorsally with sexual maturity during the breeding season. Females can also become orange. These differences are not detectable in hatchlings and are subtle in juveniles. Smaller iguanas can be carefully probed. Secondary sex characteristics become distinguishable at sexual maturity. Sexual maturity is typically achieved by two to three years (if growing normally) or once above 500 grams. Breeding is usually not successful until the third year in captivity.

**Housing** - In captivity, iguanas grow rapidly (30 to 60 cm per year) reaching adult size within two to three years, and can live 10 to 20 years if properly fed and cared for. Owners should invest in a larger aquarium initially or be prepared to purchase a large one later. A 20-gallon aquarium is adequate for juveniles, but within a few years most owners must build larger glass, plywood, and screen cages. Wood should be laminated or caulked and sealed with an undercoat of water sealant and two to three coats of non-toxic sealant such as polyurethane (let the cage air out for a week before placing an animals in it). Provide as much vertical space as is practical to accommodate their arboreal lifestyle.

Iguanas stay apart from one another in natural habitat except for breeding. Ideally one should house iguanas individually in captivity or provide a large enough cage, such as a room, so that iguanas can space themselves. Unfortunately, this generally is impractical, and it is

common for iguanas to be kept in groups. This often works for same-sized juveniles but as size disparity emerges problems develop. The larger iguana dominates food and heat sources. In turn, the smaller iguana fails to thrive and may suffer from chronic stress. As the size disparity increases, the larger iguana may actually attack or kill the smaller iguana. Barten mentions symptoms in the subordinate lizard of slow growth, emaciation, poor muscle tone and color, lethargy and susceptibility to infections and parasites. It is advisable to house iguanas individually.

As adults, males are intolerant of other males and immature females. Males may tolerate the presence of a few mature females but stable groups are difficult to maintain. Males may kill females and females may fight among themselves. Even iguanas which have been housed together for years may suddenly start fighting. Severe trauma can result. Several smaller cages are preferable to one large communal cage.

It is not advisable to allow iguanas free roam of the house because of the numerous hazards they can encounter. Barten notes that lizards allowed to roam free are subject to chilling from lack of access to heat sources, drafts from under doors, and cold outer walls and windows. Dogs, cats and ferrets particularly like to attack iguanas. Iguanas are also subject to trauma from being stepped on, closed in doors, and falling. They may also eat things that are not good for them, such as nails, tacks and staples, and spread bacteria throughout the house.

**Substrates** - The bottom of the cage should be lined with newspaper (the cheapest and easiest to use), indoor-outdoor carpeting, medium to large wood chips (large enough that they cannot be eaten) mixed with peat moss and sphagnum moss, orchid bark, pine bark mulch, alfalfa pellets, sphagnum moss, potting soil or earth. Avoid sand, gravel, kitty litter, crushed corn cobs or crushed walnut shells because they can cause numerous problems and too desiccating for iguanas. If potting soil is used make sure to remove Perlite® (the small white material) if present or the iguana may selectively eat it. If indoor-outdoor carpeting is used get a second so that a clean dry one can be substituted while the other is washed and dried. Watch for frayed edges that iguanas like to ingest which could cause intestinal problems. If using newspaper or indoor-outdoor carpeting, cages should be cleaned weekly (or sooner if dirty). The others should be changed every several months, but feces and moldy alfalfa pellets need to be scooped out weekly. Constantly moist or filthy environments are potential sources of infection. Rinsing with hot water is enough for most cleanings, more thorough cleaning with a 5% bleach solution is occasionally warranted.

**Housing Accessories** - Hardwood driftwood branches for climbing and basking are appreciated. A water bowl big enough for the iguana to enter and soak also is needed and should be cleaned whenever dirty or at least twice a week. Frye and Townsend stress that iguanas need access to water at all times and not just once a week. In the native state, iguanas are often found in close association to water.

Iguanas are very prone to retained shed skin on the toes and tail, perhaps as a result of low humidity in captivity. As retained sheds build up on toes or tails they gradually compromise circulation and gangrene may set in. One way to avoid this is to provide a humid retreat in an otherwise dry cage. For example a plastic shoe or sweater box can be half filled with damp vermiculite or sphagnum moss and an entrance cut into one side or the lid. One can boost humidity in drier parts of the country, by spraying daily or using a humidifier.

**Temperature** - Iguanas spend much of their day in the tropics soaking up the sun and prefer it warmer than most reptiles. Studies of iguanas in natural habitat found that they keep their body temperature well above ambient temperature. Active iguanas found at midday ambient temperatures of 82 to 90°F had cloacal temperatures of 91 to 100°F. Sleeping iguanas found at ambient temperatures of 75 to 78°F had cloacal temperatures of 75 to 81°F, respectively. Numerous studies of wild iguanas have shown that adult iguanas, by basking in the sun, maintain daytime body temperatures between 96.8 to 98.6°F. It is probably not coincidental that iguanas have body temperatures similar to mammalian hind gut fermenters such as horses.

