

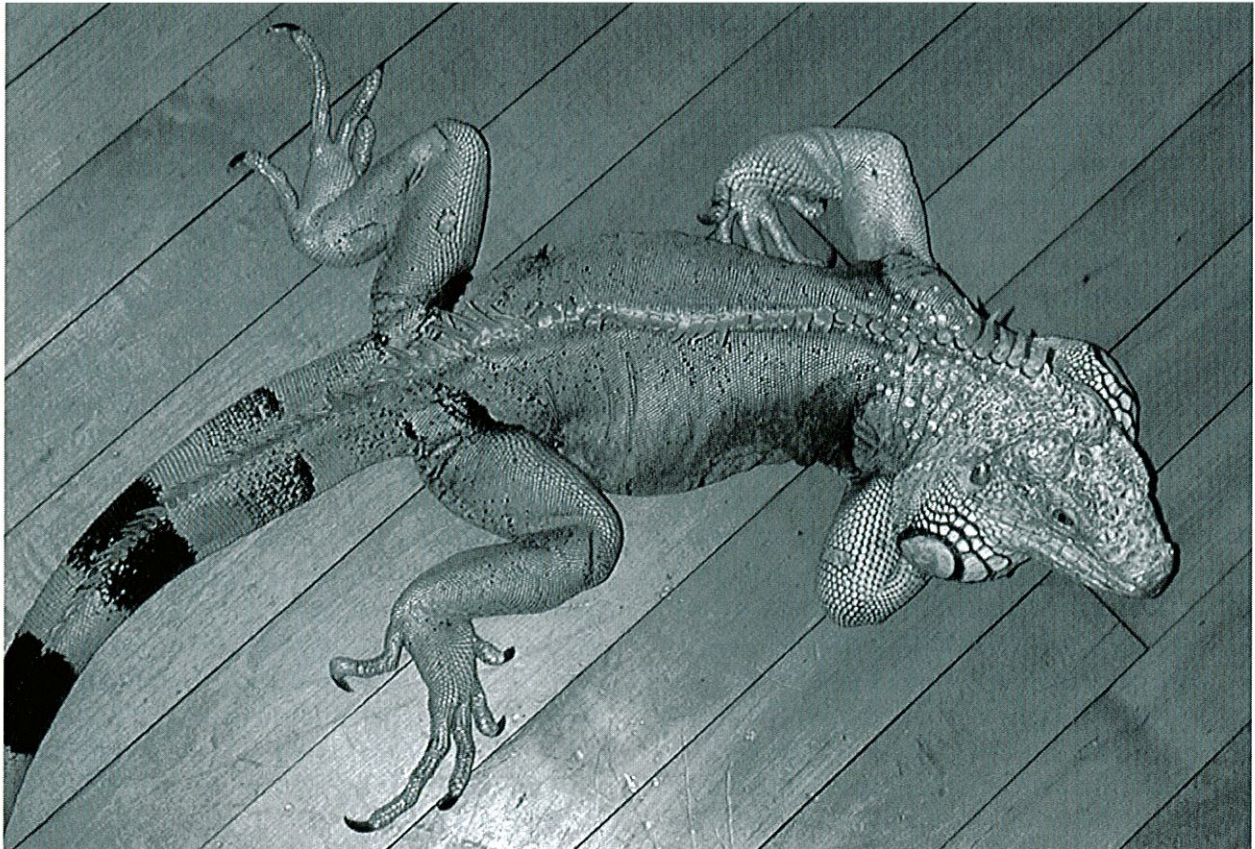
Iguana Nutrition

*Bruce Bogoslavsky, DVM
Animal Veterinary Hospital of Orlando
Orlando, FL*

One of the most misunderstood areas of iguana husbandry is their nutritional needs. An iguana's health and development are dependent on a balanced diet. Nutritional deficiencies can lead to illness and possible injury. I am amazed at the number of iguana owners who assume that, because iguanas are vegetarian, they only need lettuce and occasionally fruit to survive. Some owners have stated, "I only feed romaine lettuce and not iceberg lettuce." Although romaine lettuce contains slightly more nutrients than iceberg lettuce, both are inadequate as the bulk of an iguana's diet. I strongly advise my

clients not to feed iguanas any food item that ends with the word lettuce.

Iguanas are herbivorous and in nature feed on leaves, fruits, and flowers of many different plants. Iguanas are not insectivorous as juveniles and do not transform into herbivores as they mature. They do not have a gizzard type stomach and do not require grit to help them digest food. They digest their food by microbial fermentation in a fashion similar to cattle and goats. This process requires high environmental or intestinal temperatures to stimulate microbial activity. Inadequate environmental temperatures will lead to poor develop-



A poor diet and lack of UV to facilitate calcium metabolism leads to soft bones which are prone to fractures at the slightest stress. The fractured left limb of this green iguana was incorrectly stabilized, leading to its nonuse. This reinforces the need to seek out a properly qualified reptile veterinarian. *Photograph: Carole Saucier*

Consult the following chart for your iguana's diet:

GOOD	MODERATE	POOR
Turnip Greens	Carrot Tops	Lettuce (head, iceberg)***
Mustard Greens	Green Beans	Romaine Lettuce***
Collard Greens	Asparagus	Zucchini
Dandelion Greens	Yellow Squash	Broccoli*
Broccoli Leaves	Sweet Potato	Brussels Sprouts*
Parsley	Bok Choy*	Cauliflower*
Endive	Kale*	Radish*
Escarole	Chard**	Beets**
Water Cress	Yams	Cucumber
Kaboucha Squash	Turnips*	Spinach**
Acorn Squash	Okra	Carrots***
Butternut Squash	Green Peppers	Cabbage*
Parsnip	Rutabaga*	Sprouts*
Snap Peas	Daises	Mushrooms
Snow Peas	Carnations	Tomatoes
Hibiscus	Geraniums	Celery Stalk**
Rose Petals	Kiwi	Frozen Vegetables
Nasturtiums	Plum	Tofu
Despined Cactus Pads	Pear	Apples
Figs	Apricots	Watermelon
Papaya	Raspberries	Grapes***
Mango	Strawberries	Banana ***
Citrus Fruits	Cantaloupe	
	Dates	

* These food items can cause thyroid problems and if used at all, should be fed in very small amounts.

** These items contain oxalic acid and if used at all, should be fed in very small amounts.

*** These items contain large amounts of tannin and if used at all, should be fed in very small amounts.

ment. In nature, newly hatched iguanas will ingest fresh fecal samples from adult iguanas to "load" their intestines with microbes for digestion. Most iguanas sold now are captive-born, usually separated from adult iguanas, and unable to properly "load" their intestines with a microbial culture. To compensate, we will mix a fresh fecal sample with water and feed it to slowly developing juveniles in an attempt to increase digestive activity and promote growth. Feeding fresh fecal cultures also may be used to treat diarrhea in juveniles.

I recommend about 60% of an iguana diet be composed of green, leafy, calcium-rich vegetables. Preferred items include collard greens, mustard greens, turnip greens, dandelion greens, broccoli leaves, parsley, escarole, endive, and watercress. I like to mix a couple of these together as the base salad of an iguana's daily diet. To ensure proper uptake, pieces should not be larger than the size of

the animal's head. Store the prepared salad in an airtight container in the refrigerator.

The next 30% of the diet should be composed of other vegetables. I feed a large amount of orange-fleshed squash like acorn, butternut, or kaboucha squash. Other good food items include yellow squash, parsnip, snap or snow peas, carrot tops, green beans, and despined cactus pads. These also can be stored in the refrigerator once they have been chopped or grated into bite sized pieces, but not in the same container as the green, leafy vegetables. The daily diet should be thoroughly mixed to prevent an iguana from picking out certain items and ignoring others. Hand-toss the food for a few minutes to allow your body temperature to warm the food.

The final 10% of the diet can be fruits and flowers. Some commonly fed flowers include squash blossoms, hibiscus, nasturtiums, daisies,

Dr. Bruce's Herbivorous Lizard Diet (Iguanas, Skinks, Chuckwallas)

60% Dark Green Leafy Vegetables (Greens, Broccoli Leaves, Endive, Escarole)

15% Orange-fleshed Squash (Acorn, Butternut, Kaboucha, Pumpkin, Spaghetti)

15% Other Vegetables (Parsnips, Snow Peas, Snap Peas, Green Beans, Carrot Tops)

10% Flowers and Fruits (Hibiscus, Rose, Dandelion, Fig, Papaya, Mango)

Avoid feeding these toxic items to your iguana:

- Seeds from Apples, Apricots, Cherries, Nectarines, Peaches, or Pears
- Avocado, Eggplant, Rhubarb, Rosemary, or Sage
- Azalea, Buttercup, Daffodil, Lilly of the Valley, Marijuana, or Tulip

Avoid the following toxic plants found in Florida:

Bird of Paradise, Bottlebrush, Boxwood, Caladium, Chalice (Trumpet Vine), China Berry Tree, Christmas Cactus, Crocus, Croton, Delphinium, Holly, Hyacinth, Ivy, Jasmine, Milkweed, Mistletoe, Morning Glory, Oleander, Periwinkle, Philodendron, Poinsettia, Rhododendron, Spanish Bayonet, Taro (Elephant Ear), Tomato Plant (Foliage and Vines), Wild Parsnip, and Wisteria.

roses, carnations, geraniums, and dandelions. Strongly recommended fruits include figs, mango, papaya, kiwi, melons, and any citrus fruits. Citrus fruits have been shown to help increase calcium absorption. Many people feed bananas; however, I discourage this because they have a poor calcium-to-phosphorus ratio.