In captivity, ideal cage temperature should not drop below 70°F at night and gradually rise to between 85 and 90°F during the day with a localized hot spot or basking area between

95 and 100°F. This will allow the iguana to regulate its own body temperature and ensure proper digestion of food through behavioral thermoregulation. Large iguanas can tolerate temperatures 5° F beyond the above ranges.

There are many ways to provide the aforementioned thermal gradients, but keep in mind that, because each setup is different, it is impossible to predict what works in each situation. Therefore it is essential that the owner monitor temperatures. Inexpensive indoor-outdoor, minimum-maximum, digital thermometers are widely available from electronics stores. The basking area can be provided by placing a 60- to 100-watt incandescent light bulb with reflector outside the cage or resting on the screen top so that it warms a branch or rock in the cage. Small glass or porcelain infrared lights also work well, but make sure they are at least eighteen inches from the iguana. With either light, make sure the iguana cannot come into direct contact or too close to the light or serious thermal burns may result. Iguanas have been known to hang directly on light bulbs while their skin slowly burns!

The best way to heat the rest of the cage is to keep the room between 75 and 90°F. Additional heat sources such as portable electric heaters, heat tape, heating pads, or hot rocks may be needed. Again make sure heating sources hot enough to burn the iguana are not present within the cage without safeguards. Anything too hot to rest a hand on or under for several minutes eventually may burn the reptile. Hot rocks are not desirable because they can develop localized superhot areas without warning. Heating sources outside the cage are much safer. If the iguana spends most of its time on a hot rock this is an indication the ambient temperature is too cool.

**Ultraviolet Lights** - Ultraviolet light (UV) in the 290 to 320 nm wavelength may aid photochemical activation of vitamin D3 in reptiles. Sunlight is the best source of UV light and should be provided whenever practical. Glass aquariums should never be placed in sunlight or lizards confined to full sunlight, without shade retreat, because lethal temperatures may quickly be reached. Indoors, UV light in the 290 to 320 nm wavelength is almost completely filtered by glass and plastic. Special UV transmissible glass or plastics are available but costly. Screens allow UV transmission.

Indoors there are several options when outdoor basking is not practical. One is to provide performed vitamin D3 in the diet. This is potentially dangerous because dietary vitamin D requirements for all reptiles are unknown and vitamin D is fat soluble and thus retained in the body even if over supplemented. Vitamin D is present in multivitamins, some calcium supplements, and fortified chows. As a general rule of thumb, limit all vitamin D sources to once or twice a month. During warmer months, with regular outdoor basking, dietary vitamin D can be curtailed.

When lizards can't regularly bask outdoors for several months provide fluorescent UV lights indoors for 12 hours per day. Use a timer to keep the photoperiod regular. Broad spectrum lights with some UV output between 290 to 320 nm are hypothesized to stimulate vitamin D synthesis and may be safer than heavy reliance on multivitamins. A wide variety of commercial reptile UV lights are available and are recommended. As UV light intensity decreases exponentially with increasing distance, the lights should be within 24 inches of the lizard. Replace UV lights every 18 months as ultraviolet output decreases precipitously after this age. Plant lights, poster black lights (BLB lights), and incandescent lights do not produce UV light in the proper wavelength. Fluorescent black lights do not cause retinal damage.

**Feeding** - Captive diets for green iguanas are constantly being re-evaluated as we learn more. Unfortunately controlled studies are scarce, therefore most diets are empirical. It is important to keep an open mind, because current recommendations may change as more is learned. Commercial iguana diets offer an obvious convenience, unfortunately some are nutritionally inadequate and the safety of others remains to be seen. Until controlled studies are done it is safest to feed as wide a variety of foods as possible and not rely on any one food for the bulk of the diet.

In the past protein rich foods, such as mammalian chows, were recommended by many authors (including this one). This was based on the mistaken notion that young iguanas were partially insectivorous and to combat an epidemic of metabolic bone disease. Times change and

we now know that a varied vegetable and fruit based diet with calcium supplementation and UV light will allow for normal growth in iguanas. Mammalian chows, insects and rodents may actually be detrimental to iguanas. Barten points out that other herbivores, such as cows or rabbits, grow well without supplementing them with dog food, so we shouldn't need it for iguanas to grow normally.

Iguanas are primarily folivores (leaf eaters). So it makes sense to feed them a ration heavily dependent on dark leafy greens. Accordingly, iguanas rations should include 95% vegetables and 5% fruits. A common misconception is that iguanas will select a balanced diet from the foods offered. While this may be true in natural habitat this certainly is not true of captive iguanas. Foods listed in bold print have a positive calcium to phosphorus ratio and should provide the bulk of the diet.