Vegetables, including bok choy, broccoli, Brussels sprouts, cabbage, cauliflower, kale, radish, rutabaga, sprouts, and turnips, may cause iodine binding, which can lead to a thyroid deficiency. Hypothyroidism will decrease an iguana's metabolism, resulting in lethargy, muscle pain, and/or joint pain. An iguana may gain weight as a consequence of decreased metabolism, but overall growth will be slowed considerably. Other vegetables, like beets, celery stalk, chard, rhubarb, and spinach, contain oxalic acid, which binds to calcium and prevents its proper uptake. When fed in excessive amounts, this can lead to metabolic bone disease. Food items, including all lettuce products, carrots, bananas, and grapes, contain a high level of tannins. Tannins can affect protein metabolism and alter growth and development patterns.

Avoid freezing or microwaving the food. Although thawed frozen vegetables are easy to use, they have been shown to contain thiaminase, an enzyme that destroys thiamin. Thiamin is important for the nervous system of reptiles and also works with other B vitamins to improve the animal's overall quality of life. An absence of thiamin in an iguana's diet can lead to tremors or partial paralysis. If you must feed frozen vegetables, add a small amount of brewer's yeast to assure an adequate supply of thiamin. I recommend the use of vegetables within two weeks of freezing to ensure proper thiamin levels.

A good variety is important for an iguana's diet. However, toxic food items must be avoided. Most fruits are safe, but seeds from apples, apricots, cherries, nectarines, peaches, or pears are potentially dangerous. In the vegetable family, avocado, eggplant, rhubarb, rosemary, and sage are all toxic to an iguana. Toxic flowers include azalea, buttercup, daffodil, Lilly of the valley, marijuana, and tulip.

An iguana's digestive and renal systems are poorly suited for handling animal protein. Diets

high in these items have been connected to several health problems. If you must feed animal protein, it should not exceed 3–5% of the total diet for juveniles and breeding females. Adult males and non-breeding females should only be allowed 1–2% animal protein, if any. The most commonly fed items are monkey biscuits and dog food. These must be soaked in warm water and cut into small pieces before feeding. Although juvenile iguanas may grow rapidly when fed high levels of animal protein, eventually they will succumb to renal disease. Some of the early literature on the nutritional needs of iguanas was acquired from countries where iguanas were raised for human consumption. Because of this, the reptiles were never alive long enough for the effects of animal protein on the renal system to be noted. Almost all of the new literature on iguana nutrition clearly states the danger of excessive animal protein consumption.

Commercial diets are currently flooding the market. Unfortunately, little is known about their effects after long term use. Several independent reptile breeders have used commercial diets with some success. One problem with commercial diets is that they are unnatural to the animal. Most are dry pellets that do not provide any moisture. This can be adjusted by soaking the food in warm water before feeding. Canned varieties have higher levels of moisture than dry products. Dr. Frye has performed long-term testing on some of the commercial diets. Early findings were published in Volume 7, Number 2 of *Vivarium* magazine. His studies utilized only four different diets. Unfortunately, one of the diets resulted in very poor growth and decreased health. Until long-term studies can be performed on commercial diets, I advise my clients to use them only as a supplement to a natural, healthy iguana diet.

Multivitamin and calcium supplementation is essential for proper growth and development of any iguana. Oversupplementation, however, can lead to several health problems. Weekly use of a multivitamin supplement is recommended for juveniles, but adult iguanas need it only every 10–14 days. I recommend daily, or at least every other day, sprinkling of a calcium supplement, without phosphorus, for any juvenile or breeding female iguana. For adult iguanas, I decrease the frequency to twice a week. All supplements should be thoroughly mixed with the food to insure proper uptake.

An easily avoided problem is overfeeding. This occurs when an iguana is offered more food than it could possibly eat. Overfeeding allows the iguana to pick out its favorite items and avoid others. Selective feeding can lead to nutritional deficiencies even though a completely balanced diet is being offered. To help avoid this problem, thoroughly mix the daily items before feeding, and offer an amount you know the iguana will consume in one feeding.

Iguanas should be fed in the mid- to late-morning hours. They feed more readily after warming up, and subsequent basking promotes effective digestion. The bacteria and protozoa responsible for an iguana's digestion become more active at temperatures over 90° F. To assure efficient digestion, proper daytime temperatures for an iguana should be around 95°, with a basking site closer to 100°. A cool area around 85° should also be provided to prevent heat stress. When housed under optimum conditions, iguanas should engage in a daily pattern of warming, then feeding, and then basking.



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One of a small number of brilliantly-colored Fiji Banded Iguanas, *Brachylophus fasciatus*, part of a special breeding program at the San Diego Zoo. Photograph: John Kinkaid