**95% VEGETABLES** - The majority of the diet should consist of dark leafy greens. Dark leafy greens that are rich in calcium include **collard, mustard, and turnip tops or greens, alfalfa or Timothy hay, kale, Chinese cabbages (Bok-choy, Pak-choi), broccoli rabe or rapina (leaves from the broccoli plant, not the stuff humans eat) clover, and dandelions (flowers, stems and leaves)**. Other dark leafy greens include red or green cabbages, **Swiss chard, beet greens, escarole, parsley, spinach, watercress**, savoy, and kohlrabi. In natural habitat iguanas readily consume flowers. Flowers such as **roses, nasturtiums, carnations, dandelions** and **hibiscus** are excellent. **Mulberry** and **hibiscus leaves** are good if available. Note that the outer darker leaves of most vegetables have a higher mineral content than the inner lighter leaves. Other types of vegetables include alfalfa, radish, clover and bean sprouts, asparagus, bell peppers, Brussels sprouts, carrots, cauliflower, cucumbers, green beans, jicama, mushrooms, okra, shredded parsnips, peas and pea pods, **prickly pear cactus pads** (shave off the spines), shredded summer or winter squashes, sweet potatoes, and uncooked thawed frozen mixed vegetables (corn, green beans, lima beans, peas, carrots).

If fed exclusively members of the cabbage family have caused thyroid problems in giant tortoises but are certainly nutritious in moderation. Spinach, beets, and Swiss chard are rich in oxalic acid. Again, if fed exclusively these foods theoretically could bind with calcium in the intestinal tract and decrease calcium absorption. However, as part of a balanced diet spinach, beets and Swiss chard are certainly nutritious. Leafy greens with a light green color, such as all types of lettuce (including Romaine), have a lower mineral content (compared to dark leafy greens) but are avidly consumed by iguanas. Too often iguanas will select lettuces to the exclusion of dark leafy greens therefore they should be limited to a small portion of the diet.

**5% FRUITS** - Fruits, in general, are mineral poor yet tasty enough that iguanas will eat them preferentially over more nutritious foods. Limit fruits to 5% or less of the total ration. **Figs** are one of the few fruits rich in calcium. Apples, apricots, dates, **grapes**, kiwis, melons, mangos, peaches, **papayas**, pears, plums, prunes, raisins, star fruit, strawberries, tomatoes and **raspberries** are all fine in small amounts. Iguanas are fond of bananas unfortunately they have very little calcium present.

To make a salad wash, chop and mix two or more types of dark leafy greens, several types of fresh or frozen vegetables and sprouts and one to two fruits. Be careful to remove and discard any wires or rubber bands. It is better to chop up the salad by hand. Food processors tend to turn the salad into mush which reduces roughage and speeds spoilage. If hand chopped the vegetable portion can be stored for a week in the refrigerator but must be allowed to come to room temperature for an hour or so before feeding. Fruit can be added as a top-dressing just before feeding. For hatchlings, it is important to chop food into smaller pieces. Each week vary the diet by purchasing different foods.

Variety is key to a healthy diet! All of the items mentioned can be found in grocery stores and should be fed. Until more is known it is prudent not to rely on any one item for the majority of the diet. Most cases of metabolic bone disease the author sees are eating less than 10 different foods. It is important that the iguana eats what is offered and not just select foods, mixing the salad well should ensure this. Established bad dietary habits can take months to correct and are crucial for long term survival. Finicky eaters can be encouraged to eat more by mixing preferred foods in heavily at first and then gradually decreasing them over a few weeks.

Be more stubborn than the iguana. Avoid continually hand feeding iguanas as it is impractical to continue this long term.

How much to feed is a tricky question. In general, feed enough that the lizard continues to gain weight and grow, but not so much that it becomes obese. If the iguana eats all the food offered and still seems hungry then feed it more. Iguanas are best fed daily, especially hatchlings. After roughly six months, they can be fed a minimum of three times per week or every other day. Daily feeding is more laborious but probably much better.

**Calcium and Multivitamin Supplementation** - Every feeding sprinkle a light dusting of calcium carbonate, lactate, citrate or gluconate on the salad. Do not over supplement with calcium! A fine barely perceptible dusting is all that is required. Phosphorus and Vitamin D-free calcium sources are recommended for regular usage as vegetables tend to contain excess phosphorus and hypervitaminosis D is a concern. Multivitamins do not contain enough calcium to serve as a calcium source (regardless of what the label infers). If the iguana won't eat the salad once dusted with calcium too much calcium is being added. A little less can be added or the salad can be tossed more, but do not omit the calcium or metabolic bone disease will inevitably occur. Substitute a light dusting of good quality multivitamins for the calcium no more than once or twice a month.

**Acclimatization** - Wild-caught iguanas often are shy and should be minimally disturbed until they are eating well and seem less nervous. Have owners resist the temptation to try and tame them immediately, because it might be too much for an animal that is already maximally stressed. Allow them a few months to adjust to captivity and start feeding well. A hide box will give them a secure area in the cage for retreat. Particularly nervous individuals may need the cage covered so they do not bash their snouts whenever there is movement outside the cage or pace constantly along the glass barrier.

**For more information** - There are many good books on iguanas. Several the author consults are "The Green Iguana Manual" by Philippe de Vosjoli (Advanced Vivarium Systems, Lakeside, CA), "Green Iguana, The Ultimate Owner's Manual" by James Hatfield (Dunthorpe Press, Portland, OR) and "Iguana Iguana, Guide for Their Successful Care" by Fredric Frye (Krieger Publishing Company, Malabar, FL